Developing an ICF code set for health care practitioners to identify fall risk factors in older adults

by

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The author declares that she observed the ethical standards required in terms of the University of Pretoria's Code of Ethics for Researchers and the Policy Guidelines for Responsible Research.

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Abstract

Falls in adults older than 65 years of age constitute a global health concern and are the main cause of injury-related mortality in older adults. The falls death rate increased by 30% from 2009 to 2018, mainly due to the age of older adults increasing. Globally, it is estimated that as many as a third of community-dwelling older adults may experience a fall accident every year, of whom 35.5% may experience recurrent falls. This results in escalating health care cost due to falls in older adults. However, evidence shows that falls can be reduced and even prevented by early identification of fall risk factors and providing early intervention for those individuals who are at increased risk of future falls. If preventive health care services (which would include the identification of fall risk factors and screening for falls) are more readily available to older adults, the rising cost of health care could be offset and the health-related quality of life of these older adults could be enhanced. One way of identifying fall risk factors in older adults is by using the World Health Organization's International Classification of Functioning, Disability and Health (ICF). However, this framework contains more than 1400 codes, which impedes its clinical usability.

The main aim of this study was to develop an ICF code set for fall risk factors in older adults so as to guide health care practitioners in the identification of fall risk factors as the first step in assessing and managing fall risk in a multidisciplinary health context. Information about the numerous multidisciplinary factors that influence fall risk was obtained and integrated from different data sources. The universal fall risk code set that was subsequently created for this population contains the minimum amount of information needed to meet the three objectives of an ICF code set, namely to guide health care practitioners in

(i) identifying fall risk factors in older adults;

(ii) determining which fall risk factors would justify further diagnostic assessment or intervention; and

(iii) determining areas in which further functional assessment and/or intervention might be warranted which falls outside of the health care practitioner's scope of practice, thereby necessitating further referral.

This study followed a three-phase exploratory, sequential, mixed method research design. It also incorporated the suggested principles outlined by the ICF Research Branch for developing an ICF core set. Phase 1 focused on the qualitative data obtained from a systematic review and three different focus groups of older adults, as well two focus groups of diverse health care practitioners. The main aim of Phase 1 was to develop a list of relevant fall risk factors in older adults (65 years old and older). Phase 2 used a modified Delphi process to distil the list of relevant factors to those critical to fall risk in older adults. First, experts in the ICF were consulted to review the code set factors to be used in Round 1 of the Delphi process. Thereafter, based on their recommended changes, a three-round Delphi process commenced with experts in fall risk assessment, so as to determine the codes most critical to the identification of fall risk factors in older adults. Round 1 started with 87 codes, which were eventually reduced to 53 codes after Round 3. In Phase 3, the developed ICF code set was administered to audiologists, a group of health care practitioners who are routinely involved in screening for fall risk in this population. The aim of this phase of the study was to determine the clinical utility of the code set in terms of its appropriateness, accessibility, practicability, acceptability and professional utility.

The findings from this research study not only indicated that the ICF code set for fall risk factors in older adults has high clinical utility with regard to its acceptability, appropriateness and the professional utility, but also revealed that it could potentially be used by health care practitioners from different disciplinary backgrounds. The findings further provided recommendations on how future studies could expand on this research and add to the existing body of knowledge on fall risk factors and preventive health care in older adults by emphasising health-related quality of life in this population. These recommendations included the need for situational awareness and appropriate referral strategies by health care practitioners; providing health care practitioners with a measure to document fall risk factors in line with the domains of the ICF; guiding health care practitioners to determine areas in need of assessment and intervention; and determining the training needs of audiologists as well as their lack of initiative in expanding their own skills and knowledge.

Keywords: code set, falls; fall risk; health care practitioners, health-related quality of life (HRQoL), International Classification of Functioning, Disability and Health (ICF), older adults, preventive health care

CHAPTER 1: ORIENTATION, PROBLEM STATEMENT AND CHAPTER OUTLINE

This chapter provides an orientation to the background and problem statement addressed in the thesis. It then highlights the contribution of the study and unpacks the definitions of the most prominent terms used in the context of this study. Next follows an explanation of the terms and abbreviations used, before an outline is provided of the six chapters of the thesis.

1.1 Problem Statement

A fall can have severe and far-reaching consequences for any person, but especially for older adults, as they are more likely to break bones and have complications after sedation, surgery or trauma (Dionyssiotis, 2012). Falls are the second leading cause of deaths related to accidental injury worldwide, regardless of age group (World Health Organization, 2018). Internationally, it is estimated that a third of community-dwelling older people may experience fall accidents every year and among these fallers may experience recurrent falls (Hung et al., 2017). A recent review of falls in older adults in the United States of America (USA) indicated that deaths from falls increased from 8600 deaths in 2000 to more than 25000 deaths in 2016 (Hartholt, 2019). The World Health Organization (WHO) warns that the number of injuries in older adults caused by falls could double by the year 2030 unless fall prevention programmes that have a positive short-term effect on fall risk are employed (Park, 2017). The exact reasons for the potential increase in injuries and fatal falls are complex as the population of older adults is now increasingly subdivided into different categories with increments of 10 years (i.e., younger-old, middle-old and older-old) based on their specific age (Wiktorsson et al., 2016). As such, the reasons for an increase in falls could be different for the different age groups. In the younger-old group (65 to 75 years old), which is the focus of this research study, the majority of falls are the result of a significant external event or condition. This group is the most active group among older adults, thereby increasing their risk for a fall (Dionyssiotis, 2012). In contrast, reasons for falls in the older-old group (85 years and older) could be that this population have more age-related chronic conditions and cardiovascular diseases, which necessitate taking more brain-altering medications (Burns & Kakara, 2018). Polypharmacy, poor balance and age are also reason why falls frequently occur in this age group

(Hartholt, 2019). In all age groups, osteoporosis is one of the major causes of falls in older adults (Hashmi et al., 2013).

As populations all over the world are ageing, it is imperative that health care systems adapt to reduce the incidence and severity of preventable conditions such as falling. Regardless of the age sub-classification system used, preventive health care for falls in older adults (all adults 65 years and older) is contingent on accurately identifying risk factors that could cause a fall in this population before a fall occurs, thereby reducing the negative and potential debilitating effects of falls (Patterson & Honaker, 2014). Identifying risk as early as possible – preferably in the 65 to 75-year-old group – is an area warranting more research, as an early fall risk management perspective has the potential to yield a noticeable benefit to and positive impact on this population. In addition, if risks are identified, appropriate environmental and preventive strategies such as lifestyle modifications could be employed, thereby reducing the older adult's risks and the potential harmful consequences of falls (Hashmi et al., 2013). This perspective is in stark contrast to simply waiting for the fall risk to escalate and ultimately result in a fall, hence creating the inevitable need to engage the health care system (Hill, 2009).

Health care practitioners (HCPs) have an important role to fulfil in the reduction and possible prevention of falls in older adults. This could be achieved by the early identification of fall risk factors in this population (Liddle et al., 2018). The purpose of identifying fall risk factors, however, is not merely to predict an older adult's fall risk status, but rather to identify the presence of any factors that could contribute to or increase and older adult's risk of falling, which forms the basis of multifactorial fall risk assessments, intervention and management processes (Hill, 2009). According to Dykes (2018), fall risk factor identification has five specific features, namely

(i) identifying older adults at risk of falling;
(ii) providing a baseline measure of individualised areas of fall risk;
(iii) aiding in clinical decision making;
(iv) informing further personalised preventive measures, care plans, and communication strategies; and
(v) linking strategies to counteract identified risk factors.

Identification of fall risk factors is the first step in assessing older adults who are at risk of falling. Without using specific fall risk screening or assessment tools, the best approach is to introduce multifactorial interventions and actions to older adults universally by identifying all the fall risk factors that could potentially increase their fall risk (Hill, 2009). Early fall risk factor identification is thus the first and foremost step in preventive health care to diminish fall risk in older adults (Dykes, 2018; Hill, 2009).

Fall risk factors in older adults are most commonly classified as being either intrinsic (i.e. biological) or extrinsic (i.e. behavioural, social and/or environmental) (Kwan et al., 2016). Intrinsic fall risk factors therefore include factors such as health status, race, sex, cognitive deficits, gait, strength or balance deficits, chronic conditions, acute illnesses causing hospitalisation, and prior fall history (Ambrose et al., 2013; Fisher et al., 2005; Gale et al., 2016; Kenny et al., 2016; Ma et al., 2014; Nicklett & Taylor, 2014; Phelan et al., 2015; Van Doorn et al., 2003; Yonge et al., 2016). Extrinsic fall risk factors, on the other hand, are environmental and domestic hazards. Examples are medication, alcohol or drug intake, footwear, home features and environmental circumstances such as poor lighting, slippery floors and cluttered pathways (Fisher et al., 2005; Kelsey et al., 2010; LeCuyer et al., 2016; Phelan et al., 2015). Identifying both the intrinsic and extrinsic fall risk factors can be regarded as an effective starting point in identifying and describing factors that could increase older adults' risk of falling.

Another way of identifying and describing fall risk factors in older adults is to consider the fall risk factors – both intrinsic and extrinsic – in a multidimensional, holistic way. Thus, the factors related to the older adults themselves, as well as those related to the individual's specific environment should be considered. Identifying the factors that are relevant to – and subsequently, those that are critical for – older adults (aged 65 to 75 years old) is important when considering a preventive perspective on fall risk factor identification. A prevention agenda would best be served by focusing on the younger-old group, as they are likely the most active group of older adults who have an increased opportunity to fall while engaging in several activities (e.g., sports and leisure activities). Early intervention strategies can thus be expected to have the biggest impact in preventing future falls in this age group. Early identification of fall risk factors, preferably before the first fall, followed by timely intervention and management strategies could reduce these older adults' fall risk and keep them active for as long as possible, thereby improving their health-related quality of life (HRQoL). Furthermore, using a universal language to ensure that the person's functioning can be documented by HCPs from different health care disciplines and in different countries, will allow holistic assessment and intervention. One framework for achieving this, is the WHO's International Classification of Functioning, Disability and Health (ICF) (World Health Organization, 2001). Built on a multidimensional view, the ICF is especially suitable to obtain health information because it assists HCPs to recognise the individual (i.e., a body participating in specific activities) as being influenced by different contextual factors. The ICF acknowledges that intrinsic factors such as body functions and structures, as well as extrinsic factors such as persons or objects in the environment, can influence the individual by either facilitating or hindering participation in daily activities. Both intrinsic and extrinsic factors are therefore recognised as important and highly influential features for functioning, disability and health (Granberg, 2015; Granberg et al., 2014), and both have an influence on the older adult's risk of falling.

The ICF framework provides a holistic view of functioning and allows for a detailed description of each of the components related to the functioning of a person with a specific condition within a specific population (Pettit, 2014). Its comprehensive nature obviously requires the ICF classification to have a large number of codes – 1424 codes in all. Extensive experience of and familiarity with its classification system and codes are needed before the ICF can be used effectively in clinical practice (Granberg et al., 2014). However, certain codes can be grouped together to form an ICF code set. For instance, a list of ICF codes can be taken from the entire overwhelming classification system to describe the functioning applicable only to the individuals with a specific health status, such as fall risk in older adults (Aiachini et al., 2010). An ICF code set that contains only the factors critical to the identification of fall risk in older adults could thus assist HCPs in overcoming some of the challenges in the clinical application of the ICF. It could also guide the preventive and intervention strategies of HCPs from different disciplines for managing fall risk in older adults.

The aim of the research in hand was to develop an ICF code set that contains the critical codes to be considered when identifying fall risk factors in community-dwelling older adults, so as to guide HCPs' preventive and intervention strategies.

1.2 Contribution of the Study to Scholarly Knowledge

This research study contributed not only to theoretical knowledge in the field of fall risk, but also to the methodological process and clinical practice related to the application of the ICF. The study focused on developing an ICF code set sourced from multiple perspectives to be used by HCPs from different disciplines. For older adults, the potential life-altering consequences of a fall necessitate early identification of fall risk factors in this population. A fall not only has far-reaching medical, health, emotional and financial implications for the person who falls, but also affects their immediate and extended family, their support system and the health care system. Using an ICF code set – with its universal language that spans across different disciplines – to identify fall risk factors in older adults, could be one step closer to reducing potential falls in this population.

Data from current fall risk assessment tools (FRATs), obtained by means of a systematic review, allowed the current study to summarise published factors that could influence older adults' fall risk. Furthermore, by investigating the perspectives of the older adults themselves (both those who had and those who had not fallen) as well as of HCPs who consult with them, this study ensures a rich, qualitative basis for the research. The detailed and expansive process of sourcing fall risk factors resulted in the identification of additional relevant fall risk factors that had not been mentioned in the published FRATs or included in the systematic review, thereby enhancing existing knowledge of relevant fall risk factors for older adults.

The study contributed to the methodological process in that it not only compiled a list of fall risk factors (similar to other studies) but proceeded to include a Delphi expert panel to distil the list of relevant fall risk factors. The clinical utility of the developed ICF code set was subsequently determined by expanding its definition (Smart, 2006) and including a new construct, professional utility (Lesko et al., 2010). The additional process steps enhanced the social validity of the study. This was achieved by administering the ICF code set to a specific group of HCPs, namely audiologists.

Furthermore, the study contributed to the clinical practice by presenting and refining the developed ICF code set as a clinically useful and practical tool to guide HCPs' preventive and intervention strategies and to assist in bridging the gap between theoretical research and practical clinical application.

1.3 Definition of Terms

The following frequently used terms are listed in alphabetical order and defined within the context of this study:

1.3.1 Clinical utility

Utility in itself refers to usefulness and is typically associated (in lay terms) with achieving the greatest good for the greatest number of people (Smart, 2006). Clinical utility is an increasingly used concept in health care but lacks an agreed-upon formal definition or conceptualisation. In its broadest and most comprehensive sense, clinical utility relates to the usefulness of an intervention method or technique in clinical practice. It comprises four dimensions (aka domains) that relate to the level of appropriateness, accessibility, practicality and acceptability of the method or technique (Faure et al., 2019; Smart, 2006). For the purpose of the current study, clinical utility was expanded to also include professional utility. This construct was conceptualised from the notion of personal utility, which refers to the value that the presented information (e.g. the test results) has for the person undergoing the assessment or intervention. The presented information could be used for further effective treatment or intervention strategies, which would also personally benefit the person undergoing the treatment (Lesko et al., 2010). Unlike personal utility, professional utility does not investigate the viewpoint of the patient per se, but rather that of the HCP. For the purposes of the current study, the definition of personal utility was expanded to include professional utility. The perceived benefits for the HCPs of using this ICF code set, as well as the HCPs' perceived benefits for their patients of using the code set, were evaluated. The decision to expand the definition was made to deal with certain constraints brought on by the global COVID-19 pandemic, which resulted in restricted access to patients. Hence, the researcher employed a case study design with the HCPs, rather than to undertake patient evaluations.

1.3.2 Community-dwelling older adults

Community-dwelling older adults are defined not only by their age (65 years and older), but primarily by the fact that they live independently in the community (Steultjens et al., 2004). This study specifically focused on community-dwelling older adults as they are more likely to still be active and to participate in various activities (domestic, sport and leisure). As such, they have a higher risk of falling while engaging in these activities. Furthermore, older adults would have an increased environmental risk of falling when they own small pets or live with family members who have small children. Those who live alone, on the other hand, would not have anyone to assist them when they fall. Most community-dwelling older adults are not restricted in their movements or in the types of activity they choose to engage in, and they have little or no supervision during to their daily routine and movements. Therefore, compared to older adults who live in frail-care institutions or in assisted living facilities, those who live alone may need more focused intervention strategies to reduce their fall risk.

1.3.3 Fall

Although there is not a universally accepted definition of what a fall is, the WHO definition is used for the purposes of this thesis: a fall is an event that results in a person coming to rest inadvertently on the ground or floor or other lower level (World Health Organization, 2018).

1.3.4 Fall risk

A person presents with a fall risk when at least one of the identified fall risk factors is present. This includes age (over 65 years) or the presence of most chronic conditions as a primary diagnosis (Brand & Sundararajan, 2010).

1.3.5 Fall risk factors

Several intrinsic and extrinsic factors, which can cause a fall and increase a person's risk of falling, are referred to as fall risk factors. The more risk factors an older adult has, the more likely the person is to fall (Ambrose et al., 2013). Identifying fall risk factors could assist in the further assessment, management and introduction of intervention strategies for an older adult with a risk of falling (Calhoun et al., 2011). This would increase the personal benefit to these older adults and have a positive impact on their health-related quality of life.

1.3.6 Health-related quality of life (HRQoL)

HRQoL encompasses not only a person's physical health status, but all aspects of overall quality of life that can affect health, whether physically or mentally (National Center for Chronic Disease Prevention and Health Promotion, 2019). A person's HRQoL includes their physical and mental perceptions (e.g. energy level, mood), as well as their health risks and conditions, functional status, social support and socioeconomic status. In the framework of this study, HRQoL refers to all aspects that affect the quality of life of an older adult with a fall risk, such as their ability to participate in activities, their physical and mental health status, as well as their socioeconomic ability to manage the negative consequences of a fall, such as hospitalisation, rehabilitation, moving into a frail care centre or entering an assisted living facility.

1.3.7 Health care practitioners

In the framework of this study, HCPs specifically refer to practitioners who are trained to meet the scope of practice in those health care disciplines that are most likely to be involved in the screening of fall risk in community-dwelling older adults. These disciplines include (but are not limited to) occupational therapy, physiotherapy, audiology, medicine (including general practitioners and ear, nose and throat specialists), podiatry and nursing.

1.3.8 ICF code set

An ICF code set is a compilation of specifically selected ICF items considered to be most relevant to describe the functioning of the person with a specific health condition in one or more specific health care settings (Pan et al., 2015). A code set therefore focuses on functioning and consists of the critical factors that should be considered for specific purposes – such as identification of fall risk factors – rather than those factors critical for particular diseases or disorders (Simeonsson, 2009; Yoon, 2013). For the purpose of this thesis, an ICF code set was deemed appropriate due to the impact falls could have on older adults' participation in their activities of daily living and the range of consequences a fall could have on their social, medical and financial well-being.

1.3.9 ICF core set

Similar to ICF code sets, ICF core sets also contain a list of ICF items, albeit with a very different focus. In core sets, the focus is on specific symptoms or diseases (e.g., stroke [Geyh et al., 2004], including particular chronic health conditions) that are usually compiled for specific conditions diagnosed and classified in the International Statistical Classification of Diseases and Related Health Problems (ICD). Using an ICF core set was not deemed appropriate to address the research question stated in this thesis, as the specific condition discussed (fall risk) in the specific population (older adults) is a health condition that does not stem from a single diagnosis, as one would typically find in the ICD.

1.3.10 Identification

Identification of fall risk factors refers to the first step in the fall risk factors assessment process, where HCPs evaluate a person's present physical condition to form a prognosis based on the information gathered from the person's history and physical and/or laboratory examinations (Haynes et al., 2018). Identification has the main aim of gathering data on the relevant aspects that should be considered in further management and intervention strategies (Dovjak & Kukec, 2019).

1.3.11 Older adults

According to the WHO (2018), there is no agreement on the exact age when a person becomes "old". However, older adults are generally described according to their chronological age and changes in their social roles (e.g., retirement), as well as the possible reduction of their functional abilities (e.g., vision and hearing ability and mobility). The ICF is applicable across the entire life span and is suitable for all age groups (World Health Organization, 2002). It does not differentiate between different adult groups when it discusses "age" as a personal factor, therefore, older adults are defined as all individuals who are 65 years and older. Although the code set developed in this thesis includes "age" as one of the personal factors that HCPs would take into account when assessing an older adult, age is not a specific ICF item because personal factors are not coded in the classification system. Fall risk identification involves several factors and when the barriers to or facilitators of the different ICF items in the code set are identified, age is but one aspect of the complete process. Based on the sub-divisions of older adults in different groups – i.e., younger-old (65 to 75 years old), middle-old (75 to 84 years old) and older-old (85 years and older) – the risk factor related to age that was relevant for this study, is for older adults between 65 and 75 years old. This age group tends to be the more active group among older adults, and therefore they have a higher risk for a fall (Hashmi et al., 2013). They are also more likely to live independently in the community, which is the focus of this study (see also Section 1.3.2). Not only are older adults generally regarded as a vulnerable population (Son & You, 2015), but with the severe consequences falls could have for them, they are even more at risk of disabilities after falls with up to 80% of disability resulting from the unintentional injuries associated with falls (Stewart Williams et al., 2015). Older adults in low- and middle-income countries (LMICs) such as South Africa are even more at risk of disability after falls as there are many barriers to health care services, including cost, transportation, accessibility and resource constraints (Naidoo & van Wyk, 2019). Currently, South African primary health care services are not designed to adequately manage patients with multimorbidity, which is more prevalent in adults older than 65 years than in any other age group (Naidoo & van Wyk, 2019). The multifaceted consequences of falls are not necessarily addressed, even if an older adult actually accesses health care services after a fall. The result is that the complex health care needs of older adults are often not met, and hence they could still face several disabilities after intervention, including adverse health outcomes and reduced HRQoL.

1.3.12 Preventive health care

Preventive health care represents a shift from reactive to proactive health care, screening for and identifying health risks early and managing these risks as best as possible, preferably prior to the onset of severe negative consequences (Kim & Kawachi, 2018). By providing preventive health care, patients can determine their health status and proactively adjust to their momentary health conditions to reduce their health risks. In this study, preventive health care refers to the strategies that HCPs employ to identify fall risk factors in older adults as early as possible. Preventive health care also involves intervention strategies (including referrals to other HCPs) aimed at reducing and managing these risk factors.

1.4 List of Abbreviations and Acronyms

The following abbreviations, listed in alphabetical order, are used throughout the study.

AAA: American Academy of Audiology

CDCP: Centers for Disease Control and Prevention

COVID: Coronavirus Disease

CPD: Continuing Professional Development

DVA:	Dynamic Visual Acuity
ENT:	Ear, Nose and Throat specialist
FRAT:	Fall Risk Assessment Tool
GP:	General Practitioner
HCP:	Health Care Practitioner
HPCSA:	Health Professions Council of South Africa
HRQoL:	Health-related Quality of Life
ICD:	International Classification of Diseases and Related Health Problems
ICF:	International Classification of Functioning, Disability and Health
ICIDH:	International Classification of Impairments, Disabilities and Handicaps
LMIC:	Low- and Middle-Income Country
POPI:	Protection of Personal Information
SAAA:	South African Association of Audiologists
SANC:	South African Nursing Council
SPSS:	Statistical Package for the Social Sciences
USA:	United States of America
USPSTF:	United States of America Preventive Services Task Force
VOR:	Vestibulo-ocular Reflex
WHO:	World Health Organization

1.5 Chapter Layout

Chapter 1 explains the problem statement that initiated the study and highlights its potential contribution to the field. It also clarifies the terminology and abbreviations used and gives an outline of the six chapters that make up this thesis.

Chapter 2 focuses on the literature surrounding falls and fall risk in older adults in the light of the ICF framework, and it aims to provide insight into the problem statement and rationale of the study. The chapter presents the background to the study and offers a critical discussion of its main constructs. It discusses the importance of preventive health care, and highlights the influence of situation awareness in the implementation thereof. Thereafter, an HRQoL model is explained and the benefits of employing the ICF in clinical practice are discussed. The causes, pathophysiology and consequences of falls in older adults are detailed. The chapter concludes with a discussion of ICF code sets, followed by a brief summary of the chapter.

Chapter 3 describes the first phase of the three-phase exploratory, sequential, mixed method study. Phase 1 is the item compilation phase, which documents the qualitative process and includes the literature perspective obtained by means of a systematic review to determine the fall risk factors in published FRATs. Data is then linked to specific ICF codes using the ICF linking rules. Next, the perspectives of older adults themselves (as one stakeholder group) are obtained by means of focus groups before the data is again linked to ICF codes. The perspectives of another stakeholder group, the HCPs, are also obtained using the same methodology and linking the data to the relevant ICF codes. Lastly, the data obtained from all three perspectives is merged into a comprehensive list of ICF codes that are relevant to fall risk factor identification in older adults. The chapter concludes with a summary of the results that are presented as an initial code set and states the implications for Phase 2.

Chapter 4 presents the second phase of the research study. Phase 2 is quantitative in nature and aims to distil the initial code set compiled during Phase 1 though item evaluation and reduction. Phase 2 consists of a modified, three-round Delphi process with experts. This phase begins with a pilot study, followed by the main data collection. The results obtained by means of a series of questionnaires are provided to the expert panel who systematically reduces the number of codes critical for the identification of fall risk factors in older adults in the set three rounds. The results from each round are presented and discussed. Chapter 4 then concludes by suggesting a distilled ICF code set for fall risk factors in older adults, as well as recommendations and implications for Phase 3.

Chapter 5 presents the third and final phase of the research study, where the developed ICF code set is administered to one group of HCPs (audiologists) following a pre-post group design. The main aim of Phase 3 was to determine the clinical utility of the condensed ICF code set for audiologists and a pilot study was conducted before main collection of the data commenced. The results of the clinical utility process are discussed, and the chapter concludes with a summary of the main results and recommendations that emerged from Phase 3.

Chapter 6 comprises a summary of the results and discusses their implications. An in-depth critical evaluation of the research study is provided, highlighting its strengths as well as its limitations. The clinical implications follow and, finally, recommendations are provided for future research.

1.6 Conclusion

This introductory chapter provided the motivation for the current research by describing the background information that initiated the research and highlighting the relevance and contribution of the study. Definitions were given of each of the most important terms used in the thesis, followed by a list of terminology and abbreviations. The chapter concluded with an outline of the six chapters in this thesis.

CHAPTER 2: LITERATURE REVIEW

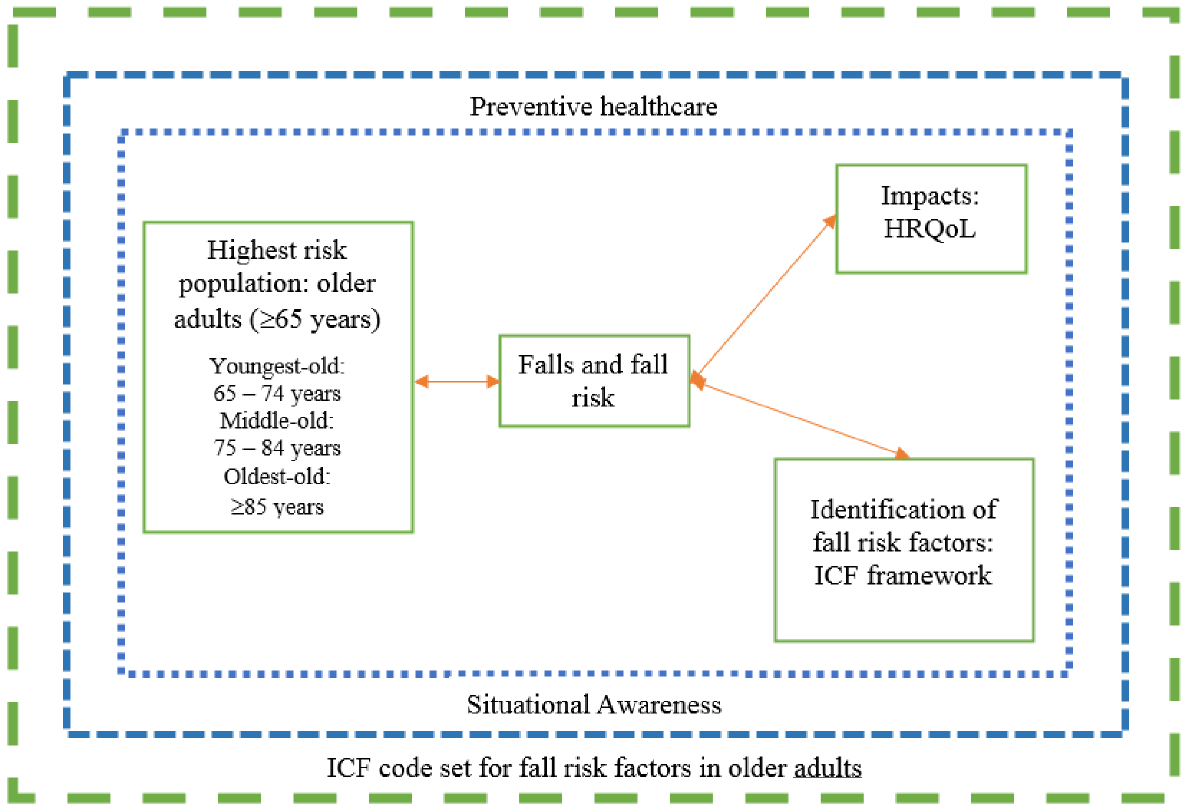
"It takes a child one year to acquire independent movement and ten years to acquire independent mobility. An old person can lose both in one day." (Isaacs, 1992)

Chapter 2 guides the reader through the relevant literature on falls and fall risk in older adults by using the ICF as a framework to provide insight into the problem statement and the rationale of the study. It provides the background to and a critical discussion of the main constructs used in the study. It starts with a conceptual framework and then discusses the importance of preventive health care and the influence of situation awareness in the implementation thereof. Thereafter, an HRQoL model is explained and the benefits of employing the ICF framework as an HRQoL model in clinical practice are discussed. The causes, pathophysiology and consequences of falls in older adults are detailed. The chapter concludes with a discussion of ICF code sets, followed by a brief summary of the chapter.

2.1 Conceptual Framework

Figure 2.1 illustrates the guiding conceptual framework and several key constructs that form the bedrock of this thesis. These constructs include falls and fall risk as the main focus of the study, with the highest population group at risk for falls being older adults (65 years and older). This population group's risk increases as their age increases, and the oldest-old group (85 years and older) has the highest fall risk. Falls and the associated risks of falling impact older adults' HRQoL and could have negative consequences that further decrease their HRQoL. These fall risk factors could be identified using the ICF framework as an HRQoL model to document functioning and guide preventive health care aimed at decreasing fall risk and increasing HRQoL. By being aware of the high incidence of falls in this population and recognising the relevant fall risk factors, HCPs with high situational awareness would be able to identify and manage these risk factors effectively and make appropriate referrals to other HCPs as needed. One strategy to achieve this, is the use of an ICF code set for fall risk factors in older adults.

Figure 2.1: Conceptual framework of the study



Each of these key concepts is discussed later in this chapter, starting with preventative health care and situational awareness in the fall risk management of older adults.

2.2 Preventive Health Care and Situational Awareness in Fall Risk Management

Falls in older adults pose a global health concern and are the main cause of injury-related mortality in older adults. The death rate involved increased by 30% from 2009 to 2018, mainly due to the age of older adults increasing, with the fastest increase seen in adults aged 85 years and older (National Center for Injury Prevention and Control, 2019). As alluded to in Chapter 1, there is no universal definition of a fall, but the WHO defines it as an event that results in a person coming to rest inadvertently on the ground or floor or other lower level (World Health Organization, 2018). One in three people over 65 years fall annually, and for those older than 80 years, the risk of falling increases to include every second person (Deems et al., 2019). Internationally, it is estimated that a third of community-dwelling older adults may experience fall accidents every year and among these fallers, 35.5% may experience recurrent falls (Hung et al., 2017). The WHO further warns that the number of injuries caused by falls – and the associated health care costs – could double by the year 2030 if fall preventive strategies are not employed (Park, 2017). Annually in the USA, more than 2.7 million people aged 65 years and older are injured from falls, and health care costs have escalated to over $19 billion[1] during 2000 (Homer et al., 2017; van der Merwe & Wilmarth, 2013). Although there are substantial information available on falls in older people in high-income countries, only scant knowledge exists on this subject in low- and middle-income countries (LMICs), including South Africa (Kalula et al., 2016). Although the frequency of falls for older adults in South Africa is unknown, it is estimated that around 25% of older adults fall annually (Kalula et al., 2016).

Evidence fortunately shows that falls can be reduced and even prevented by early screening for fall risk factors and by providing early intervention for those individuals who are at increased risk for future falls (Martins et al., 2018). It is therefore unsurprising that preventive health care has been widely adopted to decrease the burden of disease and associated risk factors emphasised in older adults due to the increase in chronic conditions associated with age (Park & Kyoung Kahng, 2021). Effective preventive health care for older adults can reduce not only health care costs, but also multimorbidity and mortality (Rivera-Hernández et al., 2019). In the USA, less than 30% of adults aged between 50 and 64 years old and less than 50% of adults aged 65 years and older are up to date with general, core preventive services related to older adults. In LMICs, including South Africa, one could expect this figure to be much lower, as there are many additional barriers that negatively impact access to health care for older adults living in these countries (Geldsetzer et al., 2020). Such barriers include access to healthcare, travel and financial restrictions as well as family dynamics. If preventive health care services are used more frequently by older adults, the rising cost of health care could be offset and HRQoL could be enhanced (Kim & Kawachi, 2018).

Fall risk screening and early intervention to reduce this risk in older adults is one of the preventive services HCPs could offer their patients[2]. In their latest report, the USA Preventive Services Task Force (USPSTF) found that identifying older adults with an increased fall risk is a

[1] Considering the current exchange rate of $1.00 equalling R13.80 in South African Rand, this would translate to over R262 billion.

[2] In this thesis, the use of the term 'patient' refers to all adults older than 65 years with whom HCPs consult in their clinical practice.

necessary step in providing preventive care to this population. To date, however, the USPSTF has not been able to identify an accurate and feasible instrument or measure for identifying older adults at increased risk for falls (Grossman et al., 2018). This task force argues that, should an accurate and feasible measure be available, HCPs who consult with older adults could reasonably and easily be trained to identify fall risk factors. They could then determine which older adults are at increased risk for falls (Grossman et al., 2018) and therefore in need of preventive, evaluative or referral strategies.

More than 90% of older adults see an HCP at least once a year. This not only creates an opportunity for HCPs to identify and address fall risk factors in older adults, but also makes preventive health care in this population feasible and practical (Dellinger, 2017). Considering that globally, between 28% and 35% of older adults (65 years and older) fall at least once a year (World Health Organization, 2007), HCPs have a clear role to play in the early identification of fall risk factors and the prompt provision of preventive health care to older adults. This is even more pertinent when taking into account the fact that falls steadily increase with an increase in age (S. B. Lee et al., 2018).

Despite the high rate of falls in older adults, less than half of those who fall will spontaneously discuss this with their HCP (Dellinger, 2017). The reasons for this are varied. Maybe older adults do not know that falls can be prevented, or they think that fall prevention is not relevant for them personally. They might also attribute the cause of the fall to a temporary condition (such as incidental low blood sugar levels), a lapse in attention or an environmental hazard (such as a low step or an object lying on the floor), without considering that it could be something that can and should be addressed or managed in the future (Dellinger, 2017). Older adults would probably be more inclined to participate in programmes that teach fall prevention strategies if these programmes are recommended by their HCPs (Bunn et al., 2014; Dellinger, 2017). Considering that falls often result from an interaction with the environment, HCPs should screen older adults for specific fall risk factors to identify at-risk individuals (Ganz & Latham, 2020). In addition, preventive health care should include education of older adults about the relevant fall risk factors, highlighting that falls are not an inevitable part of ageing and that the risk of falls can be markedly reduced if the identified fall risk factors are addressed through implementing prevention strategies as part of an effective early intervention programme (Ganz & Latham, 2020).

Effective implementation of preventive health care requires a multidisciplinary approach, with various HCPs sharing information and knowledge on the patient's current health condition as well as on the risk factors that indicate the need for intervention (Nemeth, 2008). HCPs need an awareness and understanding of not only the risk factors relevant to each patient (perception of the risk factors and comprehension of the patient's situation), but also of the different roles of the HCPs who could potentially be involved in the management of the patient's risk factors (projection of future status of the patient). This awareness – referred to as situational awareness – is a critical precursor to effective decision making and especially important in preventive health care. It requires HCPs to make decisions regarding the most likely outcome of their preventive efforts for each individual patient (Nemeth, 2008). HCPs' experience emerges from having situational awareness – a perception and understanding of the situation – as well as the ability to make decisions regarding the expected outcomes, based on the current risk factors (Riegel et al., 2017).

Situational awareness has a strong foothold and is well-understood in many organisations such as aviation, air traffic control, and nuclear power (Fore & Sculli, 2013; Green et al., 2017). It is however not as prevalent or well-understood in health care. The benefits of developing an operational definition of situational awareness to be used in health care are significant and have been defined as a three-step process by Fore and Sculli (2013):

(i) Collecting data about and from patients (e.g., biographic and clinical data, how patients perceive their own fall risk, how they already or potentially could manage these risks)

(ii) Synthesising and understanding the information gathered in (i) to establish a comprehensive account of the patient's health condition and current situation (creating a mutual understanding between the patient and the HCP; allowing the HCP to make a sound judgement and clinical decisions; including the patient's perspectives on their current health condition)

(iii) Projecting the most likely outcome of the suggested intervention and management strategies (including referrals to other HCPs).

Failures in perceiving, understanding and addressing a patient's health condition can impede patients' needs being addressed and met (Jørgensen et al., 2020) and could significantly reduce the accuracy and appropriateness of patient care decisions by the HCPs. As a precursor to decision making, poor or inadequate levels of situational awareness present serious threats to patient intervention and management strategies. A loss of situational awareness is the most frequent cause of errors in real-time tasks and has been linked to poor performance of HCPs (Fore & Sculli, 2013). Situational awareness can further be described as a person's ability to maintain an adequate internal representation of the status of the environment in complex and dynamic domains where conditions fluctuate (Green et al., 2017). This is incessantly the case in clinical practice, where HCPs consult with several patients on a daily basis, all with different needs and expectations. Situational awareness is essential for delivering sustainable best practice with improved clinical outcomes within the complex and changing clinical environment, where a loss of situational awareness could lead to adverse health outcomes for the patient (Green et al., 2017). One way of practically applying situational awareness in health care is for HCPs to use a predetermined list of risk factors when consulting with patients (Fore & Sculli, 2013; Green et al., 2017; Jørgensen et al., 2020). Using a code set for fall risk factors in older adults can help the HCP to gain a holistic picture of the patient's condition and perceptions regarding their own health status.

Situational awareness is also essential in the collaborative multidisciplinary management of patients, as clear communication between HCPs is a crucial component of the necessary preventive and referral measures to deliver quality health care to older adults with complex health conditions (Hartgerink et al., 2014). Older adults, especially those with health conditions that could lead to multidisciplinary interventions and reduced functioning – such as having a high fall risk – are more likely to need intensive intervention (Iliffe, 2016), which could in turn lead to higher health care costs.

To curb the escalating costs of health care in the ageing population, and to limit the burden on society and economic growth, HCPs are required to deliver preventive care in a more efficient manner, at the lowest possible cost and without sacrificing quality (Alhaider et al., 2020). Effective identification of at-risk individuals, as well as effective communication and referral between HCPs, requires HCPs to have a keen situational awareness (Alhaider et al., 2020). HCPs should be aware of and understand the risk factors that older adults face in terms of falling, the consequences of those risk factors on the HRQoL of these older adults, as well as the roles of other

HCPs in the intervention process. Such awareness, coupled with HCPs' ability to provide preventive care to this population to manage these risk factors, could potentially have a significant effect towards reducing falls in older adults and improving their HRQoL.

2.3 The International Classification of Functioning, Disability and Health (ICF)

In the previous section it was noted that situational awareness is a critical skill needed by individuals in high-reliability organisations such as health care. Hence, this skill was recently incorporated into the gold standard of training within the medical industry (Anbro et al., 2020). HCPs not only require situational awareness to improve their ability to provide preventive health care, but they must also employ these preventive health care practices in a way that would improve their patients' HRQoL.

A systematic review conducted by Bakas et al. (2012) identified the most frequently used HRQoL models and provided a critique on these models. They identified the Wilson and Cleary Model of HRQoL (Wilson & Cleary, 1995), the Revised Wilson and Cleary Model of HRQoL (Ferrans et al., 2005) and the WHO's ICF framework (World Health Organization, 2001), as the three most frequently used current models in health care. They concluded that researchers should preferably use one of these three HRQoL models, unless there are compelling and clearly delineated reasons for creating new models. Using a common HRQoL model will promote a coherent body of evidence that will more quickly advance the science in the area of HRQoL (Bakas et al., 2012). A systematic review by Ojelabi et al. (2017) indicated that although the Wilson and Cleary model (including its revised version) is widely used in health care for evaluating HRQoL in chronic health conditions, there is a need to further examine the relationships among constructs applicable to all health conditions – also the ageing functioning of individuals and its influence on families and the individual's community as a whole.

The ICF framework is the HRQoL model best suited to this study as it integrates and documents the health-related aspects of fall risk in older adults. This framework is preferred over the two Wilson and Cleary Models of HRQoL for several reasons, including the following:

- The ICF framework's complete overall conceptualisation of health from a biopsychosocial perspective
- Its well-defined concepts and guidelines on how to apply these concepts to a health condition
- Its strong development logic over time (starting from the WHO's International Classification of Impairments, Disabilities and Handicaps [ICIDH] model in 1980 to the ICF in 2001)
- Its solid systematic field trial basis, coupled with international experts and HCPs consultations
- Its focus on individuals with as well as without disability
- Its universal application and use by HCPs on all patients they consult with in their practice (guiding their intervention strategies and predictions of likely clinical outcomes and HRQoL outcomes)

The ICF (World Health Organization, 2001) is a biopsychosocial framework that provides an integration between the medical model and the frequently used social model. It adds elements that focus on the interaction between the individual with a specific health condition and the environment in which they find themselves (Mitra & Shakespeare, 2019). Although the ICF provides a conceptual model for understanding disability (which could be used in the development of clinically relevant tools and measures), it is also a classification of functioning and disability that aims to frame the collection of salient data on the lived experience of health conditions for research, policy development as well as clinical practice (Mitra & Shakespeare, 2019; World Health Organization, 2002). Therefore, in the current study, the ICF (World Health Organization, 2001) is applied as a framework to document factors related to falls and fall risk in older adults.

As a framework of health and health-related domains, the ICF furthermore acknowledges that the functioning (either positive or negative) of a person occurs in a specific context. It also includes a list of factors that influence functioning in relation to the body and the individual's participation in activities of daily life. The framework acknowledges the contextual factors (both environmental and personal) that influence functioning by acting either as a facilitator or a barrier (World Health Organization, 2002). During the 54th World Health Assembly on 22 May 2001, all 191 WHO member states endorsed the ICF as the international standard to describe and measure health and disability (World Health Organization, 2002). The framework is therefore used by the

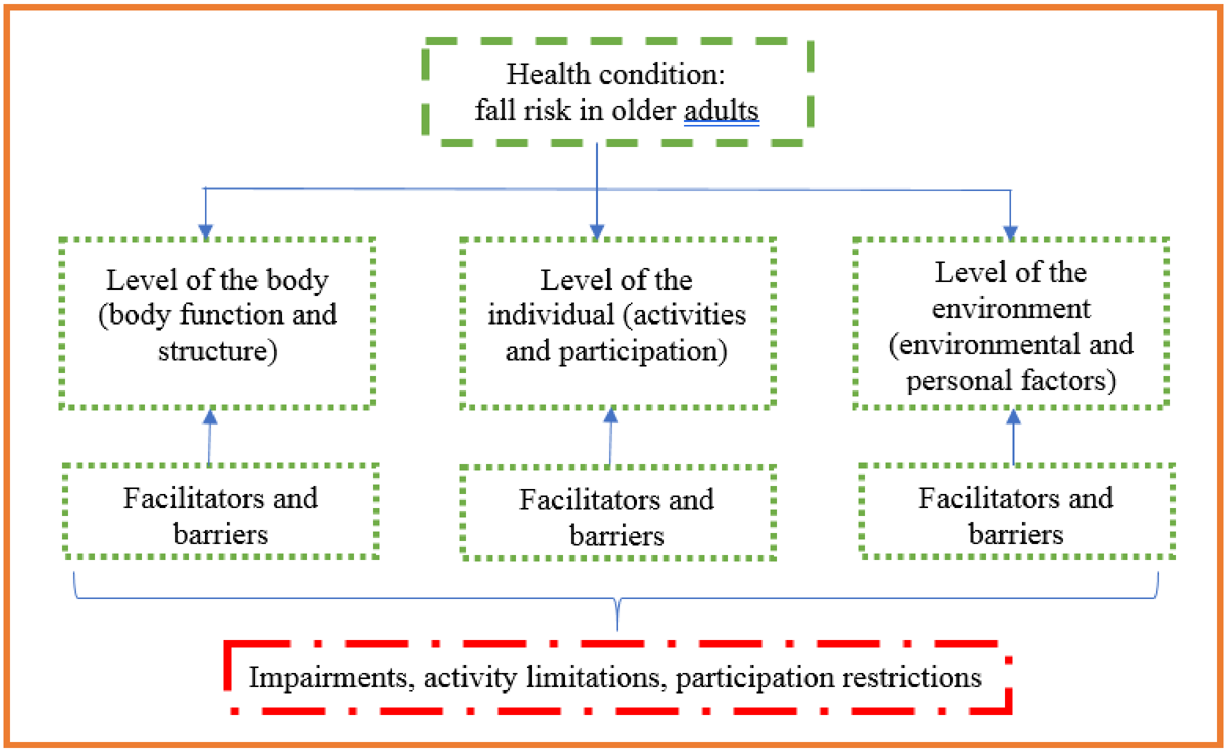
WHO to document global health and disability data at both individual and population levels. The ICF framework also serves several other purposes, such as the following:

- Organising and documenting information on functioning regarding a specific condition – such as fall risk in older adults
- Establishing functioning as a 'dynamic interaction between a person's health condition, environmental factors and personal factors' – such as the influence of the environment and personal factors on an older adults' fall risk
- Providing a common and standard language for measuring, defining and describing functioning by means of classification guidelines and codes
- Integrating and synthesising biopsychosocial factors
- Accounting for the effect of contextual factors on a person's functioning

The ICF framework depicts functioning and disability as umbrella terms, and as such provides neutral language for the description of both the positive aspects (i.e., facilitators) and negative aspects (i.e., barriers) of the health condition.

The ICF documents a person's health status at three levels: the body (body structures and functions) where the impairment is located; the individual (activities and participation), where the activity limitation and participation restrictions are noted; and the environment (environmental and personal factors). The impact of the various interacting contextual factors is taken into account, as illustrated in Figure 2.2.

Figure 2.2: Schematic representation of fall risk as a health condition depicted on the ICF framework



The ICF identifies a health condition (in this case, fall risk in older adults) that, within contextual factors, gives rise to impairments, activity limitations and participation restrictions (World Health Organization, 2002). The ICF defines an impairment as a problem in body function or in body structure as a significant deviation or loss. It defines an activity as the execution of a task or action by an individual, while participation is defined as an involvement in a life situation (World Health Organization, 2002). Functioning includes body functions and structures, as well as activities and participation, while disability includes all or any aspects of impairment, activity limitations and participation restrictions. Environmental factors refer to the entire background of an individual's life, including the physical, social and attitudinal environments in which humans live and conduct their lives. Environmental factors may be seen as either barriers or facilitators when it comes to the individual's functioning. Personal factors include a person's sex, age, coping styles, social background, education, employment and profession, as well as behavioural patterns (use of alcohol or drugs). To conclude, the ICF adopts a universal approach as it considers all individuals to be at risk of disability to a greater or lesser extent, hence disability is seen on a continuum of disablement (Mitra & Shakespeare, 2019; World Health Organization, 2001, 2002).

2.4 Unpacking the Pathophysiology of Falls within the ICF Framework

HCPs can use the ICF framework to document specific fall risk factors for each older adult they consult with in their clinical practice. By identifying the specific risk factors (i.e., potential barriers to functioning) and determining those that indicate the need for preventive strategies, HCPs could employ preventive measures to reduce fall risk and minimise the potential negative consequences of falls in their patients.

There are several causes of falls – various of these are the result of some interference with an older adult's normal gait. Normal gait requires effective coordination of the components essential for normal movement. These are the fine neural networks and brainstem responses to sensory stimuli, the musculoskeletal structures that appropriately regulate muscle tone, and the correct processing of sensory information (e.g., vision, hearing, touch, proprioception and cerebral cortex information) (Tareef, 2011). In addition, adequate cognition, concentration and an awareness of the environment are needed to maintain gait and prevent falls (Zhang et al., 2019). Where one or more of these factors are lacking, such as in the case of dementia, Parkinson's disease or Alzheimer's disease, falls increase in older adults with these medical conditions (Paul et al., 2014; Sheridan & Hausdorff, 2007). Understanding is needed of the different components that could cause falls in older adults – including factors inside and outside the body (i.e., activity and participation-related factors and contextual factors) – so as to develop the necessary assessment and intervention methods to reduce their fall risk and guide appropriate prevention strategies.

The causes of falls in older adults should be considered in a holistic manner. The ICF framework (World Health Organization, 2002) can be used to classify the risk factors that are relevant to older adults, as it adopts a holistic approach while considering the dynamic interaction between the intrinsic capacity of the individual (all their physical and mental attributes) and the influence of physical and social environments that enable or limit their ability to achieve the goals they value (Awuviry-Newton et al., 2020).

2.4.1 Causes of falls and associated fall risk factors

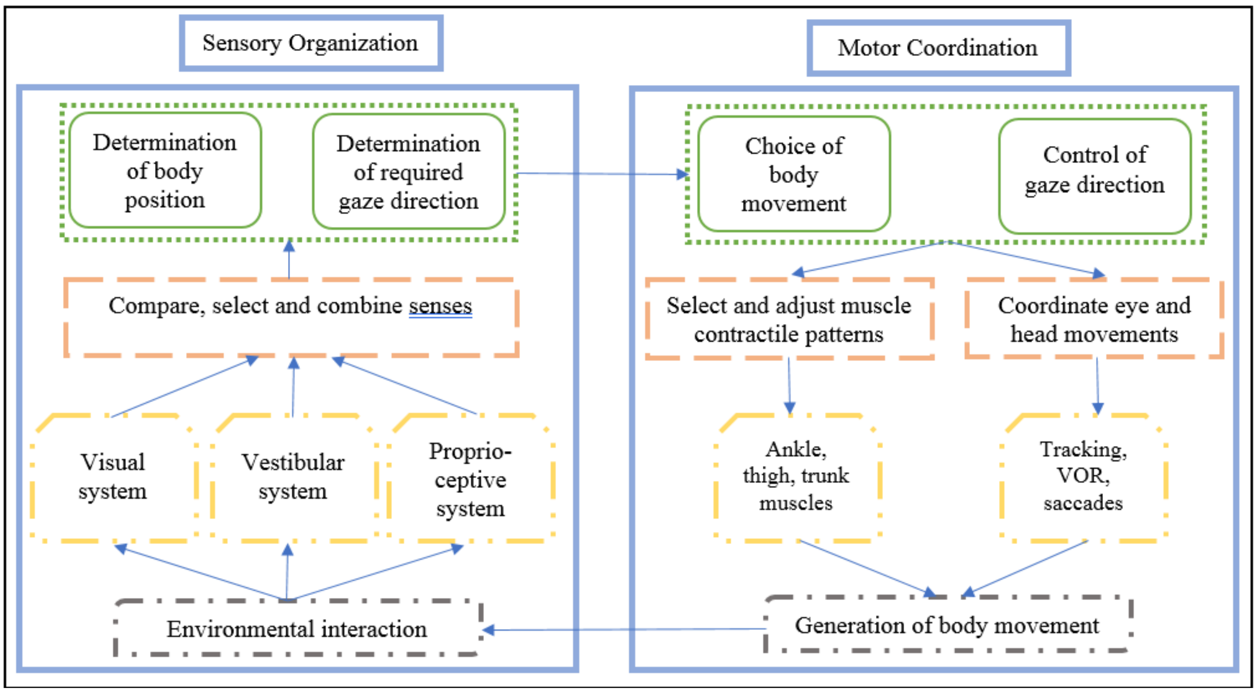
Traditionally, fall risk factors have been categorised in terms of intrinsic (body domain) and extrinsic factors (contextual factors domain). No real consideration was given for activity limitations and participation restrictions or for the deficits in these different domains that could cause falls. Recently, literature highlighted the importance of using the ICF to consider falls in different sub-groups of the population (e.g., community-dwelling older adults) and with different co-morbidities (e.g., hospitalised older adults, older adults with diabetes, stroke, osteoarthritis, etc.) (Mehraban et al., 2013; Park, 2017; Soh et al., 2020; Yen et al., 2014). Community-dwelling older adults are defined by their age (65 years or older) as well as by their ability to live independently (Steultjens et al., 2004). The greatest benefit of preventive health care could be observed in the early identification of risk factors in these community-dwelling older adults, prior to or as soon as they have had their first fall – regardless of the cause of the fall (Pillay et al., 2021).

Considering the causes of falls in community-dwelling older adults, without focusing on a specific co-morbidity or the risk factors related to the domains of the ICF (i.e., body functions and structures domain, activities and participation domain and contextual factors domain) would provide a comprehensive account of fall risk factors in this population. A recent study by Noohu et al. (2017) showed that the body function and structure, activity and environmental factors of ICF are associated with falls. Difficulties in both the activity and environmental domains are the strongest predictor of a single fall, while difficulties in the activity domain were the strongest predictor of multiple falls. Hence, the ICF can be utilised as a holistic framework to identify the various fall risk factors in community-dwelling older adults, and to document the risk factors associated with each ICF domain. The causes of falls and associated risk factors for each of these domains are discussed in more detail in the following sections.

2.4.1.1 Body functions and structures domain

One of the main physiological systems linked to falls and fall risk, is the human balance system (Hewston & Deshpande, 2016) (see the illustration in Figure 2.3). The degree of loss of balance and fall risk varies widely from person to person and typically emerges from a change in the vestibular system due to age (Ciorba et al., 2015). This is, however, only one of the aspects that influence an older adult's balance, as the human balance system is the result of the integration, organisation and coordination of several systems. These provide sensory input to the brain (sensory organisation) which in turn results in motor output (motor coordination). Balance is, generally speaking, a person's ability to control their own centre of gravity to maintain an upright position, making it an essential prerequisite for almost every activity of life, such as walking, sitting and standing (Fuchs, 2018). Presbystasis is the medical term for age-related balance problems.

Figure 2.3: Sensory organisation and motor coordination representation of the balance system



Balance is a combination of several systems to maintain a person's centre of gravity on the body's support base (Cote et al., 2005). Sensory organisation and motor coordination are in a constant feedback loop and should be in harmony for a person to maintain their balance (Zalewski, 2015). A malfunction in any of these systems can have severe consequences, such as a fall, disorientation, injury or even death. The three sensory organisation systems that are important for balance are the visual system, the vestibular system and the proprioceptive system.

For static balance, the sensory input from the visual system is important as one can visually monitor one's body and posture while standing or sitting, for example. The proprioceptive system is important as it involves the processing and integration of information at a central level and contributes to a stable, static, physical posture and sense of balance (Zisi et al., 2002). In dynamic situations and task conditions, one requires the use of feedback control where postural disturbances or maladjustments are predicted. Anticipatory postural adjustments are made, and motor control is needed to maintain stability. For dynamic balance, the feedback system is more reflexive, and the vestibular system plays a larger role in keeping balance. It rapidly transforms feedback cues into motor responses and enables adequate reaction times and appropriate motor output (Zisi et al., 2002). For both static and dynamic balance, cognitive organisation and integration of all three sensory organisation systems are needed.

Each of the three sensory organisation systems highlighted in Figure 2.3 is next described in more detail.

(i) The vestibular system

The purpose of the human vestibular system is to estimate body position and motion. It consists of peripheral and central components (Herdman & Clendaniel, 2014). The peripheral components include the three semi-circular canals, the otolith organs and the vestibular nerve fibres on each side.

The three semi-circular canals on each side of the head are orientated at right angles to each other and respond to angular motion (e.g., head rotation). They are paired to their counterpart on the contralateral side of the head in the same plane of motion and respond simultaneously and as a unit. There are three such pairs: the two pairs of horizontal canals (left and right), and the superior canal on each side working with the posterior canal on the other side (i.e., right posterior–left anterior ,and left posterior–right anterior). This ensures that head motion in any direction stimulates a response on both sides from the appropriate pair of semi-circular canals (Fuller et al., 2012).

Within the vestibular organ are two otolith organs, namely the utricle and the saccule. The otolith organs are primarily concerned with translational movements. These organs are also set at right angles to each other, and they respond to horizontal and vertical stimulation. Their main role is to keep a person upright with respect to gravity and to respond to linear acceleration (Fuller et al., 2012).

The afferent nerve fibres originate from vestibular ganglion neurons and transmit sensory information from the vestibular hair cells located in the two otolith organs and the three semi-circular canals (Khan & Chang, 2013). From here, the vestibular nerve travels to the vestibular nucleus.

The central vestibular component includes the vestibular nucleus, the vascular supply, the cerebellum and neural integrators. From the inner ear, stimulation travels along the vestibular nerve to the central vestibular nuclei of the cerebellum and forms second-order neuronal pathways that become, among others, the vestibulo-ocular reflex (VOR). This is one of the most important vestibular pathways as it is responsible for maintaining stable gaze during head movement. If the VOR fails, retinal slip could occur, causing blurry vision (oscillopsia) during head movement and having a significant effect on a person's balance (Rutka, 2004). In addition to the VOR, the vestibular system is responsible for tracking and saccadic eye movements as part of the motor coordination needed for optimal balance.

The vestibular system evidently plays a critical role in the coordination of effective postural and ocular motor reflexes, which are needed for static and dynamic equilibrium and for maintaining visual acuity during head movement (Zalewski, 2015). Deficits in the vestibular system are a common cause of dizziness and vertigo, which can lead to falls in older adults (Jahn, 2019).

(ii) The visual system

The purpose of the human visual system, which consists of three main parts – the eyes, the lateral geniculate nucleus and the visual cortex – is to maintain clear vision. The neural signals initially captured and processed by the eyes' retina travel via optic tracts to the lateral geniculate nucleus. From there, the signals continue to the visual cortex for further processing by the brain (Tamietto & Morrone, 2016).

Functionally, the visual system is responsible for object motion perception, object recognition, perception of self-motion, and postural control, and it acts as a feedback system for compensatory sway. Peripheral vision, rather than central vision, is deemed the critical factor in maintaining stable stance without sway, as sway could lead to imbalance and a subsequent fall (Gaerlan et al., 2012).

To determine the functioning of one's visual system, both static and dynamic visual acuity (DVA) need to be considered, where visual acuity is the ability of the eye to resolve the detail in an image and maintain focus during movement (Lewis et al., 2011). Static visual acuity declines when the object moves approximately 10° in either the nasal or temporal visual fields, and it decreases as the eccentricity increases. DVA not only decreases conversely to the increase in angular velocity of the stimulus, but is also dependent on other factors such as illumination, pupil diameter, contrast, sex, age, and substances such as alcohol and drugs (Lewis et al., 2011).

A person's visual acuity declines as age increases, resulting in a decrease in the ability to focus on objects in the environment during head movement. As such, the relationship between visual acuity and balance control is critical in maintaining controlled movements. Any deficit in the visual system can result in inappropriate motor output, leading to falls in older adults (Saftari & Kwon, 2018).

(iii) Proprioceptive system

In addition to the vestibular and visual systems, the proprioceptive system is needed to maintain normal stance and to effectively and safely engage in the majority of activities of daily living (Gaerlan et al., 2012). Proprioception can be defined as a person's ability to integrate the sensory signals from the body to determine the body's position and movements in the space around the person; thus it plays a crucial role in balance control (Han et al., 2015). Proprioception can also be seen as a continuous loop of feedback from the sensory receptors in the skin, muscles and joints to the nervous system and then back again. Such feedback enables the person to respond to the space around them and to have rapid voluntary or involuntary reactions to changing conditions (Proske & Gandevia, 2012). The proprioceptive system consists of several sensory receptors that all integrate and form general feedback to maintain one's balance.

In addition to the three sensory organisation systems, motor coordination is needed to maintain balance. Motor control includes the choice of body movement by using muscle contractile patterns that regulate the ankle, thigh and trunk muscles. Reduced muscle strength and joint proprioception lead to impaired balance in older adults (Messier et al., 2002), which is one of the reasons for increased fall risk. Presbystasis results in a decline in motor coordination and is associated with a decrease in the dynamic response of muscles. This causes defects in the processing and input of sensory information, which increases the likelihood of falls in older adults (Ferlinc et al., 2019).

The majority of the body's joints and muscles are needed to maintain functional, postural stability, and to give information to the proprioception system so as to reduce falls. Postural stability is important for movement control of everyday functional activity (such as walking and transferring body weight from one position to another) and is achieved by the successful organisation of sensory information and accurate motor coordination (Mesbah et al., 2017). Challenges in postural stability lead to an increase in fall risk, as postural control and stability are based on the ability to synchronise these systems in an ongoing cycle (Dunsky, 2019).

In addition, inter-joint coordination and the appropriate timing of muscle action during activities such as walking are also affected and, as such, reduce the ability of older adults to use the fall avoidance strategies practised by young people (Dunsky, 2019). The ageing of the systems involved in balance is one of the factors causing instability and declines in postural control and stability in older adults. It leads to a reduction in attention capacity and diminishes the ability to flexibly allocate resources between motor tasks (Richer et al., 2017). Older adults also need a greater proportion of attentional resources to ensure postural control and stability, and they would rather sacrifice cognitive performance in a dual-task situation (e.g., walking while talking), than risk losing stability (Richer et al., 2017).

Based on the causes of falls in the domain of the body, several fall risk factors (also referred to as intrinsic fall risk factors) have been identified that can affect older adults in this domain. These include, but are not limited to a person's age (with the associated presence of presbystasis); cognitive deficits or dementia (falls increase with impaired judgement, reduced gait, reduced visual-spatial perception, and the inability to recognise and avoid hazards); gait, strength or balance deficits (leading to impaired mobility and balance control); and sensory deficits (resulting in reduced visual acuity or altered depth perception) (Ambrose et al., 2013; Gale et al., 2016; Kenny et al., 2016; Ma et al., 2014; Nicklett & Taylor, 2014; Phelan et al., 2015; Van Doorn et al., 2003; Yonge et al., 2016). Although several risk factors can affect an older adult's body function and body structures, falls can also happen while older adults engage in activities of daily life or participate in life events.

2.4.1.2 Activities and participation domain

Although increased participation is an important part of independence in an older adult's life, it could potentially lead to more falls and injuries, resulting in reduced HRQoL (Haines et al., 2015). Participation has two dimensions, namely attending (i.e., being physically present) and involvement (i.e., the activities the older adult is participating in, while being physically present) (Adair et al., 2018; Imms et al., 2017). For example, older adults could attend a gathering where they simply sit on a chair and observe the proceedings without any physical involvement in the activities, thereby reducing their risk of falling by reducing their movements. Alternatively, they could be physically involved in the activities, such as moving chairs around or laying the tables for an event, which would increase the opportunity for them to fall as they move around and navigate potential environmental hazards (Adair et al., 2018; Imms et al., 2017).

There is no consensus in literature as to whether the association between physical activity (participation) and risk of falling is linear, as reviews about the relationship between physical activity and risk for falls are inconsistent and inconclusive. Some studies show that an increase in physical activities is associated with fewer falls or fewer recurrent falls, whereas other studies report that older persons with higher levels of activity have more falls (Klenk et al., 2015). In general, physical activity is positively associated with increased muscle strength, which could reduce falls; however, an increase in physical activities could also increase the exposure to situations that could potentially cause falls, thereby increasing the risk of falling.

Besides physical participation in activities, fear of falling is another factor that could inhibit an older adult to fully participate in life. Fear of falling could be defined as the lasting concern about potential falls, which could lead to the avoidance of certain activities (Deshpande et al., 2009). This is a serious and common problem among older adults and causes a cyclical risk relationship between actual falling and fear of falling, where a fall can cause a fear of falling, which in turn can lead to an increased risk and further falls (Greenberg et al., 2016). Even when a fall does not cause injury, it can trigger a loss of confidence, which in turn increases an older adult's fear of again falling in the future. Over time, this can lead to the person limiting their movements and reducing their activity, which simply increases fall risk as both muscle strength and confidence decrease. The presence of fear of falling reflects an older adult's self-perceived difficulties with balance or gait, and the resulting activity restriction is related to the avoidance of hazardous activities (Bruce et al., 2015). A three-year study by Trombetti et al. (2016) indicated that a decline in physical abilities, which could also lead to an increase in fall risk, increases a fear of falling and contributes to the deterioration of quality of life in older adults. Thus, as one's balance system deteriorates and causes a decrease in physical activity, one's fear of falling could increase, which could precipitate a downward spiral of adverse consequences leading to a reduced HRQoL (Scarlett et al., 2018; Trombetti et al., 2016).

Fear of falling is not the only challenge for older adults that affects their participation in activities. Sometimes, older adults have an inflated positive perception of their own state of health and quality of life, and an indifferent perception of their risk of fall in particular, which is not necessarily true (Hughes et al., 2008). Some older adults can easily and actively disassociate themselves from being "old" and thus deny such a stereotypical label for themself, regardless of their own fall history. Older adults, in general, consider falls to be an important yet preventable issue, and they may well offer other "old people" advice on falling and how to prevent it, without applying it to themselves (Eriksson et al., 2016; Hughes et al., 2008). Not all older adults necessarily think that they will end up as one of the statistics of people who fall (Gamage et al., 2018). An inflated positive perception could lead to older adults engaging or participating in risky activities or activities that are not age-appropriate, which could lead to an increased risk of falling. The risk of falls and fall injuries is constantly present in an older adult's life . Nonetheless, when questioned about falls in a recent in-depth interview study, most older adults preferred to rather talk about things that added true meaning to their life, such as their loved ones, people and activities that brought them joy, and events in the past that had been of significance to them (Gustavsson et al., 2018). This is important for HCPs to consider when they consult with their patients, as the people and activities older adults choose to engage with could give clues to the type of potential fall risks the older adults are exposed to.

2.4.1.3 Contextual factors domain (environmental and personal factors)

When discussing the causes of falls in relation to the contextual factors, one has to consider the behavioural, social and environmental factors that have an impact on older adults' fall risk (extrinsic fall risk factors), as well as the biological factors (intrinsic fall risk factors) that could influence their fall risk. Several studies have discussed the role environmental factors play in falls in older adults. For instance, Alshammari et al. (2018) report that carpets and rugs are an environmental hazard and that the majority of falls occur at home, with the most common location for fall injuries being in the bathroom. Other environmental hazards include stairs, steps, poor lighting, clutter, floor surfaces, loose carpets and slippery surfaces in the bathroom (Smith et al., 2017). Most environmental risk factors are modifiable and can be addressed in fall prevention programmes to assist older adults in managing their own fall risk (Bunn et al., 2014). Home modifications are a common compensatory strategy to reduce environmental barriers and they improve older adults' ability to safely navigate their home environment and improve functional outcomes (Stark et al., 2017). In addition to the home environment, older adults routinely find themselves in the built environment around them. Safe, walkable environments, with access to specific services needed by older adults (e.g., shopping centres, banks, health care services) are needed to increase older adults' ability to navigate their environments independently and minimise their fall risks (Barnett et al., 2017). Most environmental fall risk factors, and the associated higher fall risk for older adults when they interact with their environment, could be modified and minimised by introducing targeted fall prevention strategies (e.g., adequate lighting, smooth surfaces without small steps, quality floor surfaces that would prevent slipping and increase access to public places, transportation and recreational areas) (Smith et al., 2017).

In addition to the environmental factors, which are related to the physical environment, personal factors could also increase an older adult's risk of falling. These personal factors include human-made substances and materials that are used on a daily basis, such as psychoactive medication (e.g., sedatives, sleeping medication, central-acting antihistamines and psychotropic drugs) and alcohol or drug intake, all of which decrease one's balance coordination and depth perception (Laing et al., 2011; LeCuyer et al., 2016; Wildes et al., 2015). Another personal factor that could increase an older adult's fall risk is existing chronic medical conditions. A recent study by Paliwal et al. (2017) found that a history of stroke, arthritis, depression, chronic kidney condition and diabetes independently predicted the risk of both first-time falls and recurrent falls, but a history of heart attack, angina, asthma, and chronic obstructive pulmonary disorder only predicted the risk of recurrent falls. Regardless of the medical conditions, a history of falls also increases the chance of recurrent future falls (Hung et al., 2017). Personal factors (e.g., medication and alcohol use) could decrease sensory and/or motor functioning, which is necessary for postural control and, in association with the vestibular and proprioceptive systems, is needed for adequate gait and balance in older adults (Smith et al., 2017). By considering the impact of personal factors when discussing fall risk with older adults, HCPs could provide specific preventive measures for individual patients based on their unique risk profile, and create a customised prevention programme as needed (Jin, 2018).

2.4.2 Consequences and implications of falls in older adults

Although research continuously alerts older adults to the specific factors that increase their risk of falling (based on prevalence data concerning falls in older adults), both first-time falls and recurrent falls still occur regularly in older adults (Stewart Williams et al., 2015). Not only are the falls themselves a health hazard, but the consequences of these falls may result in a plethora of negative effects that reduce a person's HRQoL – including severe injury and even death. In fact, as mentioned earlier, injuries from falls are the fifth most common cause of death in acute care adult inpatient facilities (Callis, 2016). According to research findings by Flaherty and Josephson (2013) as well as Kalula et al. (2016), older adults experience more severe complications after falls with an increase in age, with the oldest-old adult group (85 years and older) experiencing the most severe consequences.

The consequences of falls in older adults related to the domain of the body include osteoporotic fractures, head injuries, impaired mobility, traumatic brain or head injury, increased risk of future falls, abrasions, lacerations and contusions and functional decline (Callisaya et al., 2016; Calys et al., 2013; Deschamps et al., 2016; Dueñas et al., 2016; Flarity et al., 2013; Gu & Dennis, 2016; Kenny et al., 2016; Romli et al., 2017; Wildes et al., 2015).

The consequences of falls related to the activities and participation domain not only affect the older adult who falls, but also their immediate family and/or caregivers. Some of these consequences include fear of falling again, depression, loss of independence, reduced quality of life and HRQoL, reduced participation in physical and social activities, immobility, difficulty with activities of daily living, dependency on others, social isolation, anxiety, loneliness, loss of confidence, loss of self-efficacy, and decreased self-esteem (Callisaya et al., 2016; da Costa et al., 2012; Deschamps et al., 2016; Gallagher et al., 2013; Greenberg et al., 2016; Kenny et al., 2016; Ma et al., 2014; Narayanan et al., 2016; Palumbo et al., 2016; Phelan et al., 2015; Romli et al., 2017).

Some environmental and personal consequences are also a result of falls in older adults. These include hospitalisation, early admission to nursing homes, adaptation of home environments, socioeconomic burdens on both the health care system and patients' relatives, and prolonged rehabilitation (Callisaya et al., 2016; da Costa et al., 2012; Dueñas et al., 2016; Vlaeyen et al., 2017).

One can clearly see the devastating impact of falls not only on the older adults' HRQoL, but also on the family members and the health care system. These consequences may be limited if falls in older adults can be reduced or even prevented. As such, early identification of fall risk factors in older adults is critical as the first step in the screening, assessment, intervention and management of falls in older adults. Some falls may possibly be avoided altogether if older adults at risk of falling are identified before their first fall. In fact, literature indicates that many falls could be prevented through appropriate early identification and intervention (Close & Lord, 2011). Early identification of fall risk factors in older adults could enable HCPs to provide timely assessment and intervention methods and make appropriate referrals to manage fall risk. This could potentially reduce future falls and limit the financial and medical consequences associated with falls in this population.

2.5 ICF Code Set for Fall Risk Factors in Older Adults

Early identification of fall risk factors in older adults could reduce the negative consequences of falls and so increase the older adult's HRQoL. One way of reducing these consequences is to provide HCPs with a method of identifying relevant fall risk factors, which could be achieved by an ICF code set for fall risk factors in older adults. Traditionally, fall risk screening measures can be divided into three categories, namely multifactorial measures; functional mobility measures; and environmental hazard measures (Scott et al., 2007). Multifactorial measures are typically recommended to identify fall risk factors in older adults (Martins et al., 2018).

A multitude of factors can influence an older adult's fall risk and their functioning with regard to several health conditions. It is therefore not surprising that the ICF contains more than 1400 codes, and this represents a challenge in using the ICF in clinical practice (Aiachini et al., 2010). Practical tools such as ICF core and code sets have been and are continuously being developed in an attempt to make the uptake of the ICF in clinical practice more feasible (Aiachini et al., 2010; Kus et al., 2012). Grouping together codes that are essential for a specific purpose is helpful, as these lists of codes could be used to measure health and health-related conditions (Simeonsson, 2009). Creating a list of relevant codes for a specific condition, such as fall risk in older adults, could enable HCPs to document the fall risk factors that are relevant for the older adults they consult with in clinical practice (Aiachini et al., 2010). Core sets are lists of codes taken from the entire ICF manual that are most relevant to a specific symptom or disease, including a particular chronic health condition such as depression or stroke (Cieza et al., 2004; Yoon, 2013). ICF core sets can serve as a minimum standard for reporting functioning and health conditions in clinical practice (Selb et al., 2015). Since 2003, the ICF Research Branch has collaborated with partners in more than 50 countries worldwide on implementing activities, such as the ICF Core Set Project, in research programmes and implementation activities to realise its vision. ICF core sets are usually initiated by the ICF Research Branch where, after the first and preparatory phase, consensus on the first version of the core set is reached at the International Consensus Conference (Aiachini et al., 2010; Bickenbach et al., 2012; Geyh et al., 2004; Selb et al., 2015).

An ICF core set for fall risk in an acute rehabilitation setting that was derived in the past decade (Yen et al., 2014) focuses on the risk factors related to older adults in acute inpatient rehabilitation departments in hospitals. This core set does not take into account the risk factors related to community-dwelling older adults who are not currently hospitalised. Moreover, it was developed primarily for HCPs based in an acute rehabilitation setting (e.g., nurses, emergency room doctors) (Yen et al., 2014), and is therefore not necessarily applicable to HCPs from different disciplinary backgrounds (e.g., HCPs not directly involved in acute rehabilitation settings). The focus of preventive health care is on the early identification of risk factors, preferably prior to the first fall, which could result in hospitalisation.

Furthermore, a comprehensive geriatric ICF core set was developed to reflect the most relevant health-related problems among community-living older adults without dementia. Mobility was identified as one of the most prominent problems in this population (Spoorenberg et al., 2015). The geriatric ICF core set considers several health conditions and related problems in older adults and does not focus specifically on a single health aspect, such as falls and fall risks. Similarly, an initial core set for community-dwelling adults aged 75 years and above (i.e., the middle-old group) has been derived to identify all the health factors relevant to this population. This core set has a broad focus, and while it includes falls, it does not focus specifically on falls or fall risk (Tomandl et al., 2018).

By itself, none of the three ICF core sets that hold some relevance for the current study could be accurately used to identify fall risk factors in community-dwelling older adults (65 years and older). None could be used by HCPs from different disciplines to identify the relevant fall risk factors in this population as part of preventive health care.

As explained, an ICF core set is a set of selected ICF codes that are considered as the most relevant codes to describe the functioning of a person with a specific health condition (e.g., stroke, diabetes) or in a specific health care context (e.g., fall risk in hospitalised patients). An ICF code set, on the other hand, is a set of selected ICF codes for specific purposes (e.g., fall risk factors in community-dwelling older adults to be used by various health care disciplines) (Mpofu & Oakland, 2013; Pan et al., 2015). Code sets focus strongly on the functioning of patients in their daily environments and on increasing their functioning (by extension, also their HRQoL) by serving as a preventive measure (Björck-Åkesson et al., 2010; Pan et al., 2015; Yoon, 2013).

As with ICF core sets, ICF code sets provide a list of ICF codes derived from the entire and overwhelming classification system with its total of 1400+ codes, to document only those factors applicable to individuals with a specific condition, such as fall risk in older adults (Aiachini et al., 2010). By using ICF code sets, HCPs are able to generate a list of fall risk factors related to each patient they consult with in clinical practice, and to use only the most typical and relevant codes related to fall risk in older adults as a health condition. By using the ICF rather than traditional fall risk screening tools as a framework for documenting fall risk factors in community-dwelling older adults, the focus is on health and functioning, rather than on disability.

Code sets serve as a useful tool to guide HCPs in planning preventive measures as well as assessment and management strategies from a comprehensive perspective. These measures and strategies are based not only on the impairments of the body (as would typically be considered in most fall risk screening tools), but also take into account the psychological aspects (e.g., fear of falling), difficulties with participation, the performing of activities, as well as the impact of the environment on the individual's functioning (Kus et al., 2012). As opposed to traditional fall risk screening tools, when an ICF code set is used to identify fall risk factors in older adults, the factors not directly related to the body are also taken into account and could be addressed during assessment, intervention and management strategies. Several studies have indicated the usefulness of linking falls and fall risk to the ICF (Bladh et al., 2013; Mehraban et al., 2013; Soh et al., 2020; Yen et al., 2014).

Finally, code sets also enable HCPs to document the factors related to a specific condition that should be assessed, thereby guiding these HCPs in the selection of the most appropriate tools for specific assessments within their scope of practice (Aiachini et al., 2010). In addition, code sets could be used to determine which factors require assessment outside of the HCP's scope of practice, and for which conditions patients should be referred to other HCPs. ICF code sets thus guide HCPs on *what* to measure, not *how* to measure (Pan et al., 2015). As an ICF code set would enable HCPs to identify the fall risk factors most relevant for older adults, and it could also guide them in the selection of further assessment measures. HCPs do not only gain confidence in their own ability to assist this population by identifying fall risk factors relevant to each patient, but also save time by using a universal and holistic set of codes to ensure all aspects of the older adults' health condition are documented during the consultation. This could also lead to older adults' risk profile being addressed in a comprehensive and timely manner, thereby reducing their overall risk of falling and improving their HRQoL (Bilgili & Arpaci, 2014). The current study thus focused on developing an ICF code set specifically for the identification of fall risk factors in community-dwelling older adults (65 to 75 years old) to be used by HCPs from different disciplinary fields and backgrounds.

2.6 Conclusion

This chapter illustrated that a fall could have severe and far-reaching consequences (even death) for any person, but especially for older adults (65 years and older). These consequences have medical and health implications not only for the person who falls, but also for their immediate and extended family, their support system and the health care system at large. By applying situational awareness and preventive health care principles in the health care for older adults, HCPs can assist this population to reduce their fall risk, possible falls, and associated negative consequences, thereby improving their HRQoL. The ICF framework is central to evidence-based practice that guarantees high-quality services and reflects the current state of research on the topic (Atkinson & Nixon-Cave, 2011). HCPs should not only employ preventive and early identification strategies with certain health conditions, they also need to justify their referral and intervention processes without limiting a person by their diagnosis. To address this, the ICF recognises and acknowledges the unified expression of people's suffering as well as the burdens and resources in their lives, resulting in a holistic, comprehensive approach to health and health conditions.

Chapter 3 focuses on the research methodology, results and discussion of the first of three phases of this exploratory, sequential, mixed-method approach. It covers various perspectives – those of the related literature, HCPs and older adults – regarding fall risk in older adults.

CHAPTER 3: PHASE 1 – CODE SET SAMPLING AND ITEM COMPILATION

Research methodology, results and discussion

This chapter is the first of three chapters in which the research methodology, results and a discussion of each of the three phases of this research study are outlined. Chapter 3 focuses on Phase 1, namely the code set sampling and item compilation; Chapter 4 focuses on Phase 2, the code set item evaluation; and Chapter 5 presents Phase 3, administration of the ICF code set. These three chapters should thus be read in conjunction and in accordance with the outline shown in Table 3.1.

Table 3.1: Summary of chapter outline

Chapter 3 - Qualitative Phase 1: Code set sampling and item compilation **Research methodology, results and discussion** Study main aim and sub-aims for the phase Research design Ethical considerations			
3.1 Literature perspective: Systematic review (de Clercq et al., 2020a)	3.2 Target population perspective: Focus groups with older adults (de Clercq et al., 2020b)	3.3 Clinical perspective: Focus groups with health care practitioners (de Clercq et al., 2020c)	3.4 Merging of the ICF codes
Chapter 4 - Quantitative Phase 2: Code set item evaluation and reduction **Research methodology, results and discussion** Study main aim and sub-aims for the phase Research design Ethical considerations Pilot study Modified three-round Delphi process			
Chapter 5 - Quantitative Phase 3: Code set administration **Research methodology, results and discussion** Study main aim and sub-aims for the phase Research design Ethical considerations Pilot study Main quantitative study			

This chapter first presents the main aim of the research study as well as the sub-aims of Phase 1. Thereafter the research design and ethical considerations for this phase are discussed, before each of the four sections in Phase 1 is described in detail. Firstly, the literature perspective is offered by means of a systematic review; secondly, the target population perspective is presented by means of focus groups with older adults; thirdly, the clinical perspective is illustrated by means of focus groups with health care practitioners; and finally, the items identified in the first three stages are merged. Chapter 3 concludes with a summary of the results and main discussion points of Phase 1.

3.1 Aims

3.1.1 Main aim

The main aim of this study was to develop an ICF code set for HCPs to identify fall risk factors in older adults, as the identification of fall risk factors is the first step of the assessment and management process in a multidisciplinary health context. Risk factors were identified by integrating information about the numerous multidisciplinary factors that influence fall risk, thereby creating a universal fall risk code set that contains the minimum amount of information needed to fulfil the three objectives of an ICF code set for this population. These objectives are to guide HCPs in identifying fall risk factors in older adults; determining which fall risk factors would justify further diagnostic assessment or intervention; and determining areas in which further assessment and/or intervention might be warranted which falls outside the particular HCP's scope of practice, thereby necessitating further referral.

3.1.2 Sub-aims

In order to realise the main aim of this study, specific sub-aims were set for each of three phases. The sub-aims for Phase 1 were as follows:

(i) To analyse existing mechanisms and measures for evaluating fall risk in older adults by conducting a systematic review of current fall risk assessment tools (FRATs) and to map the content of the identified measures (i.e., fall risk factors) to the ICF, thereby obtaining a literature perspective on fall risk factors in older adults.

(ii) To identify and describe the factors that older adults (as the target population) consider relevant and potentially able to increase or decrease their fall risk, and subsequently, to link these factors to the ICF.

(iii) To provide insight into the perspectives of health care practitioners (as key stakeholders) in the South African context regarding factors associated with falls in older adults, and thereafter, to link these factors to the ICF as a universal framework for describing functioning.

(iv) To merge and consolidate the ICF items identified in three preceding sections of Phase 1 in order to compile a preliminary code set for evaluation and administration in phases 2 and 3.

3.2 Research Design

The three-phase exploratory, sequential, mixed method research design that was used in this research study (Creswell & Creswell, 2018) incorporates the principles of developing an ICF core set (Selb et al., 2015). The design began with the qualitative exploration of the data to generate an ICF item list of fall risk factors. The list was refined in a second phase by means of item evaluation, and it was administered in the last phase (Creswell & Creswell, 2018). Both an exploratory, sequential method and the method proposed for ICF core set development aim to gather qualitative data, utilise the data to compile a list of items, and then administer the list of items to a sample of the population. The ICF Research Branch specifies specific steps for developing an ICF *core* set (Selb et al., 2015), but not for developing an ICF *code* set. ICF core sets are lists of codes most relevant to a specific symptom or disease, including particular chronic health conditions such as depression or stroke (Cieza et al., 2004; Yoon, 2013). On the other hand, an ICF code set is a set of selected items that focus on functioning that is useful for clinical application (Björck-Åkesson et al., 2010; Pan et al., 2015). Due to the fact that both an ICF core set and an ICF code set list items that are relevant to a certain health condition, and since they emphasise the functioning of a person with the condition, this research study incorporated the principles and guidelines set out for core set development. Furthermore, ICF core set development typically comprises three principles (Selb et al., 2015) and three phases (Aiachini et al., 2010; Bölte et al., 2014; Ruaro et al., 2014; Selb et al., 2015), all of which were utilised and adapted for developing an ICF code set in this thesis (Table 3.2).

Table 3.2: Core set vs code set development

ICF core set development principle	ICF core set development phases	ICF code set development principles employed in this research study
Principle 1: To follow an evidence-based process to utilise the qualitative data **Principle 2:** To include not only the perspectives of HCPs, but also those of the target population.	**Preparatory phase**: Systematic review; Qualitative study; Expert survey.	**Phase 1:** Systematic review; Qualitative study by conducting focus groups with both older adults and HCPs.
Principle 3: To include experts who represent a broad range of disciplines and backgrounds so as to enrich the administration of the code set in the final phase.	**Phase 1:** International ICF Consensus Conference to determine the first version of the ICF core set. **Phase 2:** Implementation of the first version of the ICF core set.	**Phase 2:** Modified Delphi process with experts to evaluate items and determine the first version of the ICF code set. **Phase 3:** Administration of the first version of the ICF code set.

Phase 1 of the current study was similar to the preparatory phase suggested for core set development, as it included the gathering of qualitative data from multiple sources to determine the factors that are relevant to fall risk in older adults. Phase 2 differed somewhat from the suggested Phase 1 for core set development, in that the ICF Consensus Conference attends specifically to core set development and is not accessible to the researcher. In the current research study, a modified Delphi process involving national and international experts in fall risk assessment was employed to evaluate the items and determine the first version of the code set. Lastly, the suggested Phase 2 for core set development focused on the implementation of the developed ICF core set. It was similar to Phase 3 of this study, albeit on a smaller scale.

By combining the process of developing an ICF core set with a three-phase exploratory, sequential, mixed method design, the researcher was able to draw not only on the strengths of the combination of qualitative and quantitative methodologies, but also on the research conducted by the ICF Research Branch, thereby improving the quality of the study. As such, equal weighting was placed on the qualitative and quantitative phases, as the strengths of both methods of data collection were required to develop the ICF code set (Creswell & Creswell, 2018).

The specific advantages of using a mixed method design in this study included the following:

- Heightening the dependability and trustworthiness of the data and enriching the meaning of the relevant constructs by using different data sources (e.g., literature, older adults and HCPs) and methods of analysing (e.g., inductive and deductive methods) the data (Meissner et al., 2011; Zohrabi, 2013);
- Addressing a complex topic with multifaceted constructs (such as fall risk factors in older adults) for which a single methodological approach would be inadequate (Palinkas et al., 2015), and offering a methodology that addressed these constructs more comprehensively than what pure qualitative or quantitative methodologies could do (Halcomb & Hickman, 2015); and
- Reflecting on the different approaches employed, which enabled the researcher to respond to and be moulded by the main research aim, both initially and throughout the study (Morse & Cheek, 2014).

The most significant disadvantage of using a mixed method design was that it is a time-consuming process, as both qualitative and quantitative data had to be collected and analysed. Furthermore, since more resources were needed to master both research methodologies, a more complex and complicated research design had to be developed and implemented. However, these disadvantages only pertained to the researcher and the research process, and not to the data gathered during the research process. Although more complex and complicated, mixed method designs are generally regarded to be superior to a single method when considering the ultimate outcome, and this outweighs the disadvantages of time and complexity in using this method (Rahman, 2016).

Phase 1 of my study focused on qualitative data collection and analysis. Data was gathered from three sources, namely the literature (via a systematic review), the target population (older adults) and HCPs (through focus groups). A systematic review involves numerous studies and result in a high form of evidence as it is likelier than a single study to produce reliable and accurate conclusions. It also enables the researcher to portray the information gathered during the review in a concise and manageable format (Ganeshkumar & Gopalakrishnan, 2013). Disadvantages to conducting a systematic review include the fact that many study factors, such as number of participants, type of study and different methodologies, could be difficult to analyse, and pose difficulties in terms of combining the result of the studies, determining how reliable a study is, and whether it should be included in the review (Ganeshkumar & Gopalakrishnan, 2013). In this study, a systematic review was only used to identify the FRATs mentioned in the study. Since it did not aim to summarise the effectiveness of the FRATs, no formal assessment was made of methodological quality or risk of bias in the included articles.

Focus groups, which are considered to be an innovative research method and suitable for reflecting on aspects of daily life that people may often take for granted (Acocella, 2012), were also conducted in Phase 1. Focus groups as a qualitative method provide sufficiently detailed information in a short amount of time at low cost (Acocella, 2012). Furthermore, as opinions are socially formed, focus groups provide participants a social environment within which to express these opinions without fear of judgement (Breen, 2006). On the other hand – focus groups can be more difficult to coordinate, it may be hard to gather all the participants in the same room at the same time, and the participants' perceptions may not always be reliable, making thematic analysis potentially more difficult, especially if one or more of the participants are demanding and dominant during the discussions (Breen, 2006). In this research study, however, groups were well-versed in social etiquette and none of the participants were overly dominant or tried to coerce others to agree with their opinions. Although it was time-consuming and cumbersome to gather all the participants (especially the HCPs) in the same room at the same time, the researcher was able to overcome this obstacle.

3.3 Ethical Considerations

The ethical principles in the Declaration of Helsinki (World Medical Association, 2001), as well as the specific ethical considerations involved in including the ICF as the research framework, were considered in the focus groups with the older adults and the HCPs. An ethical researcher is concerned with the research participants' well-being as well as with the future use of the research. Therefore, an ethical researcher accepts a personal responsibility for decisions made in the research process and for the consequences that these decisions would have for the research study, the participants and the future use of the research data (Naude, 2015).

Older adults who participated in the focus groups in Phase 1 are a potentially vulnerable group, because of possible cognitive, psychosocial, and/or physical problems (Culo, 2011). The focus group's vulnerability could be further compounded if it included older adults with specific vulnerabilities such as multiplex medical and mental conditions, cognitive impairments or dementia, or older adults in long-term care institutional settings or who are terminally ill or dying (Ilgili et al., 2014). For the purposes of this study, those specific vulnerable groups within the larger vulnerable group of older adults were not included in the focus groups.

3.3.1 The principle of informed consent

Prior to participation in the focus groups, the participants were informed of the general nature and aims of the research and clearly instructed on the type of involvement required from them during the research process. To avoid potential misunderstanding, all participants were provided the opportunity to ask questions. Because older adults sometimes need more time to process decisions and information (Ilgili et al., 2014), they were also given the researcher's contact details for if they wished to ask additional questions or offer more information at a later stage. All participants signed the informed consent form (Appendices 3A & 3B) prior to participating in the study.

3.3.2 The principle of voluntary participation

Participants were not pressurised or coerced into participating in the study. The researcher was cautious in determining whether any of the participants were in a dependent relationship or may have consented under duress, as older adults may not always be legally or mentally competent to participate voluntary (Jacelon, 2007). All participants in this study, including the older adults, were living independently and able to drive to the focus group location by themselves, thus eliminating participants who were legally or mentally incompetent. Participation was voluntary following informed consent and participants had the option to withdraw from the study at any time without any negative consequences.

3.3.3 The principle of deception and clinical use

The researcher did not try to mislead the participants and the research aims were communicated to them prior to their participation in the study. Data from the study were not fabricated or falsified in any way and it was regularly discussed with PhD peers and research supervisors during the study. The use of the ICF as a clinical tool dictates that its purpose and the research aim should be explained to all the participants and this instruction was followed as such. Participants were also given ample time to ask questions regarding the research study and to ensure that their level of participation was in line with their level of functioning (Maxwell et al., 2018; World Health Organization, 2002). The researcher ensured that all participants were aware of the purpose of and method used in the focus groups, prior to participation.

3.3.4 The principles of confidentiality and respect

The participants' identity and contribution to the research study were coded by using participant numbers. This protected their identity from third parties and no identifying information was made available to anyone not directly involved in the research study. An ICF tool needs to be used in a manner that respects the inherent value and autonomy of the individual who is being assessed or evaluated. Moreover, it should not be used to label or identify individuals solely based on their level of functioning or disability. All participants were assigned participation numbers so as to exclude and protect any identifying information. The latter was stored in password-protected files on a secure computer.

3.3.5 The principle of social use

The ICF guideline on the social use of the tool states that the information gathered using the ICF framework should be applied to enhance the participants' choices and control over their lives. The information should also be used to effect change in the profession and support the participants' own social context, so as to benefit the population group from whom the information was gathered (World Health Organization, 2002). The aim of this research study was to develop an ICF code set for fall risk factors in community-dwelling older adults and to guide HCPs in identifying these factors as the first step in their fall prevention and management strategies.

3.3.6 The principle of objectivity and professional integrity

The principle of objectivity and professional integrity obliged the researcher to ensure that bias, conflict of interest, or undue influence of others would not override the researcher's professional and ethical judgement (Hammersley, 2018). The researcher also ensured that the data collected was used in the exact format it had been intended for and that no data was altered or omitted during the data collection or analysis stages.

3.4 Literature Perspective (Systematic Review)

Several of the following paragraphs were adapted from an excerpt of the pre-print version of "Factors included in adult fall risk assessment tools (FRATs): A systematic review" by de Clercq et al. (2020a) in *Ageing and Society*. See Appendix 3C for a full copy of the published article. Permission was obtained from the publisher to include this paper as part of my PhD thesis (Appendix 3D).

3.4.1 Aim

The overall aim of this systematic review was to provide an analysis of existing mechanisms and measures for evaluating fall risk in older adults. The specific objectives were (i) to identify factors that had been utilised to quantify fall risk in older adults by means of a FRAT; (ii) to map the content of the identified measures (i.e., the fall risk factors) to ICF codes using the ICF linking rules; and (iii) to compare the weighted focus of the FRATs items in relation to the body (body function and structure domain), the individual and society (activities and participation domain) and the impact of the environment on the individual (environmental and personal factors domain).

3.4.2 Rationale

Currently, most FRATs do not describe fall risk in terms of the ICF, despite its obvious usefulness and applicability. There is also a lack of information about fall risk assessment and the ICF, especially in community-dwelling older adults (Noohu et al., 2017). Identifying fall risk factors in current FRATs may be one possible way to link fall risk factors to the ICF and gain all the advantages of using the ICF as a model for discussing fall risk in older adults. The ICF presents a scientific basis for understanding a condition (such as fall risk factors) in a specific population (i.e., older adults) and provides a holistic model and universal language for HCPs around the world to describe and classify the specific condition and population (World Health Organization, 2002). The ICF is a systematic coding system for documenting health information, not simply about fall risk as a condition, but also for explaining how falls can affect the older adult in all aspects of life. It outlines the role of the environment and personal factors, and so allows HCPs to obtain a snapshot of the older adult's present health status (Granberg, 2015).

3.4.3 Method

A systematic review was conducted based on the five stages suggested by Arksey and O'Malley (2005), and on suggestions by Adair et al. (2018), who specifically aimed to identify measures and make recommendations for quality assessment. In Stage 1, the research question was identified and articulated as the aim of the review. In Stage 2, the search strategy that was followed involved identifying relevant studies and setting specific search parameters, such as the time and language of the articles. Stage 3 involved the study selection which, for a systematic review, was articulated as the inclusion and exclusion criteria. During Stage 4, the data was charted using a customised data extraction sheet. Stage 5 involved collating, summarising and reporting the results as set out in the results and discussion section of this paper. The overall PRISMA methodology was included as this is an evidence-based minimum set of items for reporting in systematic reviews and meta-analysis (Moher et al., 2009).

3.4.3.1 Search strategy and selection criteria

The structured database search included nine databases and platforms (WorldCat; Medline; PaperFirst; ScienceDirect; SA ePublications and Journal Collection; BioOne; JSTOR Health and General Sciences Collection; JSTOR Life Sciences Collection). The primary purpose was to compile a comprehensive list of published papers on fall risk assessment tools from the literature. The search terms used were ti:(fall*) AND ti:(risk) AND ti:(assess*) AND ti:(tool*). No restriction in respect of date was placed on the search and all articles mentioning the keyword in the title were included in the initial set of results. Articles that had been published in languages other than English were excluded, due to the cost and time involved in translating such material.

3.4.3.2 Article screening and data extraction

The initial database search was conducted by the researcher who screened the titles for potentially relevant articles. After screening the titles, the articles were exported to Rayyan, a web-based systematic review program that allows different reviewers to work on the same project simultaneously and to determine the agreement percentage between reviewers (Ouzzani et al., 2016). All the identified potential articles at title and abstract level were independently screened by the researcher and co-supervisor based on the inclusion and exclusion criteria (Table 3.3). Any discrepancies related to the inclusion of articles were resolved through discussion, and if consensus could not be reached, the third researcher was available to review the article. The researcher, supervisor and co-supervisor are all dually qualified as Speech-Language Therapists and Audiologists, and each has at least ten years' clinical experience.

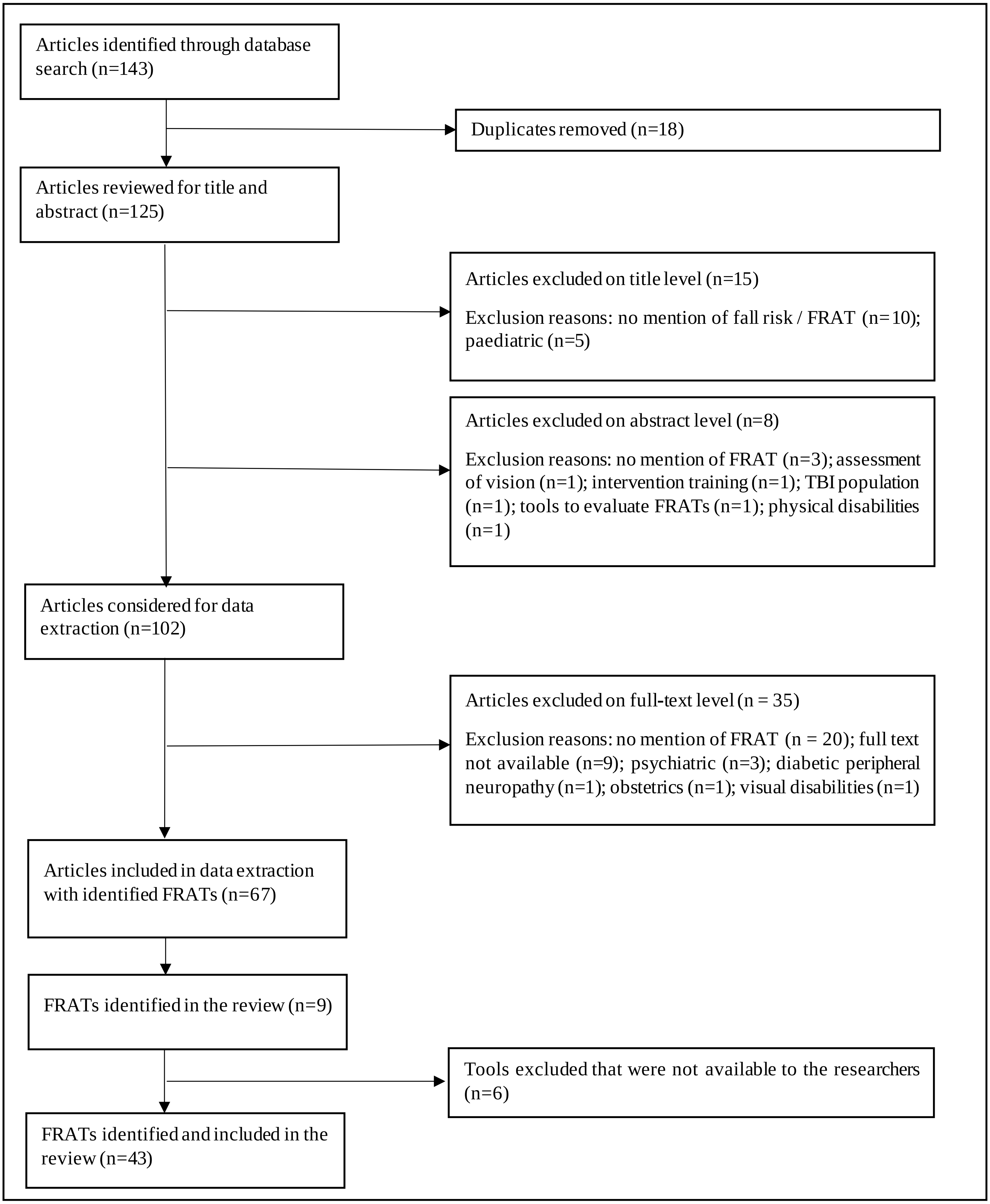
Table 3.3: Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria	Theoretical justification
Older adults	Paediatrics and obstetrics	This study focused on older adults, as fall is one of the so-called geriatric giants (Cumming, 2013).
Tools available at no cost	Tools that have to be purchased	Tools that had to be bought were excluded due to the cost and time involved in purchasing the material (Arksey & O'Malley, 2005).
Assessment tools	Intervention studies	This study focused on assessment tools as a fall prevention strategy (World Health Organization, 2018) and not on the monitoring or intervention of fall risk assessment.
Fall risk	Papers with main focus on a specific medical condition with a known fall risk	Risk factors for these medical conditions are not sensitive and specific enough to identify fall risk in the general population (World Health Organization, 2018).

A customised data extraction sheet was compiled to enable consistent and independent data reporting for the search. Data extraction included the article date, author and the names of the FRATs discussed in the article. Data extraction was completed, and no discrepancies were noted at this level.

Thereafter, two sets of criteria were used for including FRATs in the factor-mapping process. First, the FRAT had to be available at no cost, it had to be named, and it had to have a supporting reference in the articles identified in this review to allow its being located. Second, only those FRATs reported in at least one of the articles identified in the review were included. It is possible that previous researchers frequently chose only 'popular' FRATs of assessing fall risk when designing a study. For this review, however, we aimed to include all mentioned FRATs, even if the FRAT was mentioned in only one of the articles identified in the search. Thus, our data was not limited to frequently used FRATs only. The researcher and co-supervisor independently reviewed 102 studies for inclusion and excluded 35 studies. Of the 143 articles identified in the initial database search, 126 were subjected to title-level screening, 111 were evaluated on abstract level and 102 articles were evaluated for inclusion on full-text level. Of the latter 102 articles, 67 were eventually included in the data extraction process where a total of 49 tools were identified and 43 tools were included in the results (Figure 3.1).

Figure 3.1: Graphic representation of the methodological process



3.4.3.3 Quality assessment

This systematic review did not aim to summarise the effectiveness of assessment tools, the risk of bias of studies, or the quality of the methodology used to design the FRATs (Adair et al., 2018). Given the focus on the identification of FRATs, no formal assessments were performed of methodological quality or risk of bias of the included articles.

3.4.3.4 Data analysis

The 67 studies included in the review were independently evaluated and a 100% agreement score was obtained. A total of 49 FRATs were identified to be included in the review. Of the 49 tools identified, six were excluded (Hirase et al., 2014; Jester et al., 2005; Miyakoshi et al., 2014; Scott et al., 2007; Vassallo et al., 2005; D. Young et al., 2005) as the researchers were unable to obtain them despite contacting the corresponding authors of each article in which the tools were mentioned. The 43 FRATs included in the review were analysed and the fall risk factors in each tool were identified and extracted via Microsoft® Office Excel. All the tools were independently evaluated and an initial agreement of 92% was established. After discussion of the discrepancies, the researcher, supervisor and co-supervisor fully agreed on the ICF codes to which each fall risk factor in the FRATs had been linked, using the ICF linking rules.

Fall risk factors were linked to corresponding ICF codes by using the ten ICF rules for linking the relevant health information included in instruments and tools to the corresponding ICF codes (Cieza et al., 2016; Selb et al., 2015). The first seven linking rules were applied in this study, namely (1) acquiring good knowledge of the conceptual fundamentals of the ICF; (2) identifying the main concept of each item to be linked to the ICF; (3) identifying additional concepts for each item if needed; (4) considering the popular perspectives for each identified concept when collecting health-related information; (5) identifying and documenting the categorisation of the response options; (6) linking all meaningful concepts to the precise ICF category; and (7) using "other specific" or "unspecified" ICD categories as appropriate. Rules 8 to 10 were only used when a specific code was not available on the third or fourth ICF level. For the purposes of this review, a two-level ICF classification was sufficient (rules 1 – 7) and further classification was not required at the time. The researcher, supervisor and co-supervisor independently linked the identified fall risk factors to the corresponding ICF codes. The weighted focus of the fall risk factors in relation to the ICF codes in each ICF domain was calculated using the Confidence Intervals to determine the *p*-values.

3.4.4 Results

On completion of the data extraction, a summary was made of the 43 FRATs included in the review, based on the included 67 articles (see Table 3.4). These 43 FRATs were categorised according to where their focus lay with regard to the four ICF domains, namely the body (where body function and structure domains are grouped together), the level of the individual (activities and participation domain) and the impact of the environment on the individual (environmental and personal factors domain).

Table 3.4: Summary of included FRATs presented in alphabetical order

FRAT name	N (n = 67)	Original reference	Date developed	ICF focus
10 Meter Walk Test	2 (Lee & Kim, 2017; Renfro et al., 2016)	Bohannon et al. (1996)	1996	**BF&S: 67%;** A&P: 33%; E&P: 0%
13-point FRAT	1 (Chang et al., 2018)	Chang et al. (2018)	2000	**BF&S: 75%** A&P: 0%; E&P: 25%
30-Second Chair Test	2 (Chow et al., 2018; Scott et al., 2007)	Jones et al. (1999)	1999	**BF&S: 67%** A&P: 33%; E&P: 0%
Activities-specific Balance Confidence (ABC) scale	1 (Park, 2017)	Powell and Myers (1995)	1995	**BF&S: 75%** A&P: 20%; E&P: 5%
Ballarat Health Service FRAT	1 (Wong Shee et al., 2012)	Wong Shee et al. (2012)	2010	**BF&S: 69%** A&P: 25%; E&P: 6%
Berg Balance Scale	9 (Hirase et al., 2014; Kim and Xiong, 2017; Lee and Kim, 2017; Palumbo et al., 2015; Park, 2017; Renfro et al., 2016; Scott et al., 2007; Stretanski et al., 2002; X. Zhang and Lockhart, 2009)	Berg et al. (1989)	1989	**BF&S: 67%** A&P: 33%; E&P: 0%
BESTest	2 (Kim and Xiong, 2017; Renfro et al., 2016)	Horak et al. (2009)	2009	**BF&S: 67%** A&P: 33%; E&P: 0%
Conley Scale	6 (Flarity et al., 2013; Guzzo et al., 2015; Lovallo et al., 2010; Majkusova and Jarosova, 2017; Park, 2017; Scott et al., 2007)	Conley and Schultz (1999)	1999	**BF&S: 70%** A&P: 25%; E&P: 5%
Demura's Fall Risk Assessment	1 (Park, 2017)	Demura et al. (2010)	2010	**BF&S: 67%** A&P: 27%; E&P: 6%
Downton Index	8 (Majkusova and Jarosova, 2017; Meyer et al., 2005; Meyer et al., 2009; Nunan et al., 2018; Scott et al., 2007; Selb et al., 2015; Vassallo et al., 2008; Vassallo et al., 2005)	Downton (1993)	1993	**BF&S: 67%** A&P: 16.5%; E&P: 16.5%
Dynamic Gait Index (DGI)	4 (Park, 2017; Renfro et al., 2016; Scott et al., 2007; Zhang and Lockhart, 2009)	Whitney et al. (2005)	2005	**BF&S: 67%** A&P: 33%; E&P: 0%
Falls Assessment Risk and Management (FARAM)	1 (Barker et al., 2009)	Western Australia Department of Health, (2015)	2004	**BF&S: 64%** A&P: 18%; E&P: 18%
Falls Efficacy Scale (FES)	2 (Kim and Xiong, 2017; Scott et al., 2007)	Yardley et al. (2005)	2005	**BF&S: 59%** A&P: 35%; E&P: 6%

FRAT name	N (n = 67)	Original reference	Date developed	ICF focus
Falls Risk Assessment and Management Plan (FRAMP)	1 (Delfante et al., 2018)	Western Australia Department of Health, (2015)	2010	**BF&S: 54%** A&P: 36%; E&P: 9%
Four Square Step Test	1 (Hirase et al., 2014)	Dite and Temple (2002)	2002	**BF&S: 67%** A&P: 33%; E&P: 0%
FRHOP Risk Assessment Tool	1 (Hill et al., 2004)	Collins et al. (2004)	2004	**BF&S: 47%** A&P: 35%; E&P: 18%
FROP-Com	4 (Park, 2017; Russell et al., 2008; Russell et al., 2006; The et al., 2017)	Moore et al. (2006)	2009	**BF&S: 58%** A&P: 26%; E&P: 16%
Fullerton Advanced Balance (FAB) scale	1 (Park, 2017)	Rose et al. (2006)	2006	**BF&S: 67%** A&P: 33%; E&P: 0%
Functional Independence Measure (FIM)	1 (Forrest et al., 2013)	McDowell and Newell, (1996)	1996	**BF&S: 58%** A&P: 42%; E&P: 0%
Functional Reach (FR)	5 (Kim and Xiong, 2017; Lee and Kim, 2017; Russell et al., 2008; Scott et al., 2007; Yamashita et al., 2016)	Duncan et al. (1990)	1990	**BF&S: 67%** A&P: 33%; E&P: 0%
Hendrich II FRAT	13 (Baran and Gunes, 2018; Chapman et al., 2011; Flarity et al., 2013; Higaonna, 2014; Higaonna et al., 2016; Kim et al., 2007; Kim et al., 2013; Kim and Xiong, 2017; Lovallo et al., 2010; Majkusova and Jarosova, 2017; McNair and Simpson, 2016; Park, 2017; Salb et al., 2015)	Hendrich et al. (1995)	1995	**BF&S: 64%** A&P: 27%; E&P: 9%
Johns Hopkins FRAT	7 (Flarity et al., 2013; Hnizdo et al., 2013; Hur et al., 2016; Klinkenberg and Potter, 2017; Park, 2017; Poe et al., 2007; Zhang, Wang, and Liu, 2016)	Poe et al. (2005)	2003	**BF&S: 58%** A&P: 32%; E&P: 10%
LASA Fall Risk Profile	1 (Park, 2017)	Pluijm et al. (2006)	2006	BF&S: 22% **A&P: 56%**; E&P: 22%
Marianjoy FRAT	1 (Ruroede et al., 2016)	Ruroede et al. (2016)	2000	**BF&S: 46%** **A&P: 46%;** E&P: 8%
Melbourne FRAT	3 (Barker et al., 2009; Narayanan et al., 2016; Nunan et al., 2018)	Royal Melbourne Hospital (1995)	1995	**BF&S: 56%** A&P: 33%; E&P: 11%
Missouri Alliance for Home Care fall risk assessment tool (MAHC-10)	2 (Calys et al., 2013; Gallagher et al., 2013)	Calys et al. (2013)	2010	BF&S: 35% A&P: 18%; **E&P: 47%**
Mobility Interaction Fall (MIF) chart	6 (Kehinde, 2009; Lundin-Olsson et al., 2003; Meyer et al., 2005; Nunan et al., 2018; Park, 2017; Scott et al., 2007)	Lundin-Olsson et al. (2006)	2000	**BF&S: 56%** A&P: 33%; E&P: 11%
Modified Gait Abnormality Rating Scale	1 (Zhang and Lockhart, 2009)	Van Swearingen et al. (1996)	1996	**BF&S: 67%** A&P: 33%; E&P: 0%
Morse Fall Scale	15 (Chapman et al., 2011; Flarity et al., 2013; Forrest et al., 2013; Higaonna, 2014; Higaonna et al., 2016; Kehinde, 2009; Kim et al., 2007; Kim et al., 2013; Kim and Xiong, 2017; Majkusova and Jarosova, 2017; Park, 2017; Poe et al., 2007; Salb et al., 2015)	Morse et al. (1989)	1989	**BF&S: 53%** A&P: 20%; E&P: 27%
New York-Presbyterian Fall and Injury Risk Assessment Tool	2 (Chapman et al., 2011; Salb et al., 2015)	Currie et al. (2004)	2004	**BF&S: 75%** A&P: 25%; E&P: 0%
Peninsula Health FRAT	2 (Barker et al., 2009; Nunan et al., 2018)	Stapleton et al. (2009)	1999	**BF&S: 54%** A&P: 35%; E&P: 11%

FRAT name	N (n = 67)	Original reference	Date developed	ICF focus
Queensland FRAT	2 (Nunan et al., 2018; Park, 2017)	Peel et al. (2008)	2007	**BF&S: 57%** A&P: 29%; E&P: 14%
Quickscreen	1 (Tiedemann, Lord, and Sherrington, 2012)	Tiedemann (2006)	2004	**BF&S: 62%** A&P: 30%; E&P: 8%
Schmid Fall Risk Assessment	1 (Park, 2017)	Schmid (1990)	1990	**BF&S: 50%** A&P: 33%; E&P: 17%
Short Physical Performance Battery (SPPB)	1 (Park, 2017)	Guralnik et al. (1994)	1994	**BF&S: 67%** A&P: 33%; E&P: 0%
Spartanburg FRAT (SFRAT)	1 (Robey-Williams et al., 2007)	Robey-Williams et al. (2007)	2007	**BF&S: 57%** A&P: 29%; E&P: 14%
Stratify	17 (Guzzo et al., 2015; Higaonna, 2014; Higaonna et al., 2016; Hill et al., 2004; Jester et al., 2005; Kim et al., 2007; Kim et al., 2013; Kim and Xiong, 2017; Majkusova and Jarosova, 2017; Oliver et al., 1997; Papaioannou et al., 2004; Park, 2017; Scott et al., 2007; Seneviratne, 2006; Skelton et al., 2014; Vassallo et al., 2008; Wong Shee et al., 2012)	Oliver et al. (1997)	1997	**BF&S: 57%** A&P: 43%; E&P: 0%
Thai FRAT	1 (Park, 2017)	Thiamwong et al. (2009)	2009	**BF&S: 40%** A&P: 20%; **E&P: 40%**
Timed Up and Go (TUG)	13 (Cattelani et al., 2015; Hirase et al., 2014; Kim and Xiong, 2017; Lee and Kim, 2017; Park, 2017; Renfro et al., 2016; Scott et al., 2007; Zhang and Lockhart, 2009)	Podsiadlo and Richardson (1991)	1991	**BF&S: 67%** A&P: 33%; E&P: 0%
Tinetti Balance Assessment Tool (POMA)	10 (Flarity et al., 2013; Gallagher et al., 2013; Hirase et al., 2014; Kim and Xiong, 2017; Lee and Kim, 2017; Majkusova and Jarosova, 2017; Meyer et al., 2005; Park, 2017; Renfro et al., 2016; Vassallo et al., 2005)	Tinetti, Williams, and Mayewski (1986)	1986	**BF&S: 67%** A&P: 33%; E&P: 0%
Traffic Light FRAT	1 (Chang et al., 2018)	Chang et al. (2018)	2018	**BF&S: 75%** A&P: 25%; E&P: 0%
Walking While Talking (WWT)	1 (Park, 2017)	Verghese et al. (2002)	2002	**BF&S: 72%** A&P: 28%; E&P: 0%
Zur Balance Scale	1 (Park, 2017)	Zur et al. (2016)	2016	**BF&S: 67%** A&P: 33%; E&P: 0%

*BF&S = Body function and structure domain; A&P = Activities and participation domain; E&P = Environmental and personal factors domain

As depicted in Table 3.4, a total of 43 FRATs were identified. The five FRATs mentioned most often in the review were the Stratify (n=17), Morse Fall Scale (n=15), Timed Up and Go (n=13), Hendrich II Fall Risk Assessment Tool (n=13), and the Tinetti Balance Assessment Tool (n=10). Nine tools were mentioned three to eight times, namely the Berg Balance Scale (n=9), Downton Index (n=8), Johns Hopkins Fall Risk Assessment Tool (n=7), Conley Scale (n=6), Mobility Interaction Fall Chart (n=6), Functional Reach (n=5), Dynamic Gait Index (n=4), FROP-Com (n=4) and the Melbourne Fall Risk Assessment Tool (n=3). Eight other FRATs were only mentioned twice, while 21 FRATs (49%) were mentioned only once in the review. A total of 18 tools – developed between 1986 and 1999 – were mentioned in 70% of the articles being reviewed, whereas the 25 tools developed between 2000 and 2018 were mentioned in only 30% of the articles in this review.

Of the 43 FRATs, 39 (91%) focused mainly on the body (body function and structure domain), while only one tool (LASA Fall Risk Profile) focused mainly on the activities and participation domain (56%). Another tool (Marionjoy FRAT) focused equally (46%) on the body function and structure domain and on the activities and participation domain; the MAHC-10 focused mainly on the environmental and personal factors domain (47%); and the Thai FRAT focused equally (40%) on the body function and structure domain as well as on the environmental and personal factors domain.

The fall risk factors included in each of the 43 FRATs were extracted and linked to the ICF codes using the ICF linking rules (Cieza et al., 2016). Each linked ICF code was categorised based on the corresponding ICF domain. The 43 FRATs produced a total of 493 fall risk factors, which were linked to a total of 952 ICF codes (summarised as shown in Table 3.5).

Table 3.5: Summary of ICF codes linked to included FRATs

Body function domain		**Body structure domain**		**Activities and participation domain**		**Environmental and personal factors domain**	
ICF code	**N**	**ICF code**	**N**	**ICF code**	**N**	**ICF code**	**N**
b760 – control of voluntary movement	106	s770 – additional musculoskeletal structures related to movement	92	d460 – moving around in different locations	53	e110 – products or substances for personal consumption	21
b770 – gait pattern function	59	s798 – structures related to movement	81	d415 – maintaining a body position	38	e120 – products and technology for personal indoor and outdoor mobility and transportation	11
b210 – seeing	35	s750 – structures of lower extremity	22	d110 – watching	34	e115 – products and technology for personal use in daily living	7
b126 – temperament and personality functions	19	s260 – structures of inner ear	19	d410 – changing basic body position	33	e298 – natural environment and human-made changes to environment; other	6
b235 – vestibular functions	19	s610 – structures of urinary system	16	d530 – toileting	32	e150 – design, construction and building products and technology of buildings for public use	4

Body function domain ICF code	N	Body structure domain ICF code	N	Activities and participation domain ICF code	N	Environmental and personal factors domain ICF code	N
b260 – proprioception functions	19	s760 – structures of the trunk	3	d420 – transferring oneself	14	e155 - design, construction and building products and technology of buildings for private use	4
b525 – defecation function	16	s730 – structures of upper extremity	2	d445 – hand and arm use	12	e255 – climate	2
b610 – urination functions	16	s799 – structures related to movement, unspecified	2	d450 – walking	11	e340 – personal care providers and personal assistants	2
b122 – global psychosocial functions	11	s430 – structures of respiratory system	1	d429 – changing and maintaining a body position, unspecified	8	e140 – products and technology for culture, recreation and sport	1
b749 – muscle functions	10			d455 – moving around	7	e240 – light	1
b755 – involuntary movement reaction functions	8			d115 – listening	6	e350 – domesticated animals	1
b114 – orientation functions	7			d540 – dressing	3		
b139 – global mental health functions	7			d640 – doing housework	3		
b152 – emotional functions	7			d230 – carrying out daily routine	2		
b230 – hearing	6			d310 – communicating with – receiving – spoken message	2		
b420 – sensations associated with hearing and vestibular functions	6			d330 – speaking	2		
b156 – perceptual functions	5			d510 – washing oneself	2		
b117 – intellectual functions	3			d570 – looking after one's health	2		
b279 – additional sensory functions	3			d571 – looking after one's safety	2		
b530 – weight management functions	3			d920 – recreation and leisure	2		
b740 – muscle endurance functions	3			d430 – lifting and carrying objects	1		
b798 – neuromusculoskeletal- and movement-related functions	3			d465 – moving around using equipment	1		
b144 – memory functions	2			d620 – acquisition of goods and services	1		
b280 – sensations of pain	2			d630 – preparing meals	1		

Body function domain		**Body structure domain**		**Activities and participation domain**		**Environmental and personal factors domain**	
ICF code	**N**	**ICF code**	**N**	**ICF code**	**N**	**ICF code**	**N**
b125 – activity level	1			d650 – caring for household objects	1		
b134 – sleep functions	1						
b147 – psychomotor functions	1						
b163 – basic cognitive functions	1						
b460 – sensations associated with cardiovascular and respiratory functions	1						
b715 – stability of joint functions	1						
Total amount	**381**		**238**		**273**		**60**

Table 3.5 depicts the ICF codes extracted from the included FRATs, arranged from most used codes to least used codes. The domain with the most used codes was the body function domain with 381 of the 952 codes used (40%), followed by the activities and participation domain with 273 codes (28%), the body structure domain with 238 codes (25%) and lastly, the environmental and personal factors domain with only 60 codes (7%). As the body functions and structures domains are interlinked and both relate to the body, their codes were summed, which resulted in 619 codes and accounted for 65% of the codes identified in the review. The differences between the statistical significance of these domains were calculated to determine the weighted focus of the linked ICF codes in each ICF category (Table 3.6).

Table 3.6: Statistical differences between ICF domains

Pairs	**95% CI of the difference**		***p*-value**
	Lower	**Upper**	
Pair 1: Body function and structure domains (n=619) – Activities and participation domain (n=273)	-381.0090	-380.9910	$p<0.001$
Pair 2: Activities and participation domain (n=273) – Environmental and personal factors domain (n=60)	177.9910	178.0090	$p<0.001$
Pair 3: Body function and structure domains (n=619) – Environmental and personal factors domain (n=60)	-559.0090	-558.9910	$p<0.001$

Based on these values, a statistically significant *p*-value of $p<0.0001$ and a 95% confidence interval (CI) of the difference were reported among all three groups (see Table 3.6) – the body function and structure domains (n=619) compared to the activities and participation domain (n=273); the activities and participation domain (n=273) compared to the environmental and personal factors domain (n=60); and the body function and structure domains (n=619) compared to environmental and personal factors domain (n=60) (Altman, 1991).

3.4.5 Discussion

In this review, the overall aim was to provide an analysis of existing mechanisms and measures for evaluating fall risk in older adults. This review identified the fall risk factors in FRATs that are currently available in the literature and mapped them to the ICF. Results indicated that the majority of the linked ICF codes focused on the domain of the body (body function and structure domains), followed by the activities and participation domain, and lastly the environmental factors domain. All but four FRATs focused mainly on the domain of the body, indicating that 'the body' is regarded as the point of failure and of risk in most currently available FRATs.

However, contemporary research is emerging to show that other factors – outside of the body, such as environmental factors, present immediately prior to and during falls – could pose as many, if not more, significant risks (Klenk et al., 2017). In-depth knowledge of falls in older adults therefore needs further exploration to adequately consider environmental fall risk factors. A recent study by Noohu et al. (2017) agreed with this notion and mentioned that the strongest predictor of a single fall is limitations in the activities and participation as well as environmental domains, whereas multiple falls are best predicted with limitations in the activities and participation domain. This implies that more emphasis needs to be placed on factors other than those related to the body, such as environmental factors and limitations surrounding an individual’s ability to perform activities and participate in life situations.

Based on the results of this review and the strong focus on the body as the main contributor to falls in older adults, almost all freely available FRATs that focus on the medical factors and medical model of assessment, neglect to consider the contributions of the biopsychosocial model of assessment. Viewing dysfunction through the narrow focus of the medical model (which is strictly concerned with organic dysfunctions) can easily translate to HCPs being concerned only with the physical aspects of disease (Farre & Rapley, 2017), in other words the domain of ‘the body’ in the ICF. This can place a limitation on the conceptual thinking about assessing fall risk in older adults as it obscures the fact that fall risk assessment in older adult is a collaboration between HCPs and older adults, and not just a medical procedure (Légaré et al., 2018). HCPs could address the older adults' needs more comprehensively by considering all areas in their lives that could contribute to and increase their risk of falling. By focusing purely on the medical or body aspects when discussing fall risk factors in older adults, the preventive and management process can easily become restrictive, since the medical model for intervention is considered inadequate (Jensen, 2006). Although a need remains for further research to address problems in implementing a biopsychosocial model of prevention, assessment and intervention, changes could be facilitated by bringing evidence-based research on the needs of specific populations (e.g., older adults with a risk of falling) to the attention of HCPs (Farre & Rapley, 2017).

By shifting the focus away from cause towards impact – such as the impact of the limitations in older adults' ability to participate in life situations and engage in activities – all health conditions are placed on an equal footing and allowed to be compared using a common metric, the ruler of health and disability (World Health Organization, 2002). When fall risk factors in older adults are identified through the lens of the impact of the condition on the individual, older adults are viewed holistically by also considering the activities in which they participate and the environment in which these activities take place. Hence, the ICF highlights the value of including the impact of not only activities and participation, but also of environmental and personal factors on a person's abilities in the assessment of health. It thereby reiterates that the focus of FRATs should also move towards including these factors. Our results indicated that of the 22 FRATs developed after 2001, all but three still focused mainly on the domain of the body. By neglecting to focus on the individual and environmental levels when identifying fall risk factors in older adults, important factors such as quality of life, participation in activities, housing, family caring and even access to health care services, could be overlooked in the older adult's preventive and management plan.

This results of this review indicated that that only a minimal number of ICF codes representative of the environmental influence of fall risk were represented in the FRATs. Within this small number of environmental codes, the majority were linked to the use of medication. So, even when the effects of personal and environmental factors on fall risk are mentioned, the impact of the medical model is still prevalent in the significant number of codes mentioning medication. This could also be because a vast amount of research has been done on the topic of fall risk and medication use. By moving away from the medical model towards a biopsychosocial model, even our knowledge of the environmental and personal effects of falls on older adults could be enhanced. A major part of existing literature focuses on risk factors in isolation (Ek, 2019), thus ignoring possible interactions between other factors and older adults' fall risk. As risk factors seem to cluster within older adults, it is suggested that both the clinical and research focus of managing fall risk in older adults should focus more on the whole risk profile of the individual and on the effect of cumulative risk, and less on isolated medical risk factors (Ek, 2019).

This begs the question of whether activities and participation, as well as environmental and personal influences, do not perhaps play a bigger role in increased risk of falling than what is currently addressed by available FRATs. The medical focus of the most popular tools being used could also discourage HCPs from adopting a more biopsychosocially inclined model, as they continue to use – on a regular basis – FRATs focused on the medical model. This could be because HCPs see the available and validated FRATs as reliable and do not feel the need to search beyond these factors. HCPs should be able and ready to evaluate all factors contributing to a condition, not only the ones they are used to, and also not just the factors supporting a biological or organic cause of the condition (Farre & Rapley, 2017). By moving away from a medical model and towards a biopsychosocial model such as the ICF, it is during intervention possible to evaluate and consider the effects of fall risk on activities and participation in older adults, as well as to assess the contributing environmental and personal factors.

One way of moving forward the discourse around environmental and personal factors in fall risk factor identification could be to capture the perspectives and views of the older adults themselves about their own risk of falling. This could be done in a qualitative research study on how fall risk factor identification in older adults may be improved. As falls and fall risk constitute a multidimensional construct, particularly in older adults, a comprehensive ICF-based measure that not only reflects a medical perspective (with a focus on the domain of the body) but also captures older adults' perceptions and views about individual factors (related to the activities and participation domain) and the environmental domain, could lead to a more holistic preventive and management focus in future.

This is the end of the excerpt of the pre-print version of "Factors included in adult fall risk assessment tools (FRATs): A systematic review" by de Clercq et al. (2020a).

3.4.6 Personal factors

In the ICF framework, the contextual factors domain consists of both environmental and personal factors. Considering the substantial volume of literature on application of the ICF, personal factors (unlike the other ICF domains) have no purpose stated for their inclusion in the framework, no definition with inclusion and exclusion criteria, a noticeable absence of codes, and no guidelines for documentation (Simeonsson et al., 2014). On completion of the systematic review, the personal factors included in the review were reconsidered based on the ICF literature surrounding this topic. This is because the ICF only classifies environmental factors, while personal factors remain unclassified due to the wide variability of these factors (World Health Organization, 2002). As the ICF focuses on a holistic approach to health and functioning, it is counterintuitive to classify the people themselves based on their personal attributes and social background (Müller & Geyh, 2015). During the review in hand, the researcher initially erred on the side of caution and, as such, classified as personal factors two fall risk factors that could have been included in the ICF classification, namely "post-operative" and "symptoms of falling". These two factors could be coded to the ICF as "b110" and "b240" respectively. Therefore, after reassessment, both codes were included in Phase 2 of the research study to be considered for inclusion in the ICF code set for fall risk factors in older adults. The result is that only four personal factors were present in this systematic review, namely "medical conditions" (n=39), "fall history" (n=22), "age" (n=6) and "sex" (n=4).

3.4.7 Conclusion of the literature perspective

The literature perspective of this research study focused on conducting a systematic review in order to identify factors that had been utilised to

- quantify fall risk in older adults by means of a FRAT;
- map these fall risk factors to ICF codes using the ICF linking rules; and
- determine the weighted focus between the different ICF domains.

This is an important and complex body of literature that needed to be explored and reviewed to infer key findings related to FRATs and increase current knowledge on this topic.

A total of 43 FRATs were included in the review and produced a total of 493 fall risk factors. These factors were linked to ICF codes using the linking rules (Cieza et al., 2019), resulting in a total of 952 second-level ICF codes. The majority (91%; n=39) of the FRATs focused on the body function and structure domains and the linked ICF codes indicated that 65% of the codes related to the body function and structure domain. Considering that most researchers who develop FRATs are also HCPs, it was to be expected that there would be a strong focus on the level of the body, as this is generally the HCPs main scope of practice and the domain they aim at improving. Difficulties on the level of the body are what drive the need and concerns of patients to seek advice from HCPs to improve their health (Bickenbach et al., 2012).

The literature review also highlighted the impact of the medical model on the development of FRATs, even after the introduction of the ICF as a biopsychosocial model. Typically, the FRATs included in the review focused only marginally on the impact of activities and participation that result in falls in older adults. Likewise, environmental factors that can increase an older adult's risk of falling were also neglected and mostly excluded. The ICF gives a holistic representation of a person's fall risk, which includes a person's ability to participate in activities, and also acknowledges the impact environmental factors could have on that ability. With most FRATs focusing to such a negligeable extent on factors other than the body, the effect of these factors may not be considered in clinical consultations with members of this population. As such, the perspectives of HCPs would also be required to determine whether they consider factors other than those related to the body to be relevant to fall risk in older adults. It was important to gather the perspectives of the target population (the older adults themselves) to determine which factors they considered relevant, as their view might prove to differ from the perspectives found in the literature and held by the HCPs. By gathering all three perspectives, a relevant list of codes could be determined, to be used during the next phase.

3.5 Target Population Perspective (Focus Groups with Older Adults)

3.5.1 Aim

The aim of the focus groups was to gain insight into the perceptions of a diverse group of older adults regarding falls and to link these perceptions to the ICF.

Several of the following paragraphs were adapted from an excerpt of the pre-print version of "Older adults' perspectives on fall risk: Linking results to the ICF" by de Clercq et al. (2020b) in *Journal of Applied Gerontology*. For the published article, refer to Appendix 3E. Permission was obtained from the publisher to include this paper as part of my PhD thesis (Appendix 3F).

3.5.2 Rationale

Over the past three decades, fall risk research mainly focused on known fall risk factors in prevention and intervention programmes (Park, 2017). Older adults' perceptions about falls and fall risk factors have received little attention. However, research has shown that perceptions play an important role in limiting older adults' fall risk. Insight into the perceptions of older adults on fall risk could increase the level of knowledge on falls, related injuries, and preventive measures for both older adults and HCPs working with them (Gamage et al., 2018). The ICF views functioning and disability as outcomes of interactions between the health condition (in this case, falls) and contextual factors (in this case, fall risk factors), which include environmental risk factors (de Clercq et al., 2020a). Using the ICF provides a scientific basis for understanding older adults' perceptions of fall risk factors. It also yields a holistic model and universal language for HCPs to describe and classify these perceptions, thereby increasing the possibility of early identification of fall risk factors in older adults (World Health Organization, 2002). As a qualitative approach, focus groups generate excellent data on the group's views, beliefs and perceptions. This data is used to fulfil the aim of the study, namely to provide insight into the perceptions of older adults in the South African context regarding falls, and to link these perceptions to the ICF (Desai & Potter, 2006).

3.5.3 Method

A focus group methodology was used. Focus groups have the potential to elicit new information through the continuous exchange of experiences. This process triggers new thoughts and associations that provide the researcher with an in-depth understanding of the relevant research constructs (Nyumba et al., 2018).

3.5.4 Participants

Participants were selected based on criteria related to age, literacy, corrected vision and hearing, intelligible speech, as well as the self-reported absence of any neurological diagnoses (Table 3.7).

Table 3.7: Criteria for the selection of focus group participants

Criteria	Method	Theoretical justification
65 years or older	Biographic questionnaire	This study focused on older adults as they are at a higher risk of falling (World Health Organization, 2015).
Basic English literacy skills	Biographic questionnaire	The questionnaires were administered in English, as it is one of the most frequently spoken languages in Tshwane (South African Government, 2018).
Corrected vision and hearing within the normal limits	Participant selection screening questionnaire	Best corrected hearing within normal or near-normal limits was required to actively participate in the focus groups, while best corrected vision was required to complete the questionnaires (Trujillo Tanner et al., 2018).
Basic communication skills	Participant selection screening questionnaire	Basic communication skills ensured all participants had equal opportunities for verbal engagement during the focus groups (Carey & Asbury, 2012).
No self-reported neurological diagnosis, excluding dizziness or vertigo	Participant selection screening questionnaire	Falls could occur due to neurological diseases and for the purposes of this study any additional neurological contributing factors, other than vertigo or dizziness, were excluded (Homann et al., 2013).

Participants were recruited from multicultural "senior citizen" church community groups in the greater Tshwane area to allow for optimal heterogeneity of the selection criteria. These groups were representative of the local residents from all over the area. The discussions were held in both urban and rural areas to include different contexts and be representative of different ethnicities. Thirty-six participants met the selection criteria, and all consented to participate in this study. Each of the three focus groups, which lasted 60 to 90 minutes, contained a mixed sex group (males and females) of 10 to 15 participants (Stewart & Shamdasani, 2014).

3.5.5 Material and equipment

Material and equipment used during the focus groups included a participant selection screening and biographic questionnaire (Appendix 3G), a focus group script (Table 3.9), as well as voice recordings and field notes, which enabled the researcher to gain a clear understanding of the perceptions of the older adults in the focus groups. Table 3.8 summarises the materials and equipment used to conduct the focus groups, and includes the aim, rationale and method.

Table 3.8: Material and equipment for focus groups

Material and equipment	Aim	Rationale	Method
Participant selection screening and biographic questionnaire (Appendix 3G)	To ensure that participants meet the selection criteria and for descriptive purposes.	A quick and easy way to ensure participants meet the selection criteria and to increase the validity of the study (Sargeant, 2012).	Participants completed the screening questionnaire prior to commencement of the focus groups.
Focus group script (see Table 3.9 for more detail)	To explore the areas deemed important by the participants regarding fall risk.	Method to structure the group and ensure that the discussion remains focused. Ensures procedural consistency across the three groups to heighten the data integrity (Hennink, 2014).	During the focus groups, the script was followed to ensure that all areas and questions were addressed in a similar manner across the three focus groups.
Voice recording	To document all verbal discussions with the participants during the focus groups.	Reviewing recorded data increased the validity of the data and the study (Gregory & Radovinsky, 2012) and assisted with transcriptions.	All focus groups were recorded for verbal interactions.
Field notes	To document all relevant non-verbal information obtained during the focus groups.	Reviewing notes on non-verbal interactions can increase the validity of the recorded data and provide context to the data (Gregory & Radovinsky, 2012).	Field notes were made of relevant non-verbal interaction in the focus groups.

The custom-designed materials enabled the researcher to gain a rich and clear understanding of the perceptions of the older adults during the focus groups. The focus group script (Table 3.6) contained specific steps for conducting the focus groups to ensure that the discussions remain focused, to ensure procedural consistency and to heighten data integrity.

Table 3.9: Focus group script used during the discussions

Focus group script item	**Procedure**
Welcome and introduction	The researcher welcomes everyone to the discussion and introduces herself and her colleague. All the participants introduce themselves.
Housekeeping rules	The following housekeeping rules are discussed: • Everyone is encouraged to participate • No one will be forced to participate • All answers / opinions are encouraged – there are no 'dumb' questions or comments • Everyone's opinion is important • No one is to laugh at or dismiss another person's opinion / comment • Only one person should talk at a time and give everyone equal opportunity to participate • The researcher will ask a few questions, but you are welcome to go back to a previous question if we have already moved to the next question • All participants should have completed the informed consent form and the biographic questionnaire before we can continue the discussion
Ice breaker	The ice breaker question is discussed: "If you had to give up one of your senses (hearing, seeing, feeling, smelling, tasting) which would it be and why?"
Short introduction of the research aim	The researcher explains the aim of the study to the participants: "This research study focuses of falls in older adults and aims to develop a list of factors that can influence an older adult's risk of falling."
How can participants help to achieve these aims	The researcher explains that the aim of the focus group is to identify the factors that older adults (participants) consider to be facilitators (decreasing your chances of falling) and barriers (increasing your chances of falling) to the identification of fall risk in older adults. The participants can assist by giving their input on these factors.
Discussion questions	1. Which factors do you think can increase your chance of falling? (Prompts if needed: Prompt about specific factors related to (i) body functions & structure level, (ii) activities & participation level and (iii) environmental factors.) 2. Which factors do you think can decrease your chance of falling? (Prompts if needed: Prompt about specific factors related to (i) body functions & structure level, (ii) activities & participation level and (iii) environmental factors.)
Member checking	The participants' responses are summarised and read back to them. They are invited to make changes, add information or clarify their contributions.
Closing	The researcher thanks everyone for their time and contribution and the session is closed.

The two specific questions asked to the groups were, "Which factors do you think can increase your chance of falling?" and "Which factors do you think can decrease your chance of falling?" The questions were broad enough to ensure a wide variety of answers and prompts were only used to gather specific information from the participants related to ICF domains. This ensured that the aim of the paper was achieved, namely that the older adults' perceptions regarding fall risk were obtained.

3.5.6 Data collection procedures

Ethics permission was obtained from the relevant university's Ethics Committee (Appendix 3L). Participants were recruited via local church groups in the greater Tshwane municipality. The contact persons of five church groups were contacted, and their groups were invited to participate in the study. Three groups responded. The researcher visited two of these contact persons and had a telephonic conversation with the third group's, explaining the purpose and selection criteria of the study. A time and date to conduct each focus group was arranged at the venue where their weekly meetings take place. This made the participants feel comfortable in familiar surroundings and no additional logistical arrangements and costs (e.g., travel) had to be incurred.

In the first group, on average 12 to 14 adults attended the meetings; in the second group, 12 adults usually attended; and in the last group, the average number of attendees was 20. On the day of the meeting of the first focus group, 14 potential participants attended and all of them met the selection criteria and agreed to participate. When the second group met, 10 adults complied with the selection criteria and agreed to participate. Due to bad weather, only 12 adults attended the meeting of the third group, but all of them met the selection criteria and agreed to participate. The meetings of the first and second focus groups were conducted in Afrikaans and the third group used English. All the participants were conversant in the specific language used in the focus group and this language was also used for their weekly meetings.

The aim of the focus groups and research study was explained to the participants at the beginning of the gathering, as per the focus group script. All participants completed a biographic questionnaire (Appendix 3G). Questions that arose about the study were discussed and the participants were alerted to the fact that the discussion would be audio recorded for data analysis purposes. The researcher, co-supervisor and participants were introduced to one another and housekeeping rules were discussed. As the participants knew each other, rapport was quickly established. During the discussion, the researchers also made notes of the discussion to assist with member checking.

Each focus group commenced with an ice breaker question This served as an interactive and engaging start to the session and served to create a sense of familiarity among the participants and the researcher. It also strengthened group cohesion and laid a foundation for discussing fall risk and its consequences in older adults. Although participants were encouraged to participate and freely share their thoughts and ideas about falls and fall risk, they were not forced to interact. At the end of each focus group, the participants were encouraged to add their final thoughts and ideas on the topic until no further information was given, signalling data saturation. Member checking was done by reading a summary of the main discussion points back to the participants, thereby providing them the opportunity to clarify their contributions or add additional information. In all three focus groups, minimal clarification or additions were made and all participants agreed that the final script was reflective of the discussions.

3.5.7 Rigour

Three groups were recruited from diverse backgrounds to ensure that multiple perspectives were obtained. A focus group script was used to ensure consistency between the groups and participant verification (member checking) was done. Member checking, or response validation, is one of the most crucial techniques for establishing credibility in qualitative studies (Birt et al., 2016). This also facilitated a shared understanding, which further improved the accuracy of the data collected (Harper & Cole, 2012).

3.5.8 Data analysis procedures

Verbatim transcripts of the three focus groups were collapsed into one data source for analysis. In order to determine the perceptions of older adults regarding their risk of falling and to link these perceptions to the ICF, data analysis consisted of three approaches to content analysis, namely a summative, conventional and directed approach.

Firstly, in the summative approach, a latent content analysis procedure was used by transcribing the three focus groups and then analysing the data with ATLAS.ti 8, a workbench for the qualitative analysis of large bodies of textual data (http://atlasti.com).

Thereafter, a conventional content analysis approach was adopted by following an inductive thematic data analysis procedure (as suggested by Braun and Clarke (2012)). This entailed the following:

- Familiarisation with the raw data by exploring the transcribed data of all three focus groups
- Creating a coding manual to code the data, making sure to capture both the semantic and conceptual meaning

- Searching for themes by grouping codes with a similar meaning together
- Reviewing themes independently and grouping related themes together in domains that reflected the most prominent ideas
- Defining and naming the themes, and reaching consensus between the researcher, supervisor and co-supervisor on the themes
- Writing up the data to reflect the themes identified in the focus group data

Next, a directed content analysis approach was followed and a deductive data analysis was made to link the identified themes to the ICF, using the ICF linking rules (Cieza et al., 2019). This allowed the researchers to categorise the older adults' perceptions.

The researcher, supervisor and co-supervisor were all familiar with linking qualitative data codes to ICF codes and therefore independently reviewed the themes and linked them to the ICF. A 96% agreement score between the researcher, supervisor and co-supervisor was obtained and, after discussion, 100% consensus was reached on all themes and ICF codes. This resulted in a total of 298 ICF codes.

Lastly, a summative content analysis was made in the form of a word frequency count. This determined the number of times specific words were used during the focus groups, resulting in a word frequency list with a total of 2250 unique words. Summative content analysis identifies and quantifies certain words in a text to understand the contextual use of the words or content, and to explore usage.

3.5.9 Findings

The three focus groups included a total of 36 participants, illustrated in Figures 3.2 and 3.3.

Figure 3.2: Biographic information of participants (N=36)

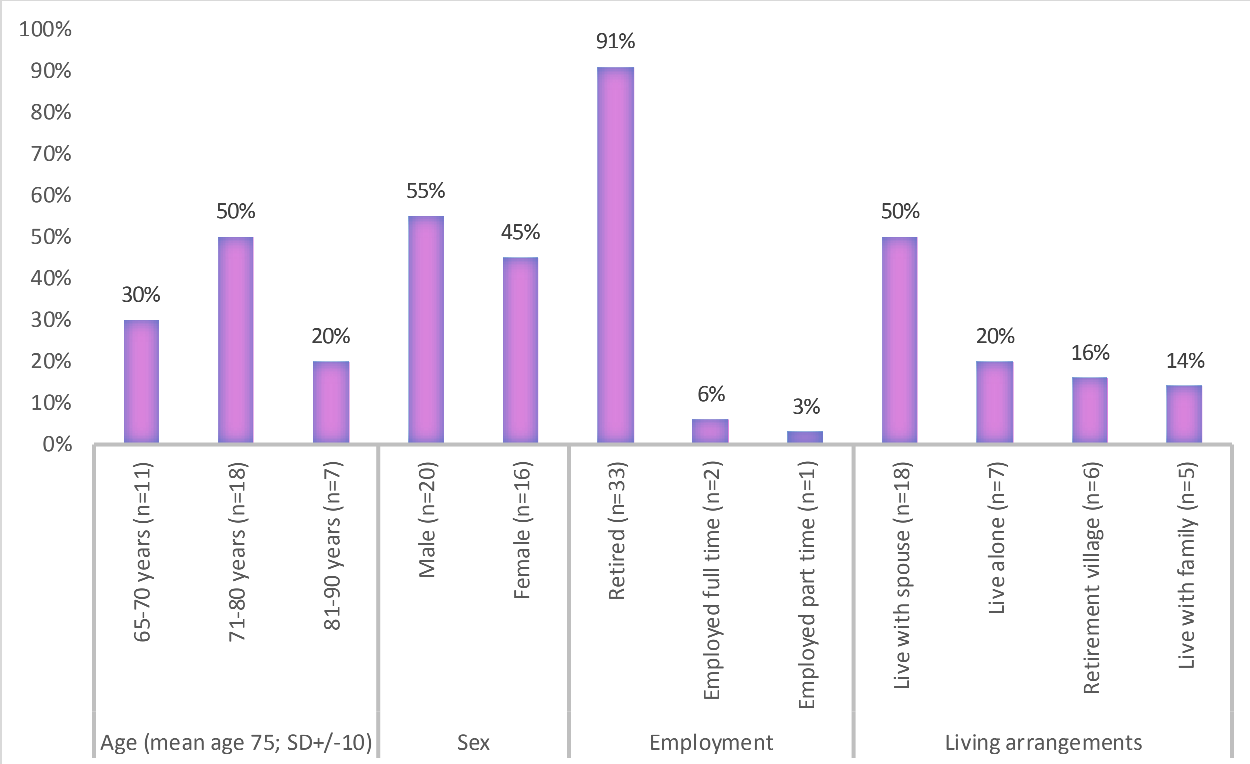
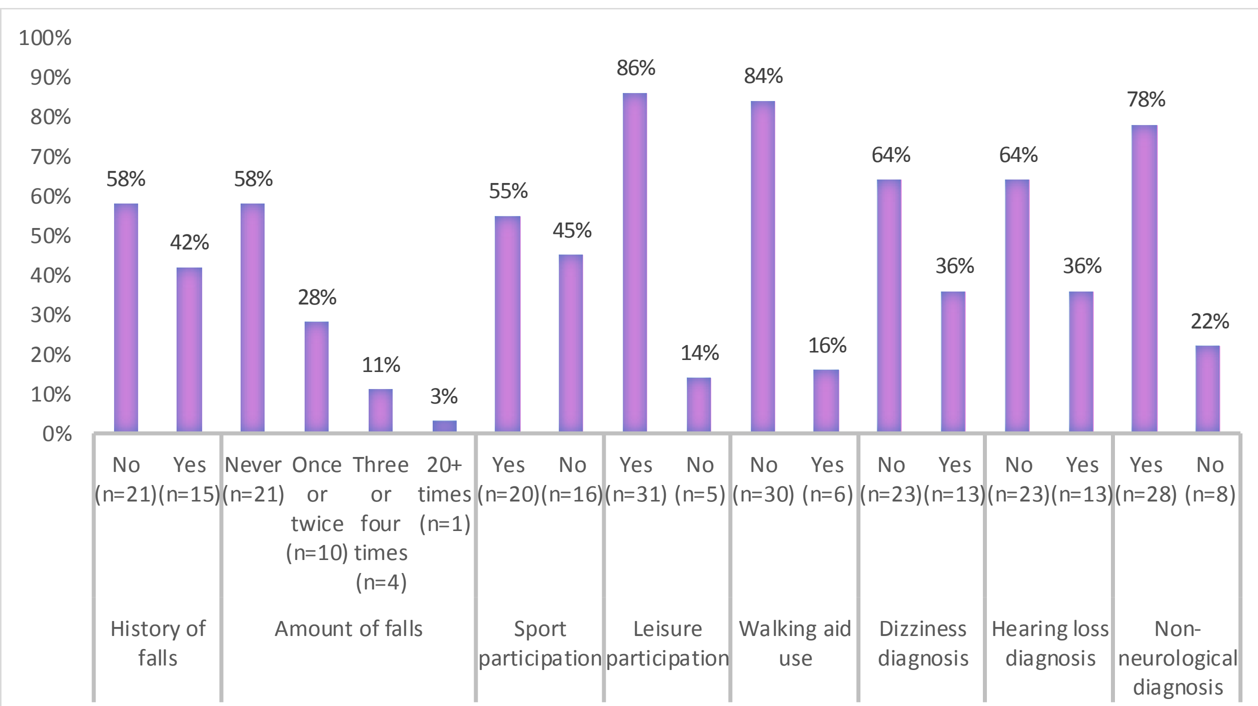


Figure 3.3: Participants' case history relevant to falls (N=36)



Half of the participants were between 71 and 80 years old, with an almost equal distribution between the sexes (56 male and 44 female) (see Figure 3.1). As expected, the majority of participants were retired persons (91%). Half (50%) of the participants lived with a spouse or partner in their own home. Apart from biographic information, information related to falls and fall risk was also sought.

Figure 3.2 shows that 58% (n=21) of the participants had not had a fall previously. Of the 15 who had, one had fallen more than 20 times. Fall history was documented irrespective of age or sport/leisure participation. Five participants sustained injuries from the falls and three were hospitalised after falling. More than half of the participants (55%) indicated that they engage in sport activities, while the majority (86%) participate in leisure activities. Only 16% (n=6) of the participants made use of a walking aid. In total, 36% of the participants (n=13) had been diagnosed with dizziness or vertigo and another 36% (n=13) with hearing loss. The majority of participants (78%) had been diagnosed with one or more non-neurological chronic condition such as high cholesterol, high blood pressure or arthritis. In accordance with the selection criteria, none of the participants had been diagnosed with a neurological condition at the time of the focus groups.

The older adults' perceptions relating to fall risk awareness in everyday life allowed for the identification of three main sets of data:

(i) Thematic data analysis that resulted in 104 focus group themes
(ii) Deductive analysis that linked the focus group themes to the ICF, resulting in 298 ICF codes
(iii) Word frequency count analysis that determined the most frequently used keyword categories (used 10 or more times) in the focus groups (n=31)

The first category captured a spectrum of possible reasons that could increase fall risk. The predominant reasons for explaining an increased risk of falling were "floor surface" (n=18); "know your own limitations" (n=9); "fear of falling" (n=8); "exercise" (n=7); "vision" (n=7); "animals" (n=6); "hand railings on stairs" (n=6); "blood pressure" (n=5) and "shoes" (n=5).

The second category resulted in a deductive analysis of the focus group codes, which was used to link the focus group themes (n=92) to the ICF. A total of 92 focus group themes were linked to the ICF and due to the nature of the linking rules, one focus group theme could appear in more than one ICF domain (results indicated in Table 3.10). Three themes could not be linked to the ICF, as these were classified as personal factors, namely “age”, “trust in God” and “medical conditions” (items that would typically be coded as codes in the International Statistical Classification of Diseases and Related Health Problems [ICD]). The 92 themes resulted in a total of 298 ICF codes, as depicted in Table 3.10.

Table 3.10: Results of themes linked to the ICF

Body function & structure domain	Activities & participation domain	Environmental factors domain
b210 - Seeing function (n=13)	d110 – Watching (n=13)	e150 - Design, construction and building products and technology of buildings for public use (n=37)
b152 - Perceptual functions (n=12)	d460 - Moving around in different locations (n=10)	e155 - Design, construction and building products and technology of buildings for private use (n=21)
b770 - Gait pattern function (n=10)	d429 - Changing & maintaining body position, other specified & unspecified (n=8)	e115 - Products and technology for personal use in daily living (n=11)
b152 - Range of emotions (n=10)	d920 - Recreation and leisure (n=8)	e350 - Domesticated animals (n=8)
b755 - Involuntary movement reaction functions (n=8)	d410 - Changing basic body position (n=5)	e140 - Products and technology for culture, recreation and sport (n=8)
b760 - Control of voluntary movement (n=8)	d449 - Carrying, moving and handling objects, other specified and unspecified (n=2)	e110 - Products or substances for personal consumption (n=7)
b140 - Attention functions (n=6)	d455 - Hand and arm use (n=2)	e580 - Health services, system and policies (n=4)
b125 - Activity level (n=5)	d430 - Lifting and carrying objects (n=1)	e120 - Products and technology for personal indoor and outdoor mobility and transportation (n=4)
b122- Global psychosocial functions (n=4)	d415 - Maintaining a body position (n=1)	e315 - Extended family (n=3)
b152 - Emotional functions (n=2)	d420 - Transferring oneself (n=1)	e310 - Immediate family (n=3)
b139 - Global mental functions, other specified and unspecified (n=2)	d450 - Walking (n=1)	e240 - Light (n=3)
b420 - Sensations associated with hearing and vestibular function (n=2)		e225 - Climate (n=2)
b134 - Sleep functions (n=2)		e298 - Natural environment and human-made changes to environment, other specified (n=2)

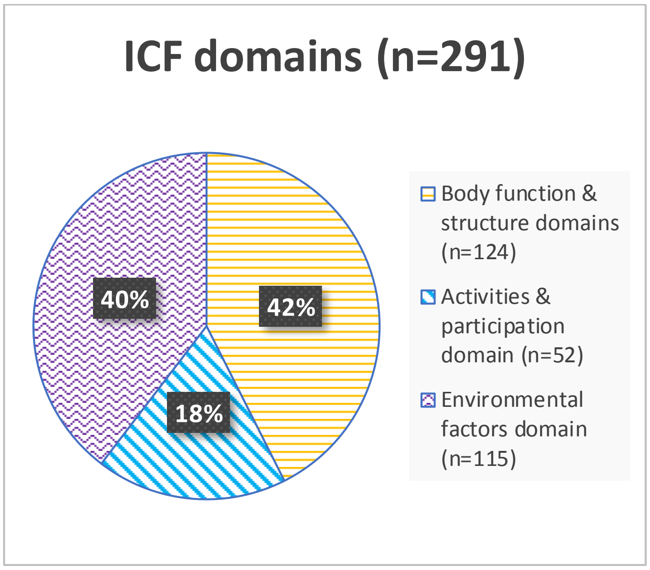
Body function & structure domain	Activities & participation domain	Environmental factors domain
b126 - Temperament and personality functions (n=2)		e230 - Natural events (n=2)
b530 - Weight management functions (n=2)		
b163 - Basic cognitive functions (n=1)		
b144 - Memory functions (n=1)		
b749-Muscle functions, other specified and unspecified (n=1)		
b260 -Proprioception function (n=1)		
b715 - Stability of joint function (n=1)		
b235 - Vestibular functions (n=1)		
s798 - Structures related to movement, other specified (n=17)		
s770 - Additional musculoskeletal structures related to movement (n=7)		
s730 - Structures of upper extremity (n=2)		
s799 - Structures related to movement, unspecified (n=2)		
s260 - Structures of inner ear (n=1)		
s750 – Structures of lower extremity (n=1)		
Total: n=124 (42%)	**Total: n=52 (18%)**	**Total: n=115 (40%)**

The linked ICF codes in each ICF domain depicted in Table 3.10 are shown in decreasing order from the code mentioned most frequently to the code mentioned least in each section. The totals of the three ICF domains were analysed using IBM's Statistical Package for the Social Sciences 24 (SPSS) (IBM Corporation, 2016). Data was checked for normality using the Shapiro-Wilk test, which indicated that each group shows a significance of <0.05, thereby not exhibiting normal distribution of the data. Next, the Friedman two-way analysis of variance (ANOVA) test was conducted to test for significant differences between the three domains (body function and structure domains, activities and participation domain, and environmental factors domain). Results indicated a statistical difference between the body function and structure domains compared to the activities and participation domain ($p<0.0001$), as well as between the activities and participation domain compared to the environmental factors domain ($p<0.0001$). There was no statistical difference between the body function and structure domains compared to the environmental factors domain ($p=0.2158$).

Due to the fact that the linking of keywords to the ICF takes into account textual meaning only and not contextual meaning also, a word frequency count was analysed. All words contained in the core vocabulary of older adults as identified by the University of Nebraska–Lincoln, were disregarded from the 2250 unique words, except for four words that were related directly to the topic ("hearing", "step", "walking", and "hands"). The remaining fringe words relevant to the context and topic discussion in the focus groups (n=267) were then analysed for frequency in context, and words with similar meanings were grouped together. When analysing the most frequently used words, it is important to consider the context in which they were mentioned, as this reflects the intention of the participants during the discussion (Sutton & Austin, 2015). This analysis resulted in 31 categories of words that were mentioned ten or more times in the focus groups. The most frequently used category was "fall" (n=213), indicating the focus groups stayed on topic during the discussion. Other than "fall", only one category was used more than 100 times, namely "vision" (n=110). Four categories were used 76 to 100 times, namely "single steps" (n=97), "walking" (n=90), "floor surface" (n=96) and "change in body position" (n=95). The two words mentioned 51 to 75 times were "age" (n=63) and "bones" (n=59). Eight words were mentioned 26 to 50 times, namely "hands" (n=45), "ladders" (n=35), "bathroom" (n=34), "hearing" (n=34), "environments" (n=33), "walking aids" (n=29), "feet" (n=28) and "animals" (n=26). The remaining fifteen words were mentioned 10 to 25 times.

Of the most frequently used categories, the top eight were also categorised under the ICF, namely "fall", "vision", "steps", "floor surface", "change in body position", "walking", "age" and "bones". These words/phrases were mentioned a total of 823 times and compared to the total amount of ICF codes (n=298) generated during the focus groups (see Figure 3.4).

Figure 3.4: ICF domains of all codes (n=291) compared to most frequently used word domains (n=823)



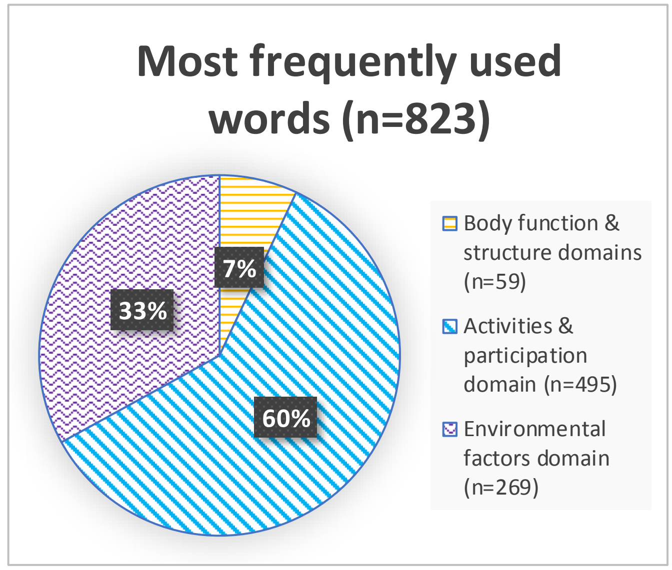


Figure 3.4 highlights the difference between linking all the textual words to the ICF and linking to it the most frequently used categories, within the context of the discussion.

3.5.10 Discussion

Participants were able to stay on topic, as is indicated by the fact that "fall" was the most used word during the discussion. Environmental factors such as "floor surface", "fear of falling", "animals" and "shoes", were frequently mentioned. This correlates with a recent study by Hanger (2017), which suggests that changing standard floor surfaces to low-impact floor surfaces can significantly reduce fall-related injuries, although it does not alter the overall risk of falling. The idea of injury-reducing flooring was also embraced by older adults in a study by Gustavsson et al. (2018), indicating that this could be a significant method of reducing fall-related injuries in homes and hospitals. A study by Brundle et al. (2015) suggests that an unfamiliar or unsafe environment, inside or outside the house, is not in itself a risk factor for falls in older adults, but rather that the person's ability to cope with the environment and their interaction with the environment are significant.

As part of a person's interaction with the environment, one also has to consider the role of older adults' reaction time and the effect of reaction time on mobility and gait. Declines in physical and cognitive functioning are indeed risk factors for falls in older adults, as their postural control, attention and abilities decrease compared to younger adults (Jehu et al., 2017). Exercises and intervention programmes could be beneficial for improving gait, reaction time and dynamic postural control in older adults, which could lead to a decreased risk of falling (Morrison et al., 2014).

The results from the textual analysis indicated that body function and structure codes were identified most frequently. This correlates with Pohl et al. (2015) who also found that participants often mentioned the ageing body and physical impairments as reasons for increased fall risk. Physical impairment and several medical conditions, including central nervous system disorders that could increase older adults' fall risk, were regularly mentioned during the discussion. This corresponds with the findings of Ensrud et al. (2003) who indicated that the use of certain central nervous system drugs could lead to increased physical impairments and falls.

Textual analysis, as used when using the linking rules to link all the themes to the ICF, focuses just on the text itself, whereas contextual analysis, as used when linking the most frequently used categories to the ICF, focuses on the surrounding conditions and environment in which the text was written – in this case, the focus groups (Drisko & Maschi, 2016). When a comparison is made between the textual and contextual analysis of all the themes and the most frequently used ICF domains, the results are vastly different, indicating the importance of considering the context in which the words were used. This supports the notion of Gamage et al. (2018) that we should use patient narratives to increase our knowledge on falls and preventive measures for older adults.

The contextual analysis of the most frequently used domains indicated that the activities and participation domain was the main focus of these discussions. Participants were more concerned about the impact that falls have on their ability to participate in daily activities than about their physical limitations such as age or medical conditions. As they age, the HRQoL of older adults might be influenced by declining physical health and functioning, due to the age-related changes in their bodies (Halaweh et al., 2018). This could lead to older adults being less active and less engaged in their daily life and recreational activities. The study by Gustavsson et al. (2018) came to the same conclusion, stating that participants were less interested in focusing on fall risks and more interested in discussing the impact falls have on social interactions and issues concerning daily activities. They further mention that older adults view falls as common and normal, and not as something out of the ordinary in the ageing population. They also reiterated that most older adults find it difficult to establish a balance between taking risks and engaging in opportunities of being independent in their daily life (Tinetti & Kumar, 2010), which could lead to falls and a reduced HRQoL. Focusing on the activities and participation domain also supports the notion by Johnson (2018) that increased knowledge of the activities that are linked to falls could be a valuable contribution to the prevention of falls in community-dwelling older adults.

Involvement in everyday activities, both social and mental, and maintaining such an involvement, is one of the factors that can increase a person's HRQoL (Nightingale et al., 2018). Participating in different life events is important for HRQoL; however, information about how falls restrict participation among older adults remains scant. A recent study by Liu (2017) indicates that about 70% of community-dwelling older adults experience participation restrictions. This supports the data gathered in this study and the notion that older adults' fall-related discussions indeed centre around the activities and participation domain, which is significantly related to fear of falling and could lead to a reduction in HRQoL (Pohl et al., 2015). Fear of falling could include fear of the actual fall, fear of the physical consequences, fear of pain, fear of loss of independent living and/or fear of being embarrassed (McMahon et al., 2011). It is therefore important for HCPs to recognise and take into account how older adults view falls, including their fear of falling, and how these perceptions may influence their daily activities and subsequently their HRQoL (Trujillo et al., 2014). Fall prevention is an important contributor to good health and improved HRQoL, and for older adults, it is imperative to stay active despite being concerned about falling (Halaweh et al., 2018).

In conclusion, the focus groups provided insight into the perceptions of older adults in the South African context with regard to falls and to link these perceptions to the ICF. This enabled identification of the following key themes from these discussions:

- Older adults perceived environmental factors such as floor surfaces, animals and footwear to be contributing factors that could increase their risk of falling.
- Falls were considered to have a significant impact on their ability to participate in daily activities and life events.
- Participation in activities was more important than the physical limitations that medical conditions or age placed on their lives.
- Falls were considered to be common and normal in the ageing population.

The final theme highlighted the importance of taking notice of older adults' narratives, including their fear of falling, and to increase clinical knowledge on falls and provide preventive measures for this population. The identified themes are important for further research and the scientific discourse could be moved forward by comparing the perceptions of the older adults to the perceptions of HCPs and researchers (as documented in the literature dealing with falls in older adults), thereby compiling a holistic picture based on the aspects considered important by all three groups of stakeholders.

This is the end of the excerpt of the pre-print version of "Older adults' perspectives on fall risk: Three focus groups" by de Clercq et al. (2020b).

3.5.11 Conclusion of the target population perspective

The focus groups with older adults used a novel approach by linking the responses from the focus groups to ICF codes and exploring an innovative topic that could be used to advance research in the area of fall risk in older adults. The results of this section revealed that, when taken in the context of the discussions, the participants focused mainly on the activities and participation domain and the impact that falls have on their ability to interact and participate with others. This could be due to the fact that older adults tend to focus on what they themselves can control to reduce their own risk and on home modifications that they are likely to conduct to reduce their personal fall risk (Dellinger, 2017).

The tone of the discussions in both focus groups was relaxed, and the older adults were eager to participate, to tell their story and to be heard. Most of the discussions involved personal anecdotes and the participants were all willing to share their opinions and perceptions. This is possibly because fall prevention is an important issue to most older adults and something they are concerned about and want to discuss (Halaweh et al., 2018). The participants not only thought about the physical ramifications of falls, but also about the social consequences and reduced activity levels that could be caused by falls. Although most participants held the perception that falls are generally age related, they also wanted to know how to prevent falls and what they could and should do to decrease their personal risk of falling. As they grew older, it could become more difficult to maintain their HRQoL (Halaweh et al., 2018) and therefore preventing falls was one of the means they had to improve their HRQoL.

The perspective of the target population indicated a strong focus by the participants on their ability to continue participating in activities and events in daily life, to increase their own HRQoL, and to decrease their personal risk of falling. This finding emerged as several participants asked what they themselves could do to reduce fall risk in their own lives. Several medical reasons and body structure and function codes were identified during the data analysis, which shows that the participants were aware of the impact conditions such as physical disabilities, strokes and osteoporosis could have on a person's fall risk. They also did not discount the need for and importance of taking medication for several health conditions and they were quite aware that such substances could also increase fall risk.

The focus groups with older adults revealed five fall risk factors that they as target population considered relevant, but that were not included in the FRATs in the literature perspective: "paying attention to one's environment" (activity); "regular screening for health conditions" (environmental factor); "support of family members" (environmental factor); "drinking lots of water" (body function); and "faith in God" (personal factor). This finding emphasises the importance of including the older adults' own narratives in this process, as the identified factors could indeed have an impact on their fall risk. One factor they added, namely paying attention to one's environment, was especially important as this is something most older adults could do to mitigate their risk. According to Saeed et al. (2018), paying attention to the structures of the environment – especially steps and stairs (two factors that exacerbated their fear of falling) – is an important factor in prevention of falls in this population.

Taking note of older adults' own narratives regarding falls and fall risk could lead to more active involvement from the older adults themselves during prevention and management. Older adults who believe that HCPs do not really listen to their concerns are less likely to participate in fall risk interventions, whereas older adults whose HCPs recommend programmes suitable to their needs and who have family and friends who are positive about the fall prevention programme, are more likely to participate (McMahon et al., 2011). HCPs thus have an important role to play in the early identification of risk factors in this population and as such, their perspectives on the topic are needed to ensure that a comprehensive account is compiled of the fall risk factors relevant to older adults.

3.6 Clinical Perspective (Focus Groups with Health Care Practitioners)

3.6.1 Aim

The aim of the focus groups with the HCPs was twofold:

(i) To provide insight into the HCPs' perspective in the South African context with regard to factors associated with falls in older adults

(ii) To link these factors to the ICF as a universal framework for describing functioning, thereby moving towards incorporating the perspectives of HCPs as key stakeholders into future fall risk guidelines for clinical practice.

Several of the following paragraphs were adapted from an excerpt of the pre-print version of "The perspectives of health care practitioners on fall risk factors in older adults" by de Clercq et al. (2020c), in Health SA Gesondheid. (For the published article, refer to Appendix 3H). Permission was obtained from the publisher to include this paper as part of my PhD thesis (Appendix 3I).

3.6.2 Rationale

HCPs could give additional insights into the current knowledge of fall risk factors in older adults and so identify potential fall risk factors not previously documented, based on their clinical experience. According to Burgon et al. (2019), HCPs have an important role in influencing patient's opinions on falls and reducing fall risk. Gathering qualitative data on HCPs' perspectives on fall risk factors in older adults, and linking these factors to the ICF as a universal framework could give insight into the clinical manifestation of fall risk in this population. This process could also be used to incorporate HCPs perspectives into future fall risk prevention guidelines for clinical practice, to identify areas to be considered when compiling a list of ICF codes, and to assist in the future development of improved strategies to prevent and manage falls in this population (Loganathan et al., 2015). All of these actions could ultimately impact older adults' HRQoL positively. HCPs are key stakeholders in the process of translating literature and research findings into clinical practice and policies (van Rhyn & Barwick, 2019). By gathering these insights, researchers could utilise the HCPs' perspectives to develop more user-friendly and appropriate clinical tools to be used in their routine preventive screening of these patients.

3.6.3 Method

Following a qualitative design, two focus groups were conducted, as these allowed the gathering of in-depth, detailed information on a novel topic – the perspectives of HCPs in South Africa on fall risk factors in older adults. This method ensured that all voices in the discussion were heard, thereby enhancing contemporary knowledge (Carey & Asbury, 2012).

3.6.3.1 Participants

(i) Recruitment

As the Protection of Personal Information (POPI) Act (Protection of Personal Information Act, 2013) prohibits the Health Professions Council of South Africa (HPCSA) to provide the contact details of currently practising HCPs to researchers, an internet search was conducted to identify potential facilities with multidisciplinary teams from both the public and the private sector by using a convenience sampling method. Search terms included 'frail care facilities Gauteng'; 'multidisciplinary facilities Gauteng'; 'holistic health care facility Pretoria'; and 'public hospitals Gauteng'. Ten facilities – six private and four public – were identified in the same geographical area and subsequently contacted telephonically. The research study was explained to the relevant authority figures, and they were invited to have the HCPs in their facility to participate. Of the ten facilities, five agreed to consider the proposal, and eventually two of the relevant authority figures consented to their facility's participation. Twenty-five potential participants were identified and a total of 18 participants consented; eight of these participants were practising in the public sector and ten in the private sector. The two venues that were chosen were easily accessible to the majority of participants in each sector. Two focus groups were held, one in the boardroom of a local public hospital where weekly meetings were held, and one at a private institution, where approximately half of the participants worked. According to Jacobsen (2021), the ideal size of focus groups is between five and ten participants per group, and in this study, the first focus group had ten participants and the second group had eight participants.

(ii) Participant selection

Participants were selected based on their registration with either the HPCSA or the South African Nursing Council (SANC). They had to have at least three years of experience in their profession and at least two years of experience working with older adults. Experienced HCPs were more likely to be confident about their own knowledge and abilities, and hence they could be expected to contribute meaningfully to the discussions (Femdal & Solbjør, 2018).

Because no consensus existed regarding the disciplines that would typically constitute a fall risk management team, an internet search for international fall clinics/centres was conducted to determine the most prominent disciplines involved. Based on the clinics' websites and publicly available information, the following six disciplines were included in this study:

1. Medical practitioners (they educate patients regarding health and personal factors that cause falls) (Phelan et al., 2015).
2. Nurses (they typically screen and then refer patients for a more in-depth assessment) (Unsworth, 2003).
3. Podiatrists (they focus on foot health care, patient education, health promotion, rehabilitation and mobility) (Frankowski, 2010).
4. Physiotherapists (they can assess environmental and behavioural factors that cause falls or increase fall risk) (Sherrington & Tiedemann, 2015).
5. Occupational therapists (they review patients' home and work environments for hazards and evaluate their personal and environmental limitations that contribute to falls) (American Occupational Therapy Association, 2020).
6. Audiologists (they identify, diagnose and provide treatment options for patients with vestibular disorders that lead to dizziness and imbalance, including fall risk) (Republic of South Africa, 2009).

(iii) Participant description

All 18 participating HCPs were part of established multidisciplinary teams. They included two ear, nose and throat (ENT) specialists, two general practitioners (GPs), three nurses, three podiatrists, three physiotherapists, three occupational therapists and two audiologists. On average, the participants had 16 years' experience in their current profession (ranging from three to 40 years), with an average of 14 years' experience working with older adults (ranging from two to 39 years). The majority were female (n = 14).

Figure 3.5: Service delivery by participants (average per month)

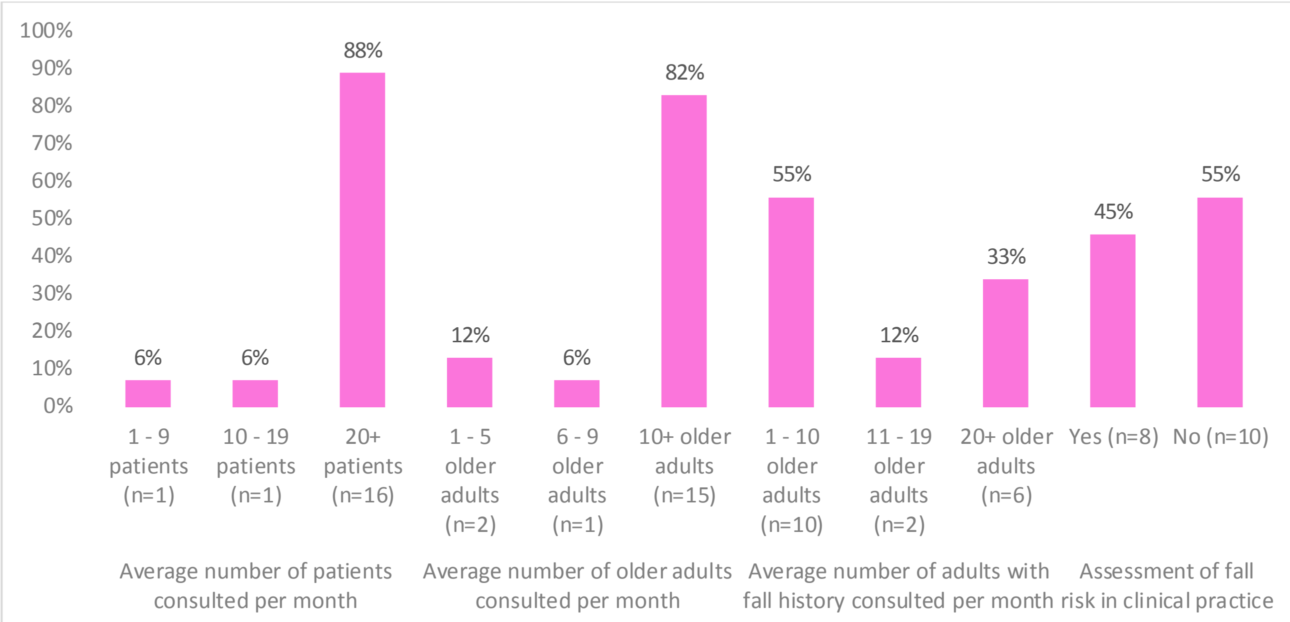


Figure 3.5 shows that 88% (n=16) of the participants consulted at least 20 patients per month in their practice, 82% (n=15) consulted at least 10 older adults per month in their practice and 55% (n=10) of the participants consulted up to 10 older adults with a fall history per month. Just over half of the participants (55%; n=10) indicated that they assess fall risk in the patients with whom they consult in their practices. However, during the discussions, all of the participants agreed that they assess fall risk in an informal manner only, or by asking the patient to perform certain tasks (e.g., standing in tandem or walking down the corridor). The occupational therapists and the nurses in the public hospital indicated that they use some of the elements of two popular FRATs (Berg Balance Scale and Morse Fall Scale) as part of an informal assessment of patients with a potential fall risk.

3.6.3.2 Materials and equipment

A biographic questionnaire (Appendix 3J) was compiled based on the inclusion criteria. It was completed prior to the focus groups to ensure that all potential participants met the selection criteria, and to obtain descriptive information (Sargeant, 2012). A focus group script (Appendix 3K) was followed to structure the group and ensure that the discussion remains focused and consistent across the two groups, thereby heightening procedural consistency and data integrity (Hennink, 2014). The script contained specific steps for conducting the focus groups, and asked a specific question: 'Which factors do you think can increase or decrease an older adult's chance of falling?' The open-ended question was broad enough to ensure a wide variety of answers. After discussing the main question, the participants were asked to consider fall risk factors that they thought HCPs could assess in clinical practice. HCPs normally use critical thinking skills when they reflect on knowledge derived from interdisciplinary subject areas (Zayapragassarazan et al., 2016). Thus, they were able to relate the topic at hand to their own knowledge and experience in the assessment and intervention of patients whom they see on a regular basis (The Health Foundation, 2012). By asking the participants to relate fall risk factors to their own experience in the assessment of their patients, the researcher was able to prompt more critical consideration of the relevant factors and enrich the data gathered during the discussions. The materials and equipment enabled the researcher to gain insight into the perspectives of HCPs regarding fall risk factors in older adults.

3.6.3.3 Data collection procedures

Prior to data collection, the relevant ethics permission was obtained from the University of Pretoria (Appendix 3L). All participants completed the informed consent form and biographic questionnaire before commencement of the focus group. The aim of the research was explained in the focus group script, all questions that arose were discussed, and participants were alerted to the fact that the discussion would be audio-recorded and notes be made during the discussion. Everyone introduced themselves, and as most of the participants knew each other, rapport was established quickly.

Member checking was performed at the end of the focus groups by reading a summary of the main discussion points back to the participants and providing them the opportunity to clarify, alter or add to their contributions. Minimal clarifications were needed for both focus groups. On completion of the second focus group, data saturation was reached. No new data was gathered compared with the first discussion, and there was no notable difference between the two groups that could have influenced the data (Fusch & Ness, 2015). Data obtained from the two groups was thus collapsed into a single data set.

3.6.3.4 Rigor

Participants were recruited from the same disciplines, but from different employment contexts, to ensure that multiple perspectives were obtained. Participant verification in the form of member checking was carried out, which is considered a crucial technique for establishing credibility in qualitative studies (Birt et al., 2016). It also facilitates a shared understanding and improves the accuracy of the data collected (Harper & Cole, 2012). Data was analysed by using ATLAS.ti software, which enabled the complex organisation and retrieval of data and improved the rigor of analysis (Pope et al., 2000). The researcher, supervisor and co-supervisor independently reviewed the themes as well as the codes linked to the ICF. After discussion, they fully agreed on the themes and the ICF codes to which each theme had been linked, thus resulting in a 100% inter-coder agreement score.

3.6.3.5 Data analysis procedures

Verbatim transcripts of the two focus groups were collapsed into one data source for analysis. Two consecutive data analysis procedures were employed. Firstly, an inductive thematic analysis was conducted to address the first objective as suggested by Clarke and Braun (2017). The five steps of data categorisation included

(i) familiarisation with the data by reading and rereading the verbatim transcriptions;
(ii) assigning preliminary codes;
(iii) searching for themes by the researcher;
(iv) reviewing themes by the researcher, supervisor and co-supervisor; and
(v) defining and grouping similar themes together.

After thorough discussion, the researcher, supervisor and co-supervisor agreed on the final list of themes.

Secondly, to address the second objective, the identified themes were linked to the ICF by means of a deductive data analysis in the form of a directed content analysis, by using the ICF linking rules (Cieza et al., 2019). For the purposes of this study, a two-level ICF classification was sufficient, and its first seven linking rules were utilised:

(i) Acquiring good knowledge of the conceptual fundamentals of the ICF – i.e., by studying the ICF manuals and coding system prior to data analysis.

(ii) Identifying the main concept of each of the themes that would be linked to the ICF – i.e., in 'walking outside on the sidewalks', the main concept would be 'walking'.

(iii) Identifying any additional concepts for each theme that could also be important and should be considered when linking the theme to the ICF – i.e., additional concepts to the previous example would be 'outside' and 'sidewalks'.

(iv) Considering the popular perspectives for each identified concept and whether the perspectives on the theme influenced the intended meaning of the theme – i.e., by reading current literature on the topic at hand.

(v) Identifying and documenting all the identified, meaningful concepts that would be linked to the ICF – i.e., all main and additional concepts were listed with the number of times each concept was mentioned.

(vi) Linking all the meaningful concepts to the precise ICF category – i.e., 'walking' would be linked to the ICF code 'moving around in different locations'.

(vii) Using 'other specific' or 'unspecified' ICF categories as appropriate.

All the meaningful concepts and linked codes of the identified themes were independently reviewed by the researcher, supervisor and co-supervisor, and an initial inter-coder agreement score of 98% was established. After discussion, full agreement on all the linked ICF codes was established.

3.6.4 Results

The focus group participants provided rich insights into their perspectives with regard to the fall risk factors that they considered relevant in older adults. Table 3.11 lists the points that emerged from these discussions, as well as how frequently each of the themes was mentioned, as per the first objective of the focus groups with the HCPs.

Table 3.11: Focus group themes (n=42)

Theme	N	Theme	N	Theme	N
Medical history/conditions	14	Hearing	2	Confusion	1
Floor surfaces	10	Inactivity	2	Crutches with worn rubbers	1
Balance / instability	8	Mental health status	2	Deformities	1
Medication	6	Muscle strength	2	Diet	1
Dizziness and vertigo	5	Orientation	2	Sex	1
Vision	4	Orthopaedic problems	2	General personality	1
Alcohol	3	Small dogs	2	Get up quickly	1
Fear of falling	3	Accessibility of home	1	Post-operative	1
Footwear	3	Age	1	Range of motion of lower limbs	1
Gait	3	Blood pressure	1	Small children	1
Pain	3	Bone density	1	Standing without support	1
Environment	2	Calcification in the eardrum	1	Things lying on the floor	1
Fall history	2	Climbing on a ladder	1	Too much physical support	1
Foot conditions	2	Clothes	1	Walking	1

A total of 42 themes emerged from the data, and the most prominent themes were identified as ‘medical history/ conditions’ (n=14), followed by ‘floor surfaces’ (n=10) and ‘balance/instability’ (n=8). One theme, ‘medication’, was mentioned six times, and ‘dizziness and vertigo’ five times, followed by ‘vision’ four times. Five fall risk factors were mentioned three times each, ten factors were mentioned twice, and the remaining factors (n=21) were only mentioned once during the discussions. Of the identified themes, four themes could not be linked to the ICF as they were classified as personal factors, namely ‘age’, ‘fall history’, ‘sex’ and ‘medical history/conditions’. The remaining 38 themes could be linked to the ICF, resulting in a total of 142 ICF codes (see Table 3.12) to satisfy the second objective of the focus groups with the HCPs.

Table 3.12: Focus group themes linked to the ICF domains

Body function domain	ICF code	N	Body structure domain	ICF code	N	Activities & participation domain	ICD code	N	Environmental factors domain	ICF code	N
Seeing	b210	10	Additional musculoskeletal structures related to movement	s770	13	Watching	d110	10	Design, construction and building products and technology of buildings for private use	e155	13
Proprioception function	b260	8	Structures of inner ear	s260	6	Maintaining a body position	d415	5	Products or substances for personal consumption	e110	9
Sensations associated with hearing and	b420	7	Structures related to	s798	3	Moving around in	d460	4	Products and technology for	e115	5

Body function domain	**ICF code**	**N**	**Body structure domain**	**ICF code**	**N**	**Activities & participation domain**	**ICD code**	**N**	**Environmental factors domain**	**ICF code**	**N**
vestibular function			movement, other specified			different locations			personal use in daily living		
Vestibular functions	b235	6	Structures of the trunk	s760	2	Changing & maintaining body position, other specified & unspecified	d429	2	Domesticated animals	e350	2
Gait pattern function	b770	4	Structures of lower extremity	s750	1	Changing basic body position	d410	1	Extended family	e315	1
Emotional functions	b152	4	Structures of external ear	S240	1	Hand and arm use	d445	1	Natural environment and human-made changes to environment, other specified	e298	1
Control of voluntary movement functions	b760	3							Natural events	e230	1
Sensations of pain	b280	3									
Activity level	b125	2									
Global psychosocial functions	b122	2									
Involuntary movement reaction functions	b755	2									
Muscle power functions	b730	2									
Orientation functions	b114	2									
Consciousness function	b110	1									
Mobility of joint functions	b710	1									
Perceptual functions	b156	1									
Stability of joint function	b715	1									
Temperament and personality functions	b126	1									
Weight management functions	b530	1									
Total percentage	**61 (43%)**			**26 (18%)**			**23 (16%)**			**32 (23%)**	

As depicted in Table 3.12, of the 142 ICF codes identified from the 38 themes mentioned in the discussions, 43% (n=61) were in the body function domain, 23% (n=32) in the environmental factors domain, 18% (n=26) in the body structure domain and 16% (n=23) in the activities and participation domain.

Differences were calculated between all four ICF domains, and statistically significant differences were found for the comparison of the body function domain (n=61) vs the body structure domain (n=26) – $p<0.0001$; the body function domain (n=61) vs the activities and participation domain (n=23) – $p<0.0001$; and the body function domain (n=61) vs the environmental factors domain (n=32) – $p=0.0003$. No statistically significant differences were reported for any of the other comparisons ($p>0.05$).

3.6.5 Discussion

As expected, the results of this study revealed that the main focus of HCPs was on the body function domain. The way in which the body functions is important to HCPs, as there is no better indication of successful assessment and intervention outcomes than improved functioning. Difficulties in functioning urge patients to seek advice from HCPs so as to improve their health and increase their own functioning (Bickenbach et al., 2012). When considering the ICF, a person's functioning (on the level of the body) is important for HCPs, as it describes the outcome of four main health strategies, namely prevention, cure, rehabilitation and support. The ICF also offers a common terminology for the improvement of clinical and patient-orientated assessment instruments (Bickenbach et al., 2012; World Health Organization, 2002). A comparison between the perspectives of HCPs and a recent systematic review of FRATs (de Clercq et al., 2020a) indicated that the majority of perspectives of both the FRATs and the HCPs focused on the body function domain. It also showed that the knowledge of HCPs was in line with contemporary knowledge in the field, as the majority of the codes mentioned in both the literature and the clinical perspectives were similar.

Functioning is furthermore related to the environment, as it essentially captures the functioning of the body in 'real-life contexts' and reflects how the body and the environment interact with one another to either increase or decrease older adults' ability to function. It was not at all surprising that approximately a quarter of the factors mentioned by the HCPs could be categorised in the environmental factors domain. Almost all the activities of daily life are complex and require complex and dynamic interaction with the environment (Young & Williams, 2015) (e.g., walking along an uneven pavement or stepping over obstacles on the floor). The physical environment poses the most significant environmental risk for older adults, and often home hazards are the most important to consider in understanding and preventing falls, especially for persons who fall repeatedly (Letts et al., 2010). A person's interaction with the environment is therefore important, as this type of interaction could increase fall risk.

When considering the ICF as a whole and the number of codes in each ICF domain, about a third of the second-level codes are in the activities and participation domain. This domain entails three concepts: one is the task being executed (activities) (World Health Organization 2002) and the others are two participation concepts, namely attending (physical presence) and involvement in activities (the type of activities the older adult is participating in, whilst being physically present) (Adair et al., 2018; Imms et al., 2017). During the focus groups, however, the HCPs had a minimal focus on the activities and participation domain and the factors they did discuss in this domain, were only activity related. They did not include any participation factors such as domestic life activities, relationship activities and community or social life activities in this domain. One possible reason for this could be that activities or the execution of a task, are more closely related to the body functions domain, and as such, more in line with the role of HCPs in the clinical identification of fall risk factors. Participation codes, on the other hand, are more in line with intervention strategies, which were not discussed during the focus groups.

A comparison between the clinical perspectives of HCPs on fall risk factors in older adults and the systematic review of FRATs (de Clercq et al., 2020a) revealed that the HCPs mentioned two relevant factors that were not captured in existing FRATs, namely 'muscle power functions' and 'mobility of joint functions'. Both of these ICF codes are important to consider for fall risk in older adults, as they relate directly to the ability to execute mobility activities. Almost 25% of older adults have mobility limitations, and both muscle power functions and (to a degree) mobility functions are modifiable impairment limitations on the mobility of older adults (Bean et al., 2007). Studies have shown a link between lack of mobility and flexibility, and between poor walking ability and balance in older adults (Martínez-López et al., 2014). HCPs were clearly aware of the importance of these two aspects and included them in the discussions, thus revealing the importance of these clinical perspectives in the discussion of fall risk factors in older adults.

HCPs have a crucial role to play in identifying fall risk factors in older adults and also in preventive health care. They do this by assisting older adults in understanding the importance of reducing their own risk, not only in terms of their own medical condition, but also with regard to their environment and how they engage and participate in activities. Early identification of fall risk factors, combined with appropriate referrals to other HCPs when needed, could reduce older adults' fall rate by up to 24% (Howcroft et al., 2013; Phelan et al., 2015). These findings revealed that HCPs' knowledge was in line with current literature. HCPs were also well aware of the importance of including not only aspects related to the body function domain, even though this was their main focus. By gathering the perspectives of HCPs on the topic at hand, the necessary clinical evidence was obtained to support the development of a holistic measure to identify fall risk factors in older adults. Such a measure could guide preventive and management strategies for this population, as well as be used easily and consistently by HCPs. It could assist HCPs in the preventive health care of older adults with a fall risk and guide older adults themselves on how to reduce their own risk of falling.

This is the end of the excerpt of the pre-print version of "The perspectives of health care practitioners on fall risk factors in older adults" by de Clercq et al. (2020c).

3.6.7 Conclusion of the clinical perspective

During the final section before the merging of the items, the HCPs' clinical perspectives regarding fall risk factors in older adults were gathered. The participants were all well versed in consulting with older adults and were part of multidisciplinary teams. Although the majority did not formally assess fall risk in their everyday clinical practice, they all assessed fall risk to some extent in an informal manner during consultations, whether by asking specific questions or by performing a physical evaluation. Some of the HCPs mentioned that they would have referred their patients to other HCPs, but they did not know to whom.

In comparison to the focus groups with the older adults, the HCPs were concerned about the amount of time that was needed for the discussion. Some were rushed to leave, as they had other matters to attend to. This was in stark contrast to the sessions with older adults who were not concerned about the time it took to complete the discussions and who stayed for refreshments afterwards. It was interesting to note that both audiologists who participated in the HCPs' focus groups did not feel that they should assess fall risk or that it was within their scope of practice. They would therefore rather consider referring the patient to HCPs in a different discipline (despite uncertainty about where to the referral should be). None of the participants utilised any formal

FRATs, but three HCPs did use some items from two popular FRATs in an informal manner when assessing fall risk in older adults, as they did not assign scores or utilise the complete FRAT.

In the private HCPs group, some time was spent on discussing medical aid claims and reimbursements for conducting fall risk assessment in older adults. Talks also centred on the ability of patients to pay for this service should they not have medical aid funds available, whereas there was almost no discussion about cost or medical aids in the group from the public sector. The focus groups with the HCPs provided insight into two fall risk factors, both from the body function domain – "muscle power functions" and "mobility of joint functions". These factors had not been included in the systematic review or in the older adult focus groups, thus expanding the list of factors relevant to fall risk in older adults.

3.7 Trustworthiness and Dependability

Trustworthiness or rigor refers to the degree of confidence in data, interpretation, and methods used to ensure the quality of a study (similar to validity in quantitative studies). Dependability is the stability of the data over time and different conditions of the study (similar to reliability in quantitative studies) (Connelly, 2016). The trustworthiness and dependability of Stages 1 to 3 of this research study involved several different strategies.

For the literature perspective, dependability was established by means of avoiding bias in the retrieval of articles. This was done by making a list of keywords and combinations used, as well as specific inclusion and exclusion criteria, to increase transparency and replicability (Moher et al., 2009). Transparency and replicability were further increased by keeping meticulous records and an audit trail of all the steps taken while conducting the systematic review, so as to ensure that the data could be duplicated under similar conditions (Noble & Smith, 2015). The review was conducted to identify FRATs and, as such, no formal assessment of methodological quality or risk of bias of the included articles was performed.

For the target population perspective and the clinical perspective, strategies were incorporated to increase trustworthiness (Table 3.13) and dependability (Table 3.14) during the focus groups and subsequent data analysis process. According to Chioncel et al. (2013), focus groups are generally regarded as strong on credibility.

Table 3.13: Increasing trustworthiness of the target population and clinical perspectives

Strategy	Technique	Application of technique in present research study
Credibility / internal validity	Discussions in multiple contexts	The three focus groups with older adults represented different contexts and living conditions, namely urban and semi-urban. The two HCPs focus groups represented both public and private health sectors.
	Audio recordings	All discussions were audio recorded for verbatim transcription, as reviewing the recorded data increases the credibility of the data and the study (Gregory & Radovinsky, 2012) and ensures that none of the comments are missed or omitted by the researcher. It also assists with transcribing the data in an accurate manner and prevents misinterpretation of the data. Credibility was further enhanced by combining the voice recordings with field notes to document non-verbal interactions and provide context to the data (Gregory & Radovinsky, 2012).
	Member checking	Member checking was conducted at the end of each focus group. The participant responses were validated by inviting participants to comment on the initial notes of the transcript and to gauge if these notes accurately reflected their perceptions. This ensured that the focus groups' notes reflected the participants' responses and not the researcher's own viewpoints and knowledge (Birt et al., 2016). The researcher remained neutral during the focus groups, used a predesigned script and did not interject her own viewpoint during the discussions – all in an attempt to minimise researcher bias (Anney, 2014).
	Verbatim transcripts	Verbatim transcripts of the discussions were made to reduce bias and increase overall validity (Halcomb et al., 2006). The researcher transcribed the discussions herself, having first-hand knowledge of both the verbal and non-verbal exchanges with the participants, thus reducing errors by a third party due to lack of knowledge. By creating an exact record of the discussions, data analysis was based on a complete account of the all factors the participants discussed and ensured that nothing was forgotten or missed (as could have happened during note taking) (Halcomb et al., 2006).
Transferability / external validity	Multiple groups	Three focus groups were conducted to represent a wider section of the population. Multiple focus groups ensured that the research findings would represent plausible information about the topic.
Authenticity	Representativeness of participants	Authenticity depends on the selection of appropriate participants for the study sample (Cope, 2014). This provides a rich, detailed description of the research constructs and in this study, focus groups were conducted to obtain

Strategy	Technique	Application of technique in present research study
		insight into both older adults' and HCPs' perceptions on falls and fall risk. The focus group participants were selected according to specific selection criteria to ensure wide representation based on the specific selection criteria of the study, and to ensure optimal group dynamics (Noble & Smith, 2015) and representation of the general local population. This provided the advantage of obtaining a deeper meaning of the constructs from the participants and increasing the reader's understanding.
Researcher bias	Neutral questions and comments / use of focus group script	Using a focus group script is a technique to structure the groups, focus the discussion and ensure procedural consistency across several focus groups (Hennink, 2014). During the focus groups, the script was followed to ensure that all areas and questions were addressed in a similar manner across the focus groups – in the case of both the older adults and the HCPs. By following a focus group script, the researcher minimised her own interjections into the discussion to influence the discussions in any way, thus reducing researcher bias.

This study aimed to improve the trustworthiness as well as the dependability of the study by employing the strategies indicated in Table 3.14.

Table 3.14: Increasing dependability of the target population perspective and the clinical perspective

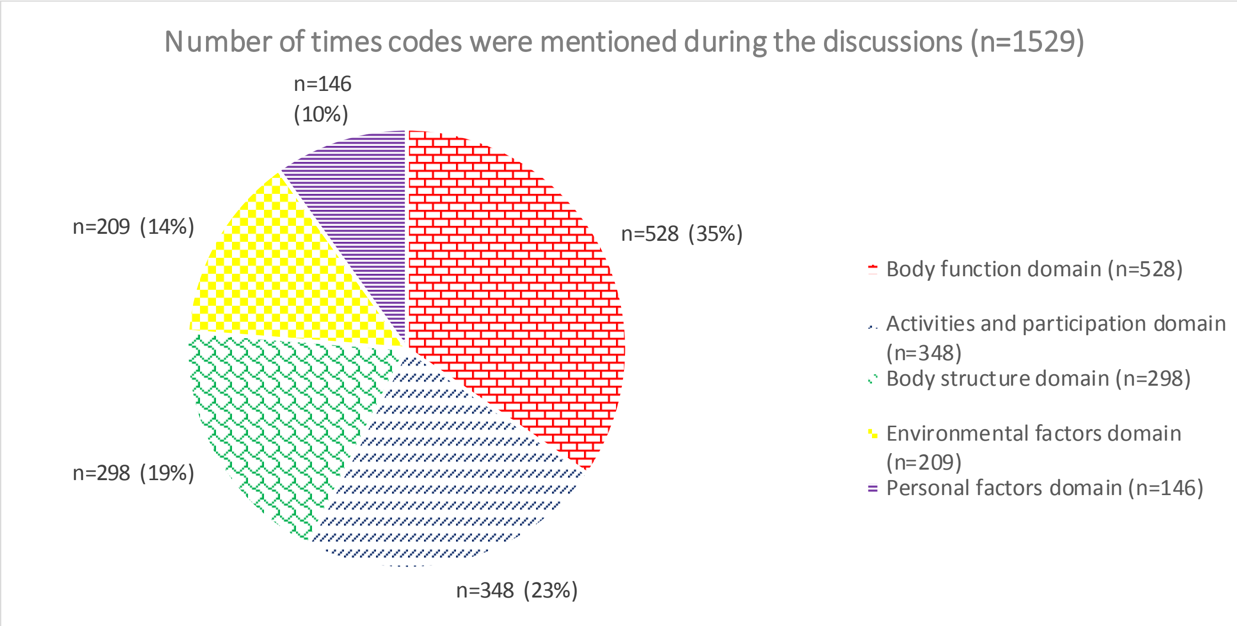
Strategy	Technique	Application of technique in present research study
External reliability	Dependability of the data / audit trail	The data had to be dependable over time, so that the results could be duplicated under the same conditions (Connelly, 2016). This was ensured by keeping meticulous records and an audit trail of all the steps taken during data collection and analysis.
	Data saturation	Focus groups with both the older adults and the HCPs were conducted to the point of data saturation, until no new information or codes emerged from the focus groups and the need for further coding was redundant.
Internal reliability	Multiple discussions with others	Reliability was further enhanced by discussions with PhD peers and supervisors as sounding boards to ensure that the researcher's interpretation of the data was consistent and transparent (Noble & Smith, 2015).
	Inter-rater reliability	The researcher made use of two secondary raters to evaluate the correctness and consistency of the data and codes obtained during the data analysis process.

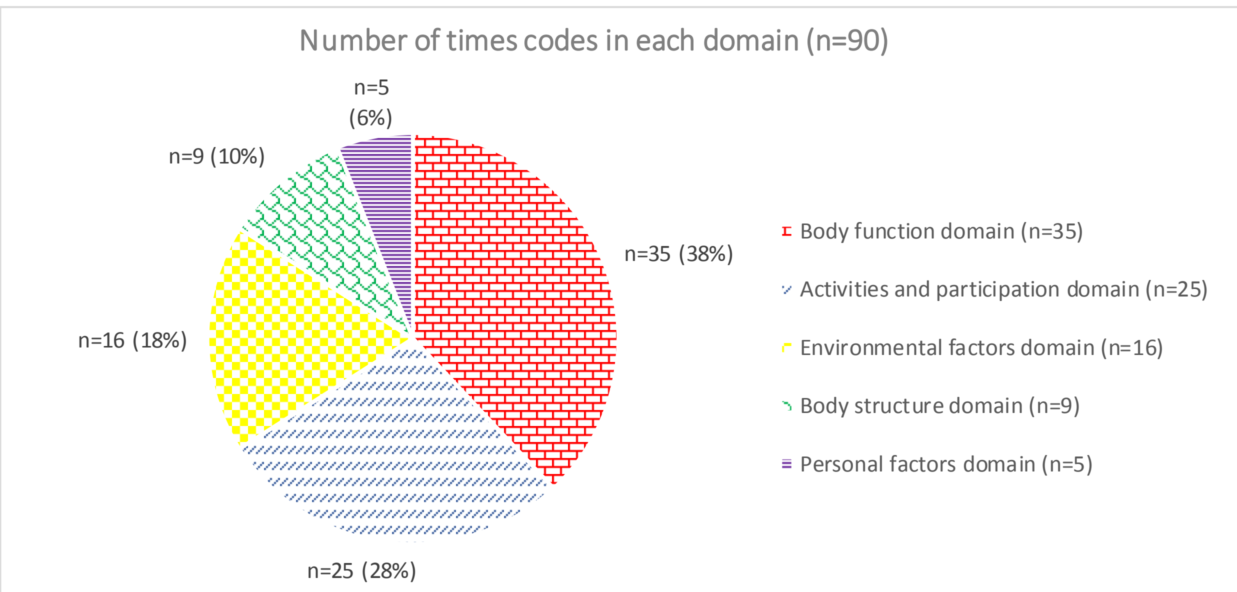
By following these strategies to improve the trustworthiness and dependability of the research study, the overall quality and correctness of the data obtained was improved.

3.8 Merging of the ICF Codes

The fall risk factors gathered from the systematic review as well as the focus groups with the older adults and the HCPs were linked to the ICF, and subsequently they were merged and consolidated into one relevant ICF code list. The results of the data merge are illustrated in Figure 3.6 by comparing the number of times the ICF codes were mentioned during the discussions (where one code could be mentioned several times) compared to the number of unique ICF codes per domain (regardless of the number of times the codes were mentioned in the discussions).

Figure 3.6: Comparison of ICF codes per domain vs the number of times codes were mentioned





As depicted, the number of ICF codes per domain, as well as the number of times the codes were mentioned during the discussions, proved to be highest in the body function domain and in the activities and participation domain. The least number of codes and least number of times the codes were mentioned during the discussions, were in the personal factors domain. This indicates that functioning and the ability to participate in activities were important considerations for developing guidelines for the prevention and management of fall risk in older adults. The best description of outcomes in health care intervention strategies is the ability to improve a person's functioning, as difficulties in functioning are what drive the need and concerns of patients to seek advice from HCPs to improve their HRQoL and increase their own functioning (Bickenbach et al., 2012).

When considering the number of second-level codes in the ICF per domain (n=362), the results of Phase 1 (excluding personal factors (n=85) that cannot be compared to the ICF) closely align with the ICF domains in terms of percentage of codes in each domain, indicating a close representation of the ICF domain (Table 3.15).

Table 3.15: HCPs ICF codes compared to ICF codes per domain

Source	Total number of codes	Body function domain		Body structure domain		Activities and participation domain		Environmental factors domain	
	N	N	%	N	%	N	%	N	%
Phase 1 merged items	85	35	41%	9	11%	25	29%	16	19%
ICF	362	114	32%	56	15%	118	33%	74	20%

The ICF provides a framework for describing functioning of older adults, and in this study, the framework was employed to guide the organisation of the ICF codes related to fall risk factors in older adults. As such, all the ICF codes identified in Phase 1, as well as the source of each code, are illustrated on the ICF framework (see Figure 3.7).

Figure 3.7: ICF framework and source of ICF codes

Fall risk factors in older adults

Body Function domain

- Consciousness function [*SR]; *Orientation functions* [*SR; OA; HCP]
- Intellectual functions [*SR]
- *Global psychosocial functions* [*SR; OA; HCP]
- *Activity level* [*SR; OA; HCP]
- *Temperament and personality functions* [*SR; OA; HCP]
- Sleep functions [*SR; OA]; Global mental functions [*SR; OA]
- Attention functions [*OA]
- Memory functions [*SR; OA]
- Psychomotor functions [*SR]
- *Emotional functions* [*SR; OA; HCP]
- Perceptual functions [*SR; HCP]
- Basic cognitive functions [*SR; OA]
- *Seeing functions* [*SR; OA; HCP]
- Hearing function [*SR]
- *Vestibular functions* [*SR; OA; HCP]
- *Proprioception function* [*SR; OA; HCP]
- Additional sensory functions [*SR]
- Sensations of pain [*SR; HCP]
- *Sensations associated with hearing and vestibular functions* [*SR; OA; HCP]
- Sensations associated with cardiovascular and respiratory functions [*SR]
- Defecation function [*SR]
- *Weight management function* [*SR; OA; HCP]
- Water, mineral and electrolyte balance function [*OA]
- Urination functions [*SR]
- Mobility of joint functions [*HCP]
- *Stability of joint function* [*SR; OA; HCP]
- Muscle power functions [*HCP]
- Muscle endurance functions [*SR]
- Muscle functions [*SR; OA]
- *Involuntary movement reaction functions* [*SR; OA; HCP]
- Control of voluntary movement functions [*SR; HCP]
- *Gait pattern functions* [*SR; OA; HCP]
- Neuromusculoskeletal- and movement-related functions [*SR]

Body Structure domain

- Structures of external ear [*OA]
- *Structures of inner ear* [*SR; OA; HCP]
- Structures of respiratory system [*SR]
- Structures of urinary system [*SR]
- Structures of upper extremity [*SR; OA]
- *Structures of lower extremity* [*SR; OA; HCP]
- Structures of the trunk [*SR; HCP]
- *Additional musculoskeletal structures related to movement* [*SR; OA; HCP]
- *Structures related to movement, other specified* [*SR; OA; HCP]

Activities & participation domain

- *Watching* [*SR; OA; HCP]
- Listening [*SR]
- Carrying out daily routine [*SR; OA]
- Communicating with – receiving – spoken message [*SR]
- Speaking [*SR]
- *Changing basic body position* [*SR; OA; HCP]
- *Maintaining a body position* [*SR; OA; HCP]
- Transferring oneself [*SR; OA]
- *Changing and maintaining body position, other specified and unspecified* [*SR; OA; HCP]
- Lifting and carrying objects [*SR; OA]
- *Hand and arm use* [*SR; OA; HCP]
- Walking [*SR; OA]
- Moving around [*SR]
- *Moving around in different locations* [*SR; OA; HCP]
- Moving around using equipment [*SR]
- Washing oneself [*SR]
- Toileting [*SR]
- Dressing [*SR]
- Looking after one's health [*SR]
- Looking after one's safety [*SR]
- Acquisition of goods and services [*SR]
- Preparing meals [*SR]
- Doing housework [*SR]
- Caring for household objects [*SR]
- Recreation and leisure [*SR; OA]

Environmental factors domain

- *Products or substances for personal consumption* [*SR; OA; HCP]
- *Products and technology for personal use in daily living* [*SR; OA; HCP]
- Products and technology for personal indoor and outdoor mobility and transportation [*SR; OA]
- *Products and technology for culture, recreation and sport* [*SR; OA; HCP]
- Design, construction and building products and technology of buildings for public use [*SR; OA]
- *Design, construction and building products and technology of buildings for private use* [*SR; OA; HCP]
- Climate [*SR; OA]
- *Natural environment and human-made changes to environment, other specified* [*SR; OA; HCP]
- Natural events [*OA; HCP]
- Light [*SR; OA]
- Immediate family [*OA]
- Extended family [*OA; HCP]
- Personal care providers/personal assistants [*SR]
- *Domesticated animals* [*SR; OA; HCP]
- Support and relationships [*HCP]
- Health services, system and policies [*OA]

Personal factors domain

- *Age* [*SR; OA; HCP]
- Fall history [*SR; HCP]
- Sex [*SR; HCP]
- *Medical conditions* [*SR; OA; HCP]
- Trust in God [*OA]

*SR = Systematic Review; OA = Older Adults focus groups; HCP = HCP focus groups; Codes mentioned in all three source are in italics.

The merged ICF codes resulted in a total of 85 unique ICF codes and five unique personal factors. The domain with the most unique codes was the body function domain (n=35), followed by the activities and participation domain (n=25), the environmental factors domain (n=16), the body structure domain (n=9) and lastly the personal factors domain (n=5). Of the total number of ICF codes in each domain that was mentioned by all three sources, the body structure domain contained the most codes 44% (n=4) mentioned by all three sources; followed by the personal factors domain with 40% (n=2); the environmental factors domain with 38% (n=6); the body function domain with 37% (n=13); and lastly the activities and participation domain with 24% (n=6). The three domains with the least number of ICF codes per domain (environmental factors domain, body structure domain and personal factors domain) are also the three domains with the most codes mentioned by all three sources, possibly because the number of codes is so little. The body function domain and the activities and participation domain have the highest number of codes, decreasing the likelihood of all three sources mentioning all the codes in those two domains.

Each domain contained ICF codes that were only obtained from one source. In the body functions domain, ten codes were obtained only from the systematic review, two only from the older adults and two only from the HCPs. In the body structure domain, the systematic review revealed two unique codes and the older adults one. In the activities and participation domain, the systematic review accounted for 13 codes not mentioned in any of the other sources. The older adults provided two unique environmental factors and the systematic review and HPCs each mentioned one factor not obtained from the other sources. Only the older adults contributed one personal factor not mentioned in any of the other sources. This highlights the need to obtain rich, qualitative data from multiple data sources, as each domain of the ICF contains at least one ICF code that was only mentioned by one of the three sources. All the codes from the different sources were combined to be utilised in the next phase of the research study, where the researcher evaluated the relevance of the codes to fall risk factor identification in older adults.

3.9 Summary and Implications of Phase 1

As is typical in the first phase of sequential mixed method designs (Creswell & Creswell, 2018) as well as in ICF core set development (Selb et al., 2015), Phase 1 of this study consisted of rich, qualitative data from three different data sources. In the current study, Phase 1 employed two different data collection methods, namely a systematic review and focus groups. The published FRATs provided a total of 952 ICF codes, with a main focus on the level of the body (381 body function domain codes and 238 body structure domain codes). This finding underscores the influence of the medical model in most of the FRATs included in this review. All but four FRATs focused mainly on the level of the body, indicating that the body is regarded as the point of failure and risk in most currently available FRATs. Viewing dysfunction through the narrow view of the medical model could potentially limit conceptual thinking about fall risk factors in older adults, as it obscures the fact that fall risk factor identification also contains a collaborative element between the patient (in this case older adults) and service providers (in this case HCPs). This finding thus begs the question of whether the activities and participation domain and the environmental factors domain should not perhaps play a more prominent role in fall risk in older adults than what is currently addressed by the FRATs. The majority of the published FRATs included in the review mainly focused on assessment, where the focus on the body could be expected.

The three focus groups with the older adults, in contrast, produced less than a third of the codes suggested by the systematic review (a total of 298 ICF codes). However, based on the contextual analysis of the focus groups' most frequently used words, the emphasis was on the activities and participation domain, with the environmental factors domain following closely. Hence, not only the number of codes differed, but also the nature thereof. Despite an awareness among older adults of medical conditions that could increase their fall risk, and how certain body structures and functions contribute to this, this fact did not dominate their discussion. The analysis revealed that they were more focused on how falls could impact their ability to participate in activities of daily life and also their social interactions. The older adults took a proactive stance towards the ageing process and requested information regarding what they could do to mitigate their own risk. This was a positive indication of older adults' need for information on fall risk prevention and their willingness to participate in possible fall risk reduction programmes.

The third data source, the HCPs, surprisingly yielded the smallest number of diverse ICF codes – a mere 142 codes. This may have been because they were more focused on completing the task at hand, within a limited time frame, compared to the older adults who were also interested in telling their personal anecdotes during the discussion and did not have to keep to a specific work schedule. The analysis of these codes showed that the majority of them were linked to the body function domain (as with the systematic review), followed by the environmental factors domain. This clinical perspective on fall risk factors in older adults, compared to the systematic review of FRATs, revealed that the HCPs mentioned two relevant factors that were not captured in existing FRATs, namely "muscle power functions" and "mobility of joint functions". Both of these ICF codes are conceptually relevant to consider for fall risk factor identification in older adults, as they relate closely to the ability to execute mobility activities. HCPs were aware of the importance of these two aspects and included them in the discussions, which emphasises the importance of incorporating a clinical perspective when discussing fall risk factors in older adults. HCPs have a crucial role to play in identifying fall risk factors in older adults as part of preventive health care. They also assist older adults to understand the importance of reducing their own risk, not only related to their medical conditions, but also in their environment and how they engage and participate in activities as part of an early identification and prevention process.

All the factors identified in Phase 1 were merged to compile a list of unique ICF codes related to a specific condition (fall risk) in a specific population (older adults) to be used in the later phases of the research study.

3.10 Recommendations for Phase 2

The complete ICF classification consists of over 1400 codes, making it necessary to identify the required information among the numerous codes without spending excessive time and resources to do so (Yoon, 2013). The grouping together of codes that are relevant and applicable to a specific condition and/or population essential for a specific purpose (Pan et al., 2015), such as fall risk factors in older adults, addresses this challenge to some degree. A list of critical items for the prevention and identification of fall risk factors in older adults, which can be derived through agreement among experts, can be used by HCPs who consult with patients with a possible fall risk (Kus et al., 2012; Selb et al., 2015). In Phase 2 of this research study, a modified Delphi process is utilised to determine a list of critical codes to consider when identifying fall risk factors in older adults.

3.11 Conclusion

Phase 1 focused on item compilation – by means of a systematic review as well as five focus groups with two different sets of participants – to merge the gathered data into an initial ICF code set for fall risk factors in older adults. The factors relevant to fall risk were obtained from published FRATs as well as from older adults and HCPs, to provide insight into their perspectives as key stakeholders.

The ICF codes identified from all three perspectives were combined, resulting in a total of 85 unique ICF codes and five personal factors. By gathering all three perspectives on factors relevant to fall risk in older adults, the researcher was able to gain a more detailed and comprehensive account of fall risk factors in older adults. All the factors identified and linked to the ICF were merged and integrated to allow for the evaluation of the code set items in the next phases of the research study.

CHAPTER 4: PHASE 2 – CODE SET ITEM EVALUATION AND REDUCTION

Research methodology, results and discussion

This chapter is the second of three chapters, each focusing on a different phase of the research. It commences with a discussion of the research methodology and results obtained for the specific phase of the study. All three chapters conclude with a discussion of the results, followed by an explanation of their implications for the next phase. Chapter 3 focused on Phase 1, which entailed the sampling and compilation of a relevant list of codes for fall risk factors in older adults. Chapter 4 now focuses on Phase 2, in which this list of codes is distilled though item evaluation and reduction to obtain a critical list of factors for identifying a specific condition (i.e., fall risk factors) in a specific population (i.e., older adults), considering each domain of the ICF classification. These specific condensed lists have been termed ICF code sets and they represent one strategy for increasing the clinical utility of the ICF. Chapter 5 will detail the third and final phase in which the code set will be administered. These three chapters should thus be read in conjunction in accordance with the outline shown in Table 4.1, because the three phases of the research follow sequentially.

Table 4.1: Summary of chapter outline

Chapter 3 - Qualitative Phase 1: Code set sampling and item compilation **Research methodology, results and discussion** Study main aim and sub-aims for the phase Research design Ethical considerations			
3.1 Literature perspective: Systematic review (de Clercq et al., 2020a)	3.2 Target population perspective: Focus groups with older adults (de Clercq et al., 2020b)	3.3. Clinical perspective: Focus groups with health care practitioners (de Clercq et al., 2020c)	3.4 Merging of the ICF codes
Chapter 4 - Quantitative Phase 2: Code set item evaluation and reduction **Research methodology, results and discussion** Study main aim and sub-aims for the phase Research design Ethical considerations Pilot study Modified three-round Delphi process			
Chapter 5 - Quantitative Phase 3: Code set administration **Research methodology, results and discussion** Study main aim and sub-aims for the phase Research design Ethical considerations Pilot study Main quantitative study			

Chapter 4 begins by reiterating the main aim of this thesis and describing the sub-aims for Phase 2. Thereafter the research design and ethical considerations for Phase 2 are discussed, which entail the modified Delphi process with experts. The chapter concludes with a summary of the results and main discussion points of this phase, as well as the implications for Phase 3.

4.1 Aims

4.1.1 Main aim

The main aim of this study was to develop an ICF code set for HCPs to identify fall risk factors in older adults, as the identification of fall risk factors is the first step of the assessment and management process in a multidisciplinary health context. Risk factors were identified by integrating information about the numerous multidisciplinary factors that influence fall risk, thereby creating a universal fall risk code set that contains the minimum amount of information needed to fulfil the three objectives of an ICF code set for this population. These objectives are to guide HCPs in identifying fall risk factors in older adults; determining which fall risk factors would justify further diagnostic assessment or intervention; and determining areas in which further assessment and/or intervention might be warranted which falls outside the particular HCP's scope of practice, thereby necessitating further referral.

4.1.2 Sub-aims

In order to realise the main aim, specific sub-aims were set for each of three phases. In Phase 2, the focus was on generating a distilled list of codes, though evaluation and reduction of the codes compiled in Phase 1. The specific sub-aims for Phase 2 were the following:

(i) To condense the number of codes from the relevant list of ICF codes compiled in Chapter 3 by using a formal consensus exercise, based on expert opinion, as a structured communication method in the form of a Delphi process.

(ii) To determine the standard minimum list of ICF codes that are critical to the identification of fall risk factors in older adults specifically related to the ICF domains, namely the body function domain, the body structure domain, the activities and participation domain, as well as the environmental and personal factors domain, to increase clinical utility of the code set.

4.2 Modified Delphi Process: Research Design

This study followed a three-phase exploratory, sequential, mixed method research design (Creswell & Creswell, 2018), combined with the recommended practices for ICF core set development (Selb et al., 2015). Phase 2 employed a quantitative, three-round modified Delphi process, which used a decision-making technique to congregate expert opinion (Juwana et al., 2010) (henceforth referred to as a Delphi process). When iterative feedback is received, a minimum of two rounds is required to incorporate such feedback (Wang & Reio, 2017). For this study, a three-round pre-determined criterion was set, based on several reasons:

- As the number of expert participants was relatively small, an executive decision was made to ensure that the number of participants does not drop below the critical level of seven panellists (Wang & Reio, 2017). Maintaining a high response rate was regarded as the most important criterion and outweighed the possibility that consensus might not be reached on certain items (Wang & Reio, 2017).

- Response rates were expected to decrease drastically after Round 3, as the participants began to lose motivation and interest in completing another round (Keeney et al., 2012).
- Panel fatigue was expected to develop for studies with more than three rounds – balancing the number of rounds with panel fatigue ensured high quality engagement throughout.
- Rather than excluding some critical items because of participant fatigue, the code set should include a few items that are potentially not critical, but still relevant (Keeney et al., 2012).
- If the mean rankings and number of items excluded in the last two successive rounds did not differ significantly (SD +/- 2), the process had to be stopped (Pawlowski, 2004).

As a group consensus strategy, the Delphi process systematically employed a literature review, the opinion of stakeholders, and the judgement of experts to reach agreement among the panel members on the inclusion of survey items (Miller et al., 2020). In the current research study, all the factors identified in Phase 1 (systematic review and focus group data) and subsequently compiled into a relevant list of factors, were included in Round 1 of the Delphi process. This was done for two reasons. Firstly, the aim of Phase 2 was to distil the provided list and reflect on the ICF codes critical for the identification of fall risk in older adults. Therefore this relevant list (compiled in Chapter 3) was used as a starting point to generate a condensed list. Secondly, the FRATs identified in the literature perspective focused on fall risk in any adult population and not specifically in older adults – whereas the current study dealt with two main components: fall risk and older adults. This broader, extensive initial focus was needed to ensure that all the relevant factors related to the two main concepts were gathered. As such, data from both the literature review and the focus groups with different stakeholder groups was needed to compile a relevant list containing factors related to both components.

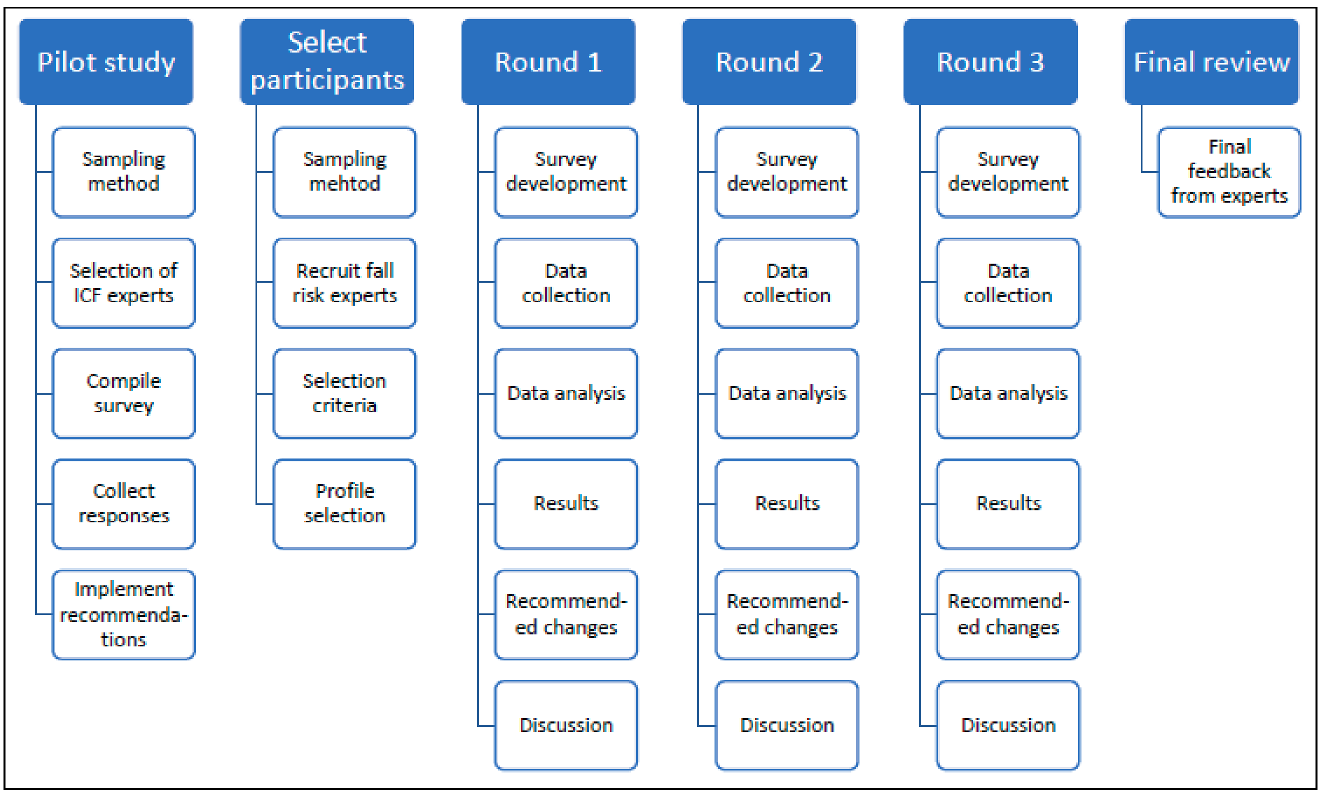
The fall risk expert participants were asked to score (on the basis of their own opinions and experience) the included second-level ICF category codes in terms of their relevance for identifying factors related to fall risk in older adults. Three consecutive rounds of surveys were administered to reach consensus on the minimum list of codes critical for the particular health condition (fall risk) and population (older adults), with the second and third survey rounds designed based on the results from the previous rounds. Using a multiphase survey (inherent to the Delphi process) and including different red-herring items throughout the survey reduced primacy bias, which could occur when the experts unconsciously assigned more importance to initial questions – to the detriment of following questions (Skinner et al., 2015). The quasi-anonymity of the process allowed experts to provide their own opinion without undue influence from others or from the researcher, thus reducing dominance bias (Skinner et al., 2015; Whitehead & Schneider, 2012).

The three main characteristics of the modified Delphi process that were relevant to this study are quasi-anonymity, iteration (in the form of rounds) and the statistical aggregation of group responses (Avella, 2016; Yousuf, 2007). Quasi-anonymity in the current research was ensured by the use of surveys. The participants did not see one another's responses, which allowed them to communicate individually, directly and privately with the researcher to express their opinions (Avella, 2016). The main aim of the process was to distil the list of ICF codes relevant to fall risk factors in older adults, and as such, the data was collected and synthesised into a manageable, condensed code set (Whitehead & Schneider, 2012) over three rounds. Each round involved a questionnaire that was sent to each participant, completed and returned to the researcher for analysis and feedback (Gliddon, 2006). Feedback was provided to the participants by means of the next round questionnaire from which the excluded ICF codes were omitted. At the end of the each round, the group's responses were analysed and synthesised (Whitehead & Schneider, 2012).

Like any research design, the modified Delphi process provides benefits and value when it is determined to be the most suitable approach, as was the case in this research study. The main advantage of the modified Delphi process is its ability to objectively explore issues that require decision making and consensus (Gliddon, 2006), for instance, deciding which codes to include in an ICF code set for fall risk factors in older adults. Another advantage is that a statistical group response is obtained as the average of the number of participants who agreed to each item's inclusion in the code set. This response reflects the majority of the participants' opinion (Habibi et al., 2014; Yoon, 2013). Furthermore, the modified Delphi process is flexible in its design and allows the researcher to collect in-depth data – which leads to a deeper understanding of the research constructs (in this case fall risk factors) in the form of an ICF code set.

The modified Delphi process is not without flaws, and the typical flaws arise at the human level (i.e., with the researcher or the participants), not at the design level. Flaws can be caused by shortcomings of the researcher or experts, and may include researcher bias, researcher shortcomings, expert participants' anonymity and petulance (Gliddon, 2006). There is the potential of low response rates, especially in the last round (McKenna, 1994). The process may also be time consuming and laborious, as it consumes large blocks of time for the researcher (Yousuf, 2007). Furthermore, the quasi-anonymity of the method could lead to a lack of accountability for the views expressed by the participants, encourage hasty, ill-considered judgements, and cause participants to be not fully engaged in the survey (Surovitskikh, 2012). The researcher addressed these potential weaknesses by reducing the process to only three rounds (which resulted in a high response rate throughout), by planning ahead to allow sufficient time to analyse and report on the responses received, and by sending the survey to each participant individually to preserve confidentially. The researcher also added red-herring codes throughout the survey at regular intervals; this helped to increase quality control and identify any potential participants who did not fully engage with the survey. The modified Delphi process that was utilised during Phase 2 is illustrated in Figure 4.1.

Figure 4.1: The modified Delphi process



4.3 Ethical Considerations

The following ethical considerations were relevant to this phase of the research study, as outlined in the Declaration of Helsinki (World Medical Association, 2001) and in the ICF (World Health Organization, 2002). Adherence to these documents ensured that stringent ethical principles were upheld.

4.3.1 The principle of confidentiality and respect

During the Delphi process, participants' confidentiality was preserved as participant numbers were used and no third party had access to the data or any identifying information of the participants. All information was stored in password-protected files. Although true anonymity could not be guaranteed as each individual participant's responses were known to the researcher, quasi-anonymity was established. This was done by the researcher contacting participants individually to ensure that participants did not know who the other panel members were and to enable her to follow up on non-respondence (Carrougher et al., 2018; Keeney et al., 2006).

4.3.2 The principle of informed consent

Informed consent, as a fundamental and thoughtful process, was gained from all participants to ensure their initial and continuing participation. They were from the onset made aware of the aims of the research study as well as of their role in the study and the data collection process (Locher et al., 2006; World Medical Association, 2001). All participants who agreed to participate completed an informed consent form (Appendices 4A & 4B) in which the study's topic, aims and data collection procedures were described.

4.3.3 The principle of researcher bias

Researcher bias is any trend or deviation from the truth in data collection, data analysis, interpretation or publication that can cause false conclusions (Simundic, 2013). The researcher did not guide or manipulate any participants during the process or in their responses to arrive at predetermined conclusions (Santaguida et al., 2018). Also, the researcher did not focus on the ICF codes that were excluded in each round, but rather on determining consensus with regard to the ICF codes included. This was done by providing only a list of the included codes in the next round, thus trusting the opinions of the fall risk experts on the codes they consider critical and not attempting to include codes which they had already excluded – regardless of what these codes were, and whether the researcher considered them as critical or not.

4.3.4 The principle of voluntary participation

Voluntary participation is the choice a participant has to perform certain tasks or actions without being influenced by others or being subjected to compelling external influences. Voluntary participation consequently leads to more reliable data (Kilinç & Firat, 2017). In this study, none of the participants were forced or coerced into participation and the researcher did not apply any pressure on potential participants to agree to participate. Participants are motivated to participate actively if they feel they will obtain valuable information from the process. Its value needs to be at least equal in their minds to the effort expended to contribute information (Millar et al., 2006).

4.3.5 The principle of deception and clinical use

The researcher did not intentionally mislead any participants regarding the aims and scope of the research study, or regarding their role in the data collection process, as all expectations were communicated prior to their participation in the study. The researcher guarded against any deception in the collecting or reporting of the data by ensuring that no data was falsified in any way, that all answers were coded directly from the questionnaires, and that results were not exaggerated (Kilinç & Firat, 2017; World Medical Association, 2001). The researcher also made use of two additional coders to check all the codes obtained during the process and to ensure that all data was accurately displayed.

4.4 Modified Delphi Process: Pilot Study

The modified Delphi process utilised in this study was preceded by a pilot study. The aim of the pilot study was to establish content and face validity of the ICF codes in the code set, prior to the commencement of the Delphi process. The pilot study specifically focused on whether the proposed examples for each code in the code set were appropriate in terms of the ICF descriptions and whether they could be used on a larger scale (Leon et al., 2012). By conducting a pilot study, the likelihood of success in the main study is enhanced (Thabane et al., 2010). The pilot study participants will henceforth be referred to as 'ICF expert participants'.

4.4.1 Aim

The specific aims of the pilot study were to determine if any changes needed to be made in terms of the technical aspects of the survey; the layout and visual representation of the survey; the survey items; and the general aspects of the survey (see Table 4.3 for a detailed account of the aims and procedures).

4.4.2 ICF expert participants

4.4.2.1 Sampling method

A non-probability, purposive sampling method was used to select the ICF expert participants for the pilot study (Leedy & Ormrod, 2014). This method ensured that the ICF experts were selected based on specific selection criteria, which eliminated the need to consider all aspects of the general population in the selection process (Acharya et al., 2013).

4.4.2.2 Selection of expert panel

National and international ICF experts were combined in the panel as the code set aimed to provide a universal profile. An expert is defined as a person, regardless of their location or profession, with in-depth theoretical knowledge about the ICF. As the current study focused strongly on the ICF, a pilot study that would evaluate the survey through the lens of the ICF was deemed relevant and necessary. Moreover, this also ensured that the pool of potential participants for the Delphi survey (i.e., experts in fall risk assessment in older adults) was not depleted. ICF expert participants were selected based on the same selection criteria used in the Delphi survey, save for the area of expertise (see Table 4.4). Expertise in the ICF was determined based on the potential participants' knowledge on the subject, as well as the number of publications related to the ICF. Seven potential ICF expert participants were recruited for the pilot study. All seven consented, but only six completed the pilot study, as one unexpectedly became unavailable during the data collection period. Participants were recruited through the researcher's clinical contacts as well as the supervisor and co-supervisor's academic and clinical contacts.

4.4.2.3 Participant description

Six ICF expert participants completed the pilot study, and their biographic information is shown in Table 4.2.

Table 4.2: Biographic information of the pilot study participants (N=6)

Biographical aspect	Participants' responses
Highest educational qualification	PhD (n=3)
	Master's degree (n=3)
Country where service is rendered	Sweden (n=3)
	South Africa (n=3)
Occupation	Occupational therapist (n=1)
	Nurse (n=1)
	Physical therapist (n=1)
	Speech therapist (n=1)
	Medical doctor (n=1)
	Audiologist (n=1)
Registered with local governing body	Yes (n=5)
	No (n=1)
Number of published papers	1 – 3 published papers (n=2)
	4 – 6 published papers (n=1)
	10+ published papers (n=3)

As indicated in the biographic information, three of the participants held PhDs and three Master's degrees; they worked in Sweden and South Africa; they had different occupations; and they had all authored at least one academic journal paper. Three of the ICF expert participants had published more than 10 academic papers each.

4.4.3 Materials

During the pilot study, the invitation letter (Appendix 4C), informed consent letter (Appendix 4A) and biographic questionnaire (Appendix 4D) as detailed in the materials and equipment used for the modified Delphi process (Table 4.6) were used. The initial ICF code set developed in Phase 1 (see Survey development for the Delphi process) (Appendix 4E) was also used, and a feedback survey was compiled to document additional feedback from the pilot study participants (Appendix 4F).

4.4.4 Data collection procedures

Participants received an informed consent letter with a reply slip via email. The letter contained a short description of the aim of the research study and their expected role in the data collection process. All ICF experts who consented to participate were sent a follow-up electronic mail containing the link to the online questionnaire, as well as the feedback questionnaire on which they were to give feedback on completion of the questionnaire. They were requested to return all responses to the researcher within two weeks. The researcher also logged in to the Qualtrics system to ensure that she was able to see the responses and that all the participants' responses were recorded on the software. This ensured that no unexpected technical difficulties would arise.

4.4.5 Results and recommendations

The specific aims, procedures, results and recommendation of the pilot study are presented in Table 4.3. All aims that required changes have been highlighted in this table.

Table 4.3: Aim, procedures, results and recommendations of the pilot study

Aim	Results of the pilot study	Recommendations and changes made to the survey
	Technical aspects	
To determine if the Qualtrics link to the survey provided the intended access in an easy and reliable manner	None of the participants experienced any technical difficulties opening the Qualtrics link.	No changes were required or made to how the survey could be accessed using the Qualtrics link.
To determine if the link to the survey worked effectively on different web browsers	Participants mentioned the different web browsers they used (Google Chrome and Firefox), and they reported no difficulties.	No changes were required or made to the Qualtrics link.
To determine if all the questions in the survey could be answered by all the participants	All of the questions could be accessed, and responses could be recorded by the participants without technical difficulties.	No technical changes were required or made to the survey.
To determine if the survey could be completed on different devices, e.g., laptop, desktop computer or on a mobile device	Four participants completed the survey using laptop computers and two used a desktop computer. No challenges were reported. As none of the participants completed the survey on a mobile device, the researcher accessed and completed the survey on her own mobile device – without any technical difficulties.	No changes were made to enhance the accessibility of the survey on different devices.
	Layout and visual representation of the survey	
To determine if the layout of the survey and flow of the codes were intuitive	• Information should be added on who will use the code set. • An explanation of the ICF component titles should be included to highlight the difference between Body functions and Body structures.	• Information about who will use the code set was included in the informed consent. • The section with the ICF headings was elaborated on to include a short definition of the component.

Table 4.3: Aim, procedures, results and recommendations of the pilot study (cont.)

Aim	Results of the pilot study	Recommendations and changes made to the survey
	• The activities and participation domain codes should be placed first to avoid misunderstandings concerning repetitive codes/ examples. • Navigation instructions like "click the arrows to view the questions" should be added before the demographic information. • The ICF codes should be grouped together according to the ICF manual.	• The order of the survey was changed to start with the activities and participation domain codes, followed by the body function and structure domain codes. • Information was added after the informed consent to clarify the use of the arrows, as well as the option to exit the survey at any time while still recording the responses. • All codes were changed to follow the order of the ICF manual.
To determine if the response options should be displayed in a horizontal or vertical format	• All participants agreed that the horizontal response direction was preferable. • One participant suggested to perhaps add a numerical value to the written response options.	• No changes were made to the direction of the response and it remained horizontal. • No changes were made to the response options as they did not change throughout the survey and numerical values could potentially confuse participants.
To determine if the positive responses should be on the right- or left-hand side of the scale	All but one participant preferred the positive responses on the left-hand side. This participant did not justify the specific preference.	No changes were made to the side on which the positive responses were placed in the survey.
Survey items		
The participants made several comments and based on them, the following three aims in this section are described as one		
To determine the appropriateness of each ICF code's example in relation to the ICF description To determine the clarity of the examples given in the survey To determine if the survey contained repetitions in terms of ICF descriptions or examples	• The codes should be grouped together according to the ICF chapters, otherwise it creates frustration. • The example of "Legal services, systems and policies" was unclear, making it difficult to rate. From a high-income country perspective, this code could include examples such as the right to assistance or technical aids.	• The survey order was changed to follow the order of the ICF manual. • This was a red-herring code and thus not related to fall risk, but the example was expanded from "influence of customary marriage law" to "influence of customary marriage law, right to assistance, technical aids" to ensure

Table 4.3: Aim, procedures, results and recommendations of the pilot study (cont.)

Aim	Results of the pilot study	Recommendations and changes made to the survey
		clarity according to the ICF description, while remaining a red-herring code.
	• The examples for "Control of voluntary movements" are functional, i.e., understood as an activity domain code; however, a less complex example should be given, e.g., bending the legs or lifting arms, coordinating body parts to perform desired movements.	• The example for "Control of voluntary movement" was changed from "sitting, standing, turning around in bed" to "bending the legs or lifting the arms".
	• The examples for "Gait pattern functions" are understood as an activity domain code, but the functions needed must be made obvious, e.g., add "functions used for" walking, running or other whole-body movements.	• The example for "Gait pattern function" was expanded from "walking, running" to "body functions used for walking or running".
	• The examples for "Emotional functions" should be expanded to increase clarity by adding "functions of appropriateness and regulations of emotions".	• The example for "Emotional functions" was changed from "fear, anxiety, happiness, sadness, regulation of emotions" to "functions of appropriateness and regulations of emotions".
	• The example for "Proprioception function: Moving hand……" can be seen as repetitive as it is related to both Voluntary movements (b) and Hand and arm use (d). It should be changed to "Functions to enable moving….".	• The example for "Proprioception function" was changed from "sense of joint position, moving hand to an object without knocking it over" to "functions to enable moving your hand or arm".
	• The example for "Vestibular functions" should be expanded by adding "Sensory functions to keep your balance…." (b260).	• The example for "Vestibular functions" was expanded from "keeping your balance while moving" to "sensory functions to your balance while moving".

Table 4.3: Aim, procedures, results and recommendations of the pilot study (cont.)

Aim	Results of the pilot study	Recommendations and changes made to the survey
	• The example for "Involuntary movement reaction functions" should be clarified to show that the question concerns basic functions, and not the activity performed.	• The example for "Involuntary movement reaction function" was changed from "keeping balance when nudged/bumped" to "functions of postural reaction".
	• The example for "Global psychosocial functions" is very good and can be expanded by adding "Personal and…".	• The example for "Global psychosocial functions" was expanded from "interpersonal skills used during social interactions" to "personal and interpersonal skills used during social interactions".
	• The example for "Sensations associated with hearing and vestibular function" is difficult to understand in terms of relevance just after another question about vestibular function was answered. Maybe it should contain a clarification highlighting their difference by adding "sensation of dizziness ". Similarly, "hearing" is mentioned in a later code and since the examples do not clearly relate to "hearing", the codes can be understood as repetitive.	• The order of the codes was changed to align with the ICF manual order. The example for "Sensations associated with hearing and vestibular function" was expanded from "dizziness/vertigo" to "sensations of dizziness or vertigo". When the order of the codes was changed to directly follow each other as per the order of the ICF manual, it was clear that the "hearing" codes contained no repetitive examples and hence required no change.
	• The example for "Attention functions: functions of paying attention" should be clarified by adding a code to the activities and participation domain section.	• The code "Attention function" was removed, and an additional code was added to the activities and participation domain section (d160), namely "Focusing attention on the environment (e.g., changes in physical or social stimuli)".

Table 4.3: Aim, procedures, results and recommendations of the pilot study (cont.)

Aim	Results of the pilot study	Recommendations and changes made to the survey
	• Due to the lack of questions about all five senses, the example "Additional sensory functions (e.g., loss or dysfunction in any of the five senses)" unfortunately causes one to waste time trying to remember one's earlier answers. This example should be clarified by removing "of the five".	• The example for "Additional sensory functions" was edited from "loss or dysfunction in any of the five senses" to "loss or dysfunction in any of the senses". As soon as the order of codes was changed to the ICF order, the codes about the senses followed each other and clearly indicated separate codes for the different senses.
	• The examples for "Stability of joint function" cover body structures.	• The example for "Stability of joint function" was changed from "shoulder or hip displacement, frozen joints" to "functions related to hip or shoulder stability".
	• The example for "Muscle endurance functions" relates to "Maintaining body position".	• The example for "Muscle endurance functions" was changed from "keeping back straight while sitting" to "functions related to keep a single body or limb position for a period of time".
	• The example for "Neuromusculoskeletal- and movement-related functions" is over-arching and should be clarified.	• This example was not changed as it was one of the fall risk factors coded to this specific ICF code and relevant to the topic at hand.
	• The example for "Psychomotor functions" related to "motor" is confusing. Although they are included in the ICF, more detail is needed, e.g., stereotypes and motor perseveration.	• This example was not changed as this was also a specific FRAT item that was coded related to agitation and the correct example for the specific ICF code.
	• The example for "Mobility of joint functions" relates to the activities and participation domain and should be changed to "Functions to bend knees, elbows and other joints easily, range of motion". Likewise, "arthritis" is a	• The example for "Mobility of joint functions" was changed from "bending knees or elbows, range of motion of joints, arthritis" to "functions to bend knees, elbows and other joints easily, range of motion".

Table 4.3: Aim, procedures, results and recommendations of the pilot study (cont.)

Aim	Results of the pilot study	Recommendations and changes made to the survey
	diagnosis that might not be included in a functional classification.	
	• The code "Additional musculoskeletal structures related to movement" is strange as it comes first but adds the value "additional".	• The order of the codes was changed to the order of the ICF manual, hence this code would no longer be first in the body structure domain section.
	• Add a code about "Focusing attention on the environment (e.g., changes in physical or social stimuli)" for code d1601 – based on the 2016 WHO updates.	• The code "Focusing attention on the environment (e.g., changes in physical or social stimuli)" was added as suggested.
	• For the elderly, the content for "Moving around in different locations" needs to be discussed from two perspectives – outside vs inside the house.	• Specifying inside or outside the home was not added to this code as the two separate components related to this one ICF code have already been clarified in the example.
	• Add examples "opening or closing a door" for code "Hand and arm use" (see ICF d 4450-4451).	• The example for "Hand and arm use" was expanded from "reaching for something, pick up an object, turning a door handle" to "reaching for something, picking up an object, turning a door handle, opening or closing a door".
	• Include the example "moving around" for "Walking" first and divide "Walking" into two codes to initially determine the person's basic ability to walk, e.g., (1) Basic walking (short and long distances); (2) Walking (on different surfaces, stepping over objects, walking forwards or backwards and around obstacles).	• Question order was changed to follow the order of the ICF manual and to enhance the clarity of the code and example. "Walking" was divided into "Basic walking (e.g., short and long distances") and "Walking (e.g., walking on different surfaces, stepping over objects, walking forwards or backwards around obstacles") even though it relates to the same ICF code.
	• Include the example "going up and down stairs" for "Moving around" in accordance with the 2018 WHO updates which include a new code (d451). Remove the	• The example for "Moving around" was changed from "skipping, jumping, climbing stairs, moving around obstacles" to "going up and down stairs".

Table 4.3: Aim, procedures, results and recommendations of the pilot study (cont.)

Aim	Results of the pilot study	Recommendations and changes made to the survey
	example of skipping and jumping as it is inappropriate for the specific population.	
	• Relate the example for "Speaking" to fall risks by adding an example such as "talking while walking"?	• The example for "Speaking" was expanded from "requesting help, telling a story" to "requesting help, telling a story, walking while talking".
	• Remove the code "Discussion" as it is not relevant. A person can attend a group discussions sitting in a wheelchair.	• This was a red-herring code and therefore it was not changed.
	• Extend the example for "Dressing" to clearly include footwear.	• The example for "Dressing" was expanded from "getting dressed" to "getting dressed, putting on shoes".
	• Simplify the example for "Communicating with – receiving – spoken message (e.g., inability to understand idiomatic expressions during conversations)" to "understanding spoken messages (e.g., responding and comprehending questions or instructions)".	• The example for "Communicating with – receiving – spoken message" was changed from "inability to understand idiomatic expressions during conversations" to "responding and comprehending questions or instructions".
	• Simplify the example for "Lifting and carrying objects" by considering the population (elderly people) and refer to daily tasks in the house, such as lifting an object from the floor or a table to transport it from one place to another.	• The example for "Lifting and carrying objects" was changed from "carrying objects from the car to the house or around the house, lifting a child to the hip" to "lifting an object from the floor or a table to transport it from one place to another".
	• Replace the example for "Looking after one's health: avoiding harm to one's health" with a more concrete example, e.g., "managing medication, avoiding risks of alcohol or drugs".	• The example for "Looking after one's health" was expanded from "maintaining a balanced diet, avoiding harm to one's health" to "maintaining a balanced diet, managing medication, avoiding risks of alcohol or drugs".

Table 4.3: Aim, procedures, results and recommendations of the pilot study (cont.)

Aim	Results of the pilot study	Recommendations and changes made to the survey
	• Remove the number "28" in front of the code "Caring for household objects".	• The question number before the code was removed.
	• Expand examples for "Design, construction and building products and technology of buildings for public use" by adding "guardrails" (e1503) based on the 2012 WHO updates.	• The example for "Design, construction and building products and technology of buildings for public use" was expanded from "public spaces, stairs, floor surfaces and public bathrooms" to "public spaces, stairs, floor surfaces, public bathrooms and guard rails'.
	• Add examples for "Products and technology for personal use in daily living" such as "mats and furniture, kitchen and cleaning equipment, support handles".	• The example for "Products and technology for personal use in daily living" was expanded from "footwear, clothing" to "footwear, clothing, mats and furniture, kitchen and cleaning equipment, support handles".
	• Adjust the examples for "Natural environment and human-made changes to environment, other specified" by removing "walking outside", as it was mentioned among the activity and participation domain codes and replace it with "crowding, landforms, bodies of water".	• The example for "Natural environment and human-made changes to environment, other specified" was changed from "walking outside, uneven surfaces, environmental hazards" to "uneven surfaces, environmental hazards, crowding, landforms, bodies of water".
	• As a code including "family" has not yet been presented, the example "Extended family" can create confusion. Consider adding "extended" to family or clarify by using the expression "emotional or physical support from relatives outside the immediate family" and reflect on "visiting", as the support could appear everywhere.	• The code order was changed to follow the order of the ICF manual, thus "immediate family" was mentioned before "extended family". Example for Extended family was changed from "visiting with and support from family" to "emotional or physical support from relatives outside the immediate family".
	• Extend examples for "Health services, system and policies" as the latter includes more than just "going to the doctor". It also entails having access to rehabilitation and other health services.	• The example for "Health services, system and policies" was changed from "going to health care professionals" to "having access to rehabilitation and other health services".

Table 4.3: Aim, procedures, results and recommendations of the pilot study (cont.)

Aim	Results of the pilot study	Recommendations and changes made to the survey
	• Place examples for "Natural events: rain, strong wind" in the code "Climate", as natural events are concerned with more serious events, such as tornadoes, hurricanes or forest fires in the ICF definitions.	• The theme coded to this ICF code was "rain", so the example of "rain" was moved to Climate and the code Natural events was removed from the survey.
	• Consider using the same examples for "Support and relationships, other specified" as for family.	• The example for "Support and relationships, other specified" was expanded from "physical support from others" to "physical support from non-family members".
	• Is the code "Going to the museum at recreation and leisure" a relevant code (common activity) for many people across the world?	• The example for "Recreation and leisure" was not changed as many older adults visit museums, although there might be differences in population areas.
	• Expand the example for "Products for culture, recreation" in addition to sports equipment.	• The example for "Products and technology for culture, recreation and sport" was changed from "sport equipment" to "equipment used during sport or leisure activities".
	• The code "Personal factors (political views)" is mainly aimed at the American audience with democrat as example and should be reconsidered.	• This is a red-herring code and not applicable to the topic at hand, but the code "Political views" was changed from "being a democrat" to "voting for a specific political party of your choice during general election".
	• The example for "Faith in God" should include a broader spiritual perspective.	• The code and example for "Faith in God" was changed from "trusting in God to provide in your needs an prevent you from falling" to "Faith (e.g., trusting higher spiritual power to provide in your needs and prevent you from falling)".

Table 4.3: Aim, procedures, results and recommendations of the pilot study (cont.)

Aim	Results of the pilot study	Recommendations and changes made to the survey
	• The example for "Fever" is confusing as it is unclear if this refers to high environmental temperatures or body temperatures. • Merge examples for "Carrying out daily routine" with "Dressing", "Washing oneself" and "Doing housework" • "Other specified" codes are typically not used in a code set, as they are less specific. • Avoid using verbatim ICF headings, rather paraphrase some headings into more lay terms.	• The example for "Fever" was expanded from "fever due to high temperatures or due to illness" to "fever due to high body temperatures or due to illness". • Although these codes might appear to be repetitive, they represent different codes within the ICF and therefore they were not changed or merged to be one code in the survey. • Upon revision of all the codes, no "other specified" codes were present in the list unless another code in that domain was included. • Verbatim heading was used to ensure continuity between surveys and with the ICF manual. Each heading was subsequently explained in layman's terms.
To determine the appropriacy of the headings for each section in relation to the codes in the section	For the heading of each ICF domain of the survey, it explains that several codes related to the specific domain are included. However, ICF codes consists of a letter followed by a numeric code, and as there are no codes, this expression is misleading. It would be more appropriate to consistently use the term "survey item" and/or "ICF category".	The headings in the survey were changed from "several codes" to "several survey items".
To determine the clarity of the instructions	• Information about the geographical distribution of participants should be added. • The abbreviations related to local governing bodies should be expanded upon. • The subheading "Will you experience any risk or discomfort during the study?" should be in bold font.	• Information was added to the informed consent part of the survey. • Abbreviations were typed out in full. • The subheading was bolded in the informed consent part of the survey.

Table 4.3: Aim, procedures, results and recommendations of the pilot study (cont.)

Aim	Results of the pilot study	Recommendations and changes made to the survey
	General aspects	
To determine how long the survey takes to complete	The participants stated that they completed the survey in a range from 15 to 30 minutes, with an average of 24 minutes.	The length of time needed to complete the questionnaire was deemed appropriate and hence no changes were made to the survey.
To determine if more or less time is needed than suggested in the informed consent	All participants agreed that a suggested time frame of 20 to 30 minutes would be sufficient.	No changes were made to the consent letter as it states that it takes approximately 20 to 30 minutes to complete the survey.
To determine if the number of codes in the survey is appropriate for the topic at hand	All participants agreed that although the survey contained many codes, it was not overly time consuming and that it covered all the relevant codes.	No changes were made to the survey.
	Further suggestions	
To determine if the participants had any additional suggestions or comments	• After selecting "No" on the biographical question of being registered with a local governing body, one still had to write in the box "Please name the governing body…" • Add another polite box inviting participants to add further reflections of importance for the assessment of and interventions to this population group. • I had wished to get the opportunity to save my responses to continue later as I needed to reflect on my answers. The last arrow automatically sent the survey back to you and I wish I could adjust some of the responses after reading them all.	• The questions to indicate the local governing body the participant belonged to were changed to not include a forced response before one can continue the survey. • At the end of the survey, another question was added to invite participants to add further reflections of importance for the assessment of and intervention with older adults as suggested. • Information was added after the informed consent to clarify the use of the arrows, and the option was added to exit the survey at any time to save the responses.

Table 4.3: Aim, procedures, results and recommendations of the pilot study (cont.)

Aim	Results of the pilot study	Recommendations and changes made to the survey
	• Maybe consider labelling the sections, e.g., Section 1: Biographic information, etc.	• Sections were labelled according to the ICF domains to clarify the section heading.
	• It would be easier if pages were numbered and one section per page could be completed.	• A maximum of six codes were grouped per page to reduce the time needed to scroll through the codes on a mobile device. Page numbers were not included as it was an electronic survey.
	• Please say what the ICF stands for in the beginning.	• The ICF abbreviation was typed out in full in the informed consent section.

As indicated in Table 4.3, several changes were made to the survey instrument based on the pilot study feedback. The majority of these recommended changes were related to the survey items, specifically the appropriateness and clarity of the ICF code examples. On completion of the pilot study, the recommendations were implemented to refine the survey instrument, thereby increasing its reliability and contributing positively to the quality of the modified Delphi process.

4.5 Modified Delphi Process: Main Study

4.5.1 Aim

The aim of this phase was to undertake a formal consensus exercise, by means of a modified Delphi process, to distil the number of codes in the relevant list of codes and to determine the ICF codes that were critical in the identification of fall risk factors in older adults. These codes were specifically related to the ICF domains, namely the body function domain, body structure domain, activities and participation domain, as well as the contextual factors domain (consisting of environmental and personal factors).

4.5.2 Participant selection

4.5.2.1 Sampling method

A non-probability, purposive sampling method was used to identify and select a limited pool of information-rich participants, as the goal was to obtain expert opinions based on predetermined criteria (Leedy & Ormrod, 2014). This ensured optimal and effective use of manpower, as participants who are especially knowledgeable about or experienced in the interest of the research study were selected (Meissner et al., 2011; Palinkas et al., 2015). The participants also had to be available, willing and able to participate by communicating their responses in an articulate, expressive, and reflective manner (Palinkas et al., 2015). Furthermore, a non-probability, purposive sampling technique is well-suited for use with the Delphi process, as valid and reliable results are reliant on the careful selection of expert participants who typically represent specific disciplines (Habibi et al., 2014; Keeney et al., 2010). In the current study, the participants represented different disciplines, but all were experts in fall risk assessment in older adults. Delphi surveys can consist of ten to 100 participants and it was decided to recruit as many potential participants as possible to account for possible attrition (Akins et al., 2005). according to

Chernysheva et al. (2016), seven to nine participants are recommended as the minimum number of experts to be included in all three rounds.

4.5.2.2 Participant recruiting

Experts in the field of fall risk in older adults were recruited both nationally and internationally. Since the data collection was done electronically, location was not a criterion in selecting the experts, which means that the data and subsequent fall risk factor code set were not applicable to one geographical region or country only. Experts were purposefully used to enhance the clinical utility of the developed code set by reducing the number of codes, and to establish content and face validity of the codes based on their importance. Participants were recruited first via the researcher's clinical contacts and the supervisor and co-supervisor's academic and clinical contacts, and thereafter, the researcher used a snowballing technique by asking the identified experts to nominate other experts in the field (Creswell, 2013). None of the fall risk expert participants were directly involved with or had a direct working relationship (in the same organisation or staffing structure) with the supervisors or researcher, thus their voluntary participation, ability to decline the invitation or to withdraw from the process at any time was never compromised (Singh & Wassenaar, 2016).

An initial invitation-to participate letter was sent to the identified potential participants via email (Appendix 4G). The letter contained the research aims, the purpose of the study and an outline of what would be expected of participants. Those who agreed to participate in the study were requested to complete and return their signed informed consent form (Appendix 4B). A follow-up reminder was sent to five experts who had agreed to participate but had not yet completed the informed consent form by the requested date. They did so within two to three days of receiving the reminder.

4.5.2.3 Participant selection criteria and profile

Participants were selected to be homogeneous enough (all experts being HCPs) but diverse enough to have individual and different theoretical and clinical knowledge (Naude & Bornman, 2018) regarding fall risk factor identification in older adults. Experts are generally defined as persons who have an elite, peak or exceptionally high level of performance on a specific task or in a given profession and therefore, in the context of the current study, being deemed an HCP as an expert required an inventory of what the expert knows, does and has achieved (Bourne et al., 2014). For the purposes of this study, an expert referred to any individual with relevant academic knowledge and experience in fall risk assessment in older adults. Publications and conference presentations related to falls and fall risk were used as a proxy for academic knowledge. Assessment of individual patients is based on scientific evidence and the clinical experience of the HCPs, hence fall risk experts were chosen to represent professional groups that directly influence patient care and would benefit from clinical practice guidelines (Eubank et al., 2016). The expert participants' specific discipline, years of experience in their field and expertise provided important information. Furthermore, all experts had to be proficient in English as the information and survey had been compiled in English. An inventory of their skills and accomplishments was listed and weighted to establish expertise (Table 4.4).

Table 4.4: Selection criteria: Delphi survey

Selection criteria	Theoretical justification	Weighting
Title, first name and surname, email address	Used for participant numbering and to ensure communication is sent to the correct participant.	No weighting - used for biographic information
Country and current profession	International and interdisciplinary perspectives were used, as one of the successes of a Delphi survey rests on the combined expertise of the participants, regardless of geography and combination of different professional outlooks (Keeney et al., 2010). No restrictions were placed on the country where the participants currently practise or their current profession.	No weighting - used for biographic information
Highest qualification	Professionals with higher academic qualifications have more in-depth knowledge in their field (Souto-Otero & Whitworth, 2015).	Bachelor's or Honour's degree = 1 point Master's degree = 2 points PhD = 3 points
Number of peer-reviewed publications and number of conference presentations related to balance or fall risk	Professionals with published work or public presentations are usually more motivated to enhance their professional reputation and area of expertise (Miller et al., 2011).	1-3 publications/conferences = 1 point 4-6 publications/conferences = 2 points 7-9 publications/conferences = 3 points 10+ publications/conferences = 4 points
Years of clinical experience in the field of fall risk assessment / vestibular assessments	Clinical expertise is a fundamental quality and individual characteristic to consider during research (McHugh & Lake, 2010). The 10,000-hour rule states that in order to become an expert, one must have 10,000 hours of deliberate practice under one's belt, which equates to 3-5 years' experience (Ericsson et al., 1993).	1 year = 1 point 2-3 years = 2 points 4-5 years = 3 points 6+ years = 4 points
Number of fall risk assessments conducted (or assisted with) per month, and number of older adults assessed (or assisted with assessing) for fall risk or vestibular symptoms per month	As the main focus of this study was on fall risk assessment in older adults, experts were expected to have a hybrid of practical and theoretical knowledge in conducting these assessments and consulting with older adults about any vestibular-related symptoms (Flaherty & Josephson, 2013).	1-3 assessments = 1 point 4-6 assessments = 2 points 7-9 assessments = 3 points 10+ assessments = 4 points

Based on these criteria, all potential fall risk expert participants who scored at least one point for each criterion were considered for inclusion in the Delphi survey. Due to the specific recruitment strategy that was followed, the first 11 potential expert participants who were identified, met the required criteria and all 11 agreed to participate. As such, and based on the small number of potential fall risk expert participants, no further recruiting was conducted. The participants are described in Table 4.5.

Table 4.5: Participant description, including expert weighting (N=11)

Participant number	Country	Profession	Highest qualifi-cation	Publica-tions	Clinical experience	Confe-rence presenta-tions	Fall risk assess-ments	Older adults assessed for fall risk	Total
1	USA*	Biomedical engineer	3	4	4	3	1	1	16
6	SA*	Physiotherapist	2	1	4	2	4	3	16
8	USA*	Physiotherapist	2	1	4	2	4	3	16
3	SA*	Audiologist	1	1	4	2	4	3	15
7	Ger*	Physiotherapist	2	1	4	3	2	3	15
9	SA*	Physiotherapist	1	1	2	1	4	4	13
2	USA*	Audiologist	3	1	3	2	1	1	11
5	SA*	Occupational therapist	1	1	3	1	3	2	11
10	SA*	Occupational therapist	1	1	2	1	3	3	11
4	SA*	Audiologist	1	1	2	2	1	1	8
11	SA*	Occupational therapist	1	1	2	1	2	1	8

*USA = United States of America; SA = South Africa; Ger = Germany

As shown in Table 4.5, seven of the 11 fall risk expert participants were based in South Africa , three in the USA and one in Germany. Four of the participants were physiotherapists, three audiologists, three occupational therapists and one a biomedical engineer. The weighted scores to determine inclusion ranged from 8 to 16.

4.5.3 Material and equipment

The modified Delphi process made use of several materials and equipment as shown in Table 4.6.

Table 4.6: Materials and equipment for the modified Delphi process

Materials and equipment	Aim	Rationale for use	Method
Invitation letter and informed consent form (Appendices 3B & 3D)	To invite potential participants and gain their informed consent	A critical component in ensuring transparency and ethical data collection (Hammersley, 2018)	Participants completed the informed consent form prior to receiving further communication (see recruitment section for details).
Biographic questionnaire (Appendix 3E)	To ensure that participants meet the selection criteria and to describe them	A quick and effective way to ensure participants meet the selection criteria and to increase the internal validity of the results (Sargeant, 2012)	Participants completed the biographic questionnaire prior to commencement of the Delphi survey.
Qualtrics software	To compile the surveys and record and analyse the participants' responses electronically	A user-friendly way to create, test, and modify surveys with intuitive and powerful survey flow logic options to allow for custom survey design (Qualtrics, 2019)	The participants' responses were recorded on the software, and the researcher downloaded, accessed and analysed the responses for analysis on completion of each round.
Delphi survey instruments (see 4.5.4 for details)	To systematically extract the essential ICF codes and gain consensus on the included codes related to fall risk in older adults	An effective method to ensure content validity of the included codes and to establish the importance of the codes (Hasson & Keeney, 2011)	The Delphi survey was distributed to the participants to rate each code in terms of relevance and then of importance.

The materials used to collect data for this phase of the research study included an invitation letter, informed consent form, biographic questionnaire and the developed Delphi surveys (Appendices 4H – 4J), which were compiled on Qualtrics software. The biographic questionnaire consisted of questions related to the selection criteria as previously depicted in Table 4.4.

4.5.4 Delphi survey: Round 1

4.5.4.1 Round 1: Survey development

(i) Type of survey instrument

The survey instrument for all three rounds consisted of closed-ended questions, as each survey item (ICF code description and examples) had to be rated for relevance (first survey) and thereafter for importance (in the second and third surveys). An advantage of using a structured survey with already confirmed items from the start is that participants have a framework to evaluate their own opinions against and additional items can be added (Toma & Picioreanu, 2016). Due to the fact that the items reflected a merging of collated items following Phase 1 of the research study, open-ended questions were only included to add additional items that participants wanted to recommend for inclusion.

(ii) Type of rating scheme

A 7-point Likert scale (rather than the 5-point scale) was selected as the rating scheme for the surveys as several studies concluded that it is one of the best options for scale reliability (Finstad, 2010; Toma & Picioreanu, 2016), especially since the participants were all subject experts and considered to have average or above average cognitive abilities. For the first round, the level of relevance was rated on seven points, with response anchors ranging from 1 = ‘not at all relevant’ to 7 = ‘extremely relevant’. For the second and third rounds, level of importance was also rated on seven points, with response anchors ranging from 1 = ‘not at all important’ to 7 = ‘extremely important’ (Vagias, 2006).

(iii) Neutral or midpoint response

One of the features of a Delphi process, as was used in Phase 2 of this study, is that it allows sufficient time for the participants to consider their answers and determine their opinion or standpoint (Toma & Picioreanu, 2016). As such, a neutral point should not significantly influence the experts’ opinions, which could be the case when participants are faced with real-time decisions during face-to-face surveys. In such surveys, they might not have enough time to consider their responses, and this may typically cause them to simply select a neutral answer.

(iv) Order and labelling of response options

Response options were placed in a horizontal direction even though the surveys were conducted electronically, with space not being as big a concern as it would have been for paper-based surveys. Positive response options were placed on the left-hand side. According to Maeda (2015), selection bias does not need to be considered if response ratings are used to make relative judgements, such as rating the relevance or importance of some items compared to others.

(v) Survey content

The surveys for all three rounds of the Delphi process started with an overview of the aim of the study and the expectations of the participants who completed the survey. All three surveys contained the same descriptions and examples of the included ICF codes following the pilot study's recommendations (Table 4.7).

Table 4.7: ICF survey items – Round 1

ICF code description	Description
Body function domain (n=31)	
Consciousness functions	State of one's awareness or alertness
Orientation functions	Knowing where you are, what time it is and your orientation to your environment
Intellectual functions	Intellectual or mental retardation[3], dementia
Global psychosocial functions	Personal and interpersonal skills used during social interactions
Temperament and personality functions	Confidence, non-compliance, impulsiveness, emotional stability
Sleep functions	Sleep disturbances, lack of sleep, quality of sleep, insomnia
Global mental functions	Global cognitive or mental status
Memory functions	Short- or long-term memory loss, amnesia, ability to remember
Psychomotor functions	Agitation
Emotional functions	Functions of appropriateness and regulation of emotions, fear, happiness, sadness
Perceptual functions	Lack of insight, altered awareness, illusions
Seeing function	Clarity and quality of vision
Hearing	Localising sound, discriminating speech or words
Vestibular functions	Sensory functions to keep your balance while moving
Sensations associated with hearing and vestibular function	Sensations of dizziness / vertigo
Proprioception function	Sense of joint position, functions to enable moving your hand or arm
Additional sensory functions	Loss of or dysfunction in any of the senses
Sensations of pain	Pain in legs, pain affecting level of functioning
Sensations associated with cardiovascular and respiratory functions	Shortness of breath, oxygen requirements
Defecation function	Frequency of defecation, constipation, incontinence
Weight management function	Lack of appetite, weight loss, weight gain
Urination functions	Stress, urge, dribbling, incontinence
Mobility of joint functions	Function to bend knees, elbows and other joints easily, range of motion
Stability of joint function	Function related to hip or shoulder stability
Muscle power functions	Contracting arm or leg muscle for movement
Muscle endurance functions	Function related to keeping a single body position for a period of time
Muscle functions	Muscles needed to transfer oneself from the bed to a chair
Involuntary movement reaction functions	Functions related to postural reactions
Control of voluntary movements	Bending the legs or lifting the arms
Gait pattern function	Body functions used for walking or running
Neuromusculoskeletal- and movement-related functions	Impaired mobility
Body structure domain (n=8)	
Structures of the inner ear	Vestibular apparatus and cochlea
Structures of respiratory system	Trachea, lungs and muscles of respiration
Structures of urinary system	Kidney, bladder

[3] Although "mental retardation" is considered outdated and possibly derogatory terminology, it was included as this is the term used in the ICF. Contemporary terminology would include "intellectual disability" or "cognitive disability".

ICF code description	Description
Structures of upper extremity	Upper arm, forearm, hand
Structures of lower extremity	Thigh, lower leg, ankle and foot
Structures of trunk	Vertebrae, muscles and ligaments of the trunk
Structures related to movement	Structures related to active movement such as leg muscles when walking
Additional musculoskeletal structure related to movement	Structures of the legs, hips, trunk and arms
Activities and participation domain (n=27)	
Watching	Looking at object(s) or people in the environment, watching a sports event
Listening	Listening to conversations, the radio/TV, warning signals
Focusing attention on the environment	Changes in physical or social stimuli
Carrying out daily routine	Completing activities of daily living, activity level, sedentary lifestyle
Communicating with - receiving - spoken message	Responding and comprehending questions or instructions
Speaking	Requesting help, telling a story, talking while walking
Changing basic body position	Sitting down on a chair from a standing position, getting up from the dinner table into a standing position
Maintaining a body position	Remaining standing in a queue at the bank, sitting on a bench
Transferring oneself	Moving from bed to chair
Changing and maintaining body position	Turn around while walking without losing balance
Lifting and carrying objects	Lifting an object from the floor or a table to transport it from one place to another
Hand and arm use	Reaching for something, picking up an object, turning a door handle, opening or closing a door
Basic walking	Short and long distances
Walking	Walking on different surfaces, stepping over objects, walking forwards, backwards or sideways
Moving around	Going up and down stairs, moving around obstacles
Moving around in different locations	Walking inside or outside the home
Moving around using equipment	Use of walking aids, cane
Washing oneself	Taking a bath or shower
Toileting	Planning and carrying out a trip to the toilet and cleaning yourself afterwards
Dressing	Getting dressed, putting on shoes
Looking after one's health	Maintaining a balanced diet, managing medication, avoiding risks of alcohol or drugs
Looking after one's safety	Not taking unnecessary risk, avoiding harm to one's safety
Acquisition of foods and services	Going shopping
Preparing meals	Cooking food with heat, preparing cold drinks, serving food
Doing housework	Sweeping, cleaning the house
Caring for household objects	Watering plants
Recreation and leisure	Visiting with friends, going out to social events, the gym or the museum
Environmental factors domain (n=15)	
Products or substances for personal consumption	Medication, alcohol
Products and technology for personal use in daily living	Footwear, clothing, mats and furniture, kitchen and cleaning equipment, support handles
Products and technology for personal indoor and outdoor mobility and transportation	Walking aids, crutches, canes
Products and technology for culture, recreation and sport	Equipment used during sport or leisure activities
Design, construction and building products and technology of building for public use	Public spaces, stairs, floor surfaces, public bathrooms and guardrails

ICF code description	Description
Design, construction and building products and technology of building for private use	Bathrooms, railings, stairs in one's own home
Climate	Excessive heat or cold, rain
Light	Darkness, poor lighting
Natural environment and human-made changes to environment, other specified	Uneven surface, environmental hazard, crowding, landforms, bodies of water
Immediate family	Emotional or physical support from immediate family members
Extended family	Emotional or physical support from relative(s) outside the immediate family
Personal care providers and personal assistants	Emotional or physical support from non-family members
Domesticated animals	Pets
Support and relationships, other specified	Physical support from non-family members
Health services, system and policies	Having access to rehabilitation and other health services
Personal factors domain (n=5)	
Age	Being over 65 years old
Faith	Trusting higher powers to provide in your needs and prevent you from falling
Fall history	Previous falls in the last 12 months
Sex	Being male or female
Medical conditions	Pre-existing medical conditions

In addition to these 86 codes, red-herring codes were also included in the Round 1 and 2 surveys.

(vi) Red-herring codes

The first and second round surveys contained a total of 15 red-herring codes each, spread across the different ICF domains. Red-herring items are typically included in the beginning, middle and end of a survey (Miller & Baker-Prewitt, 2009), as was also the case with these surveys. Due to the large number of codes in this code set, the red-herring codes were included in the beginning, middle and end of each of the five ICF domains, with three red-herring codes per ICF domain. The first round contained 15 red-herring codes and at least 82% of the participants were able to correctly identify 14 of the 15 red-herring codes as "irrelevant". The one code that 92% of the participants deemed "relevant", was a personal code, namely "History of causing car accidents (e.g., causing several car accidents in the last 12 months)". The description might have misled participants, as it could be interpreted that the cause of the accidents was related to a condition such as dizziness or vertigo, which would increase fall risk. This code was disregarded for the second round and replaced with a different red-herring code that was less ambiguous as it did not relate to falls in any way. In the second round, all 15 red-herring codes were changed. These new codes were inserted at the same places throughout the survey, again with three red-herring codes in each of the ICF domains. The red-herring codes were changed for the second round to keep the participants engaged and focused while completing the survey (Boateng et al., 2018) and also to show that their recommendations were implemented. No red-herring codes were used in the third round as the last round was only used to obtain consensus on the answers obtained in Round 2 (Miller & Baker-Prewitt, 2009).

Table 4.8: Red-herring codes used during Round 1 and 2

ICF domain	Red-herring codes Round 1 (n=15)	Red-herring codes Round 2 (n=15)
Body function domain	• Articulation function (e.g., stuttering or stammering) • Procreation function (e.g., sexual activity) • Functions of hair (e.g., hair loss, slow hair growth)	• Calculation functions (e.g., specific mental functions of determination, approximation and manipulation of mathematical symbols and processes) • Fluency and rhythm of speech function (e.g., functions of fluency, rhythm, speed and melody of speech, impairments such as stuttering, stammering) • Alternative vocalisation functions (e.g., functions of the production of notes and range of sounds, such as in singing, chanting, babbling and humming; crying aloud and screaming)
Body structure domain	• Structures of the nose (e.g., nose cartilage) • Structures of the intestines (e.g., small and large intestines) • Structures of nails (e.g., nail, cuticles)	• Structures of the sympathetic nervous system (e.g., fibres and ganglia associated with the sympathetic nervous system) • Structures of salivary glands (e.g., salivary glands, secretion of salivation) • Structures of skin glands (e.g., sweat glands, sebaceous glands)
Activities and participation domain	• Writing (e.g., drafting a letter) • Discussion (e.g., talking about current events in a group setting)	• Making decisions (e.g., making a choice among options, implementing the choice, and evaluating the effects of the choice) • Producing non-verbal messages (e.g., using gestures, symbols and drawings to convey messages)

ICF domain	Red-herring codes Round 1 (n=15)	Red-herring codes Round 2 (n=15)
	• Intimate relationships (e.g., having a healthy sex life)	• Rehearsing (e.g., repeating a sequence of events or symbols as a basic component of learning, such as counting by tens or practising the recitation of a poem)
Environmental factors domain	• Flora and fauna (e.g., birds in cages at the zoo) • Sound (e.g., loud thunderstorms outside when you are sitting inside the house) • Legal services, system and policies (e.g., influence of customary marriages, right to assistance, technical aids)	• Products and technology for education (e.g., equipment, products, processes, methods and technology used for acquisition of knowledge, expertise or skill, including those adapted or specially designed) • Products and technology for employment (e.g., equipment, products and technology used for employment to facilitate work activities) • Social norms, practices and ideologies (e.g., social norms of moral and religious behaviour or etiquette; religious doctrine and resulting norms and practices; norms governing rituals or social gatherings)
Personal factors domain	• Political views (e.g., voting for a specific political party of your choice during a general election) • History of causing car accidents (e.g., causing several car accidents in the last 12 months) • Nail biting (e.g., being a nail biter)	• Online shopping (e.g., buying many items through online shopping) • Loving animals (e.g., have a great love for all animals and being an advocate for animal rights) • Wealth (e.g., being wealthy and able to buy many materialistic items for yourself)

4.5.4.2 Round 1: Data collection procedures

In each round, the fall risk expert participants were given at least seven days to complete the survey (Appendix 4H). This time frame allowed for participants to complete the survey at their own pace, at a time convenient for them, and it afforded them ample time to consider their responses and formulate their thoughts (Yen et al., 2014). In addition, 14 days were allowed between the end of one round and the beginning of the next round.

According to Hasson et al. (2000), there is no set time that should be allowed between rounds, as this is usually dependent on the research question, the number of codes in a survey and the researcher's time to analyse the data between rounds. In this study, a week for completion of the survey and the approximate two-week time frame between rounds were deemed sufficient. This is because the survey did not require participants to generate the codes in a qualitative way, but only to rate the included codes.

4.5.4.3 Round 1: Data analysis procedures

Data was collected, documented and saved separately for each round using Qualtrics software, a program that allows researchers to compile electronic surveys, record participants' responses and download the responses in different formats (Qualtrics, 2019). The researcher employed the software function of exporting the raw data to a Microsoft Excel spreadsheet for each round, encoded to numerical values between 1 and 7 (1 = not at all relevant; 2 = low relevance; 3 = slightly relevant; 4 = neutral; 5 = moderately relevant; 6 = very relevant; 7 = extremely relevant). The content validity ratio across codes was established by means of numerical content validity indices where the average relevance was calculated by using a cut-off value of 82% of the experts' judgements to decide whether the items measured the respective constructs (Koller et al., 2017). The higher cut-off value of 82% (compared to a typical 70% value) was chosen based on the small number of participants to ensure higher content validity.

Descriptive statistics (means and standard deviation) were calculated for each code (Holey et al., 2007). All variable values were listed and counted to ensure all codes were included and counted. Each round was analysed separately for percentage response rate by percentage of agreement ratings. In addition, each round was independently analysed for internal consistency by means of computing Cronbach's alpha, which is an appropriate measure for determining reliability in Delphi surveys (Tavakol & Dennick, 2011). Cronbach's alpha was determined for Round 1 and a high correlation of α=0.97 was found, denoting a strong relationship between the targeted variables. A red-herring score of below 1 is acceptable for surveys (Lambert et al., 2003) and for this Delphi survey, the red-herring score was α=0.3, indicating above average content validity.

4.5.4.4 Round 1: Results, recommendations and discussion

For Round 1, the responses from all 11 participants were summed and each code was allocated a percentage of the number of participants who deemed that specific code relevant. All responses recorded as "moderately relevant", "very relevant" or "extremely relevant" were summed and described as "relevant". All responses recorded as "neutral", "slightly irrelevant", "low relevance" and "not at all relevant" were summed and described as "irrelevant". Consensus was calculated by assigning a numerical value to each response option, and all response options of 5 to 7 were averaged to determine the percentage score. Consensus was defined at 82% or more agreement between participants (Paz-Pascual et al., 2019; Stewart et al., 2017). All codes with an agreement score of 82% (nine out of the 11 participants) were included in the second round. All other codes were disregarded for the second round.

Several comments were received on completion of the first round and the following changes were made to the survey prior to Round 2 (Table 4.9).

Table 4.9: Changes made to the survey based on the recommendations made by the experts after Round 1

Recommendation	Changes made to survey items
Type of terrain, i.e., gravel, paving, grass, rocky, mountainous – rural and urban areas, accessibility-related falls	Example for *Design, construction and building products and technology of building for public use* was expanded from "e.g., public spaces, stairs, floor surfaces, public bathrooms and guardrails" to "e.g., public spaces, stairs, floor surfaces, type of terrain you walk on, public bathrooms, guardrails and accessibility to public areas"
Type of footwear used when mobilising	Example for *Products and technology for personal use in daily living* already includes footwear (e.g., footwear, clothing, mats and furniture, kitchen and cleaning equipment, support handles). No changes were made to this code.
Personality type	Example for *Temperament and personality functions* was expanded from "e.g., confidence, non-compliance, impulsiveness, emotional stability" to "e.g., confidence, non-compliance, impulsiveness, emotional stability, personality type"
Diabetes	Diabetes is a diagnosis and as such not specifically coded to the ICF. Example for *Acute / chronic medical conditions* was expanded from "e.g., acute ischemic incident, chronic high blood pressure" to "e.g., acute ischemic incident, chronic high blood pressure, blood sugar level disorders" to include a description of this condition.
Depression	Depression is a diagnosis captured in the ICD and therefore specifically excluded in the ICF. Although two people could be assigned the same ICD code for depression, a series of different ICF codes can be used to document the differences in their functioning. Hence the ICF does not use diagnostic ICD codes, but rather a series of codes to determine the level of functioning (Reed et al., 2009). Consequently, the codes in the survey were not changed to include depression.

Recommendation	Changes made to survey items
Cognition	The example for *Global mental functions* already contains this suggestion as an example "e.g., global cognitive or mental status". No changes to this code were made.
Fear of falling	It was an excellent recommendation to add "fear of falling" to the example for the code *Emotional functions.* This code was expanded from "e.g., functions of appropriateness and regulation of emotions, fear, happiness, sadness" to "e.g., functions of appropriateness and regulation of emotions, fear of falling".
Fetching firewood	The example for *Acquisition of goods and services* was expanded from "e.g., going shopping" to "e.g., going shopping, selecting and gathering food, fuel, household items or cooking necessities for daily living"
Collecting water from communal tap or river stream using wheelbarrow/on their heads	Example for *Products and technology for personal use in daily living* was expanded from "e.g., footwear, clothing, mats and furniture, kitchen and cleaning equipment, support handles, buckets or containers for gathering water"
Preparing meals on open fire	The example for *Preparing meals* was expanded from "cooking food with heat, preparing cold drinks, serving food" to "cooking food with heat or an open fire, preparing cold drinks, serving food"
Doing laundry in river or stream	The example for *Doing housework* was expanded from "e.g., sweeping, cleaning the house" to "e.g., sweeping, cleaning the house, collecting and washing clothes inside or outside the house"

Based on the recommended changes, no new codes were added to Round 2, but several examples of the ICF codes were expanded to include the participants' suggestions. On completion of Round 1, consensus was established on the included codes and, apart from the red-herring codes, the following number of codes were excluded based on the responses of the participants:

- For the 31 body function domain codes, six were excluded, resulting in 26 remaining codes.
- Half of the eight body structure domain codes were excluded, resulting in four remaining codes for Round 2.
- For the original 27 activities and participation domain codes, two were excluded, resulting in 25 codes included in Round 2.
- Three of the 15 environmental factors domain codes were excluded, resulting in 12 remaining codes.
- Two of the five original personal factors domain codes were excluded, resulting in three codes remaining for Round 2.

The specific codes excluded in Round 1 are shown in Table 4.10.

Table 4.10: ICF codes excluded after Round 1 and the source they originated from

ICF domain	ICF code	ICF description and source
Body functions domain	b122	Global psychosocial functions (e.g., personal and interpersonal skills used during social interactions) [*SR; OA; HCP]
	b147	Psychomotor functions (e.g., agitation) [*SR]
	b525	Defecation function (e.g., frequency of defecation, constipation, incontinence) [*SR]
	b530	Weight management function (e.g., lack of appetite, weight loss, weight gain) [*SR; OA; HCP]
	b545	Water, mineral and electrolyte balance functions (e.g., drinking at least 2 litres of water per day) [*OA]
	b610	Urination functions (e.g., stress, urge, dribbling, incontinence) [*SR]
Body structure domain	s260	Structures of the inner ear (e.g., vestibular apparatus and cochlea) [*SR; OA; HCP]
	s430	Structures of respiratory system (e.g., trachea, lungs and muscles of respiration) [*SR]
	s610	Structures of urinary system (e.g., kidney, bladder) [*SR]
	s730	Structures of upper extremity (e.g., upper arm, forearm, hand) [*SR; OA]
Activities and participation domain	d115	Listening (e.g., listening to conversations, the radio/TV, warning signals) [*SR]
	d570	Looking after one's health (e.g., maintaining a balanced diet, managing medication, avoiding risks of alcohol or drugs) [*SR]
Environmental factors domain	e140	Products and technology for culture, recreation and sport (e.g., sports equipment used during sport or leisure activities) [*SR; OA; HCP]
	e225	Climate (e.g., excessive heat or cold, rain) [*SR; OA]
	e315	Extended family (e.g., emotional or physical support from relatives outside the immediate family) [*OA; HCP]
Personal factors domain		Faith (e.g., trusting higher powers to provide in your needs and prevent you from falling) [*OA]
		Sex (e.g., being male or female) [*SR; HCP]

*SR = Systematic review; OA = Focus groups with older adults; HCP = Focus groups with HCPs

From the total of 86 ICF codes included in Round 1, altogether 17 codes (20%) were excluded (refer to Table 4.13 for a detailed code reduction list for all three rounds). The majority of the excluded codes (n=9) stemmed from only one source – seven came from the systematic review and two from the focus groups with the older adults. Four codes each came from two sources (the systematic review and the focus groups) and from all three sources, respectively. Each excluded code is discussed in more detail next.

Global psychosocial functions: Literature documents various psychological and social factors thought to be associated with falling (Chen & Chen, 2017; Deschamps et al., 2016). The association of these factors with falls has however received relatively little attention from research and may go unrecognised by HCPs, who might focus more on factors where a direct correlation to falls has been established (Means et al., 2003). While the precise relationship between falling and most psychosocial factors remains unclear, it is plausible that social participation, including personal and interpersonal skills, could be negatively affected by falls in older adults – which in turn can cause them to become fearful about subsequent falls and injury. Social skills do not buffer the effect of falls on social participation, but could be targeted in intervention and rehabilitation programmes to reduce the negative effects of falls (Pin & Spini, 2016).

Psychomotor functions: Agitation was mentioned as a fall risk factor in the systematic review (in Phase 1). Agitation as a singular factor does not necessarily contribute to an older adult's fall risk, but could be an indication of neurological conditions in some older adults, as well as a symptom of hospitalised patients being under constant observation or post-operative (Fields et al., 2018). As stated earlier in this thesis, the FRATs included in Phase 1 were not restricted to community-dwelling older adults, hence the inclusion of agitation in the modified Delphi process. Furthermore, agitation is often associated with dementia in community-dwelling older adults (Aksay et al., 2014), which would be classified as an ICD code and not included as an ICF code per se. The fall risk experts thus correctly excluded this code, as agitation as such is not a definitive indicator of increased fall risk.

Defecation function, Urination function and *Structures of the urinary system*: All three these codes relate to continence, which may cause falls through various mechanisms, e.g. slips on wet surfaces; rushing to get to the bathroom in time (which could result in tripping); medical conditions such as urinary tract infection, nocturia and postural hypotension (Batchelor et al., 2013). Despite this association between falls and continence in older adults, recent literature suggests that it is unlikely that the relationship is causative, especially since both conditions are also associated with multiple other factors (Batchelor et al., 2013; Hunter et al., 2013). More research is needed to accurately assess the relationship between falls and the implementation of successful intervention measures (Denning & Pomajevich, 2018). Continence assessment by HCPs is only a small, and sometimes negligible part of the intervention process for older adults with incontinence, as the mainstay of the process lies in the modification of the environment to improve access and reduce the risk of falls (Nair, 2018). As such, it could be expected that the experts excluded these codes during the Delphi process, as they are not necessarily directly relevant when discussing the most relevant factors associated with fall risk in older adults.

Weight management function: Unintentional weight loss in older adults is associated with increased morbidity and mortality (Gaddey & Holder, 2014). Medication could interfere with taste and cause nausea, which could in turn lead to eating less and cause frailty (Gaddey & Holder, 2014), resulting in falls as a secondary consequence. In contrast, weight gain in older adults could lead to obesity. Obese adults do not have a higher risk of fall-related injuries compared to healthy-weight adults, but they are more likely to have other associated health conditions and polypharmacy, which could increase their fall risk (Jegtvig, 2014). In other words, falls in older adults are, at most, a secondary consequence of weight management (weight loss or gain) and not necessarily critical when considering relevant factors related to fall risk in this population.

Water, mineral and electrolyte balance functions: This factor was mentioned during the focus groups with the older adults in Phase 1, specifically 'drinking enough water' to reduce one's risk of falling. Despite an association between dehydration and a possible increased falls risk (Nash & Bergin, 2018) – in the sense that fall risk could be exacerbated by dehydration – there is no research identifying a causal relationship between the two. Conditions such as orthostatic hypotension or urinary tract infections could lead to dehydration, which could lead to more dramatic effects and subsequent falls (Kappel, 2017). Although dehydration is a serious condition in older adults, it is not considered to be a critical fall risk factor in community-dwelling older adults as dehydration should be treated independently of a possible fall risk.

Structures of the inner ear: The causal effect of dysfunction in the inner ear and fall risk in older adults has been well established (Jahn, 2019). Although this is a critical aspect in the identification of fall risk factors in older adults, the experts excluded this code. Dysfunction of the inner ear does not always relate directly to the actual structure but to the functionality of the structure (Schrauwen et al., 2016). Therefore, the exclusion of the inner ear as a structure – as opposed to inclusion of the codes "vestibular functions" and "sensations associated with hearing and vestibular functions" – can be explained and justified.

Structures of respiratory system: Although the structures of the respiratory system are important when considering fall risk factors in older adults, the fall risk experts excluded "structures of respiratory system". Instead, they included "sensations associated with cardiovascular and respiratory", which could include the respiratory structures (Kleinstreuer & Zhang, 2010). Again, dysfunction could be more related to function than structure, as (similar to the previous code) the exclusion of this code could be explained and indicates that the experts were consistent in their thinking and recommendations.

Structures of upper extremity: Although this code (which is a more generic code) was excluded, the codes "hand and arm use" as well as "structures of the trunk" were included, which shows a tendency for greater specificity of the codes that were recommended for inclusion in the code set. These two remaining codes would account for "structures of upper extremity" (Forro et al., 2020).

Listening: Listening is a fundamental skill for making sense of one's environment and the conversations taking place in that environment (Beck, 2015). Listening and hearing are also two separate entities. Providing the brain with louder acoustic signals (i.e., amplification) in the case of hearing loss does not necessarily equate to better listening skills, as perceiving sound (hearing) and attributing meaning to sound (listening) are separate sophisticated cognitive processes (Beck, 2015). A recent systematic review on the relationship between hearing loss and fall risk in the elderly concluded that a more comprehensive understanding of the mechanisms underlying this relationship is yet to be elucidated and interventions to address hearing loss may reduce fall risk (Agmon et al., 2017). The ICF code "listening" indicates an activity and not the presence or absence of hearing loss; as such, the fall risk experts most likely concluded that the physical activity of listening to the environment does not necessarily have a direct impact on fall risk in older adults, but the that ICF code "hearing function", which denotes one's ability to hear, does impact fall risk. Hence this code was retained.

Looking after one's health: Older adults have a higher risk of neglecting their health by polypharmacy (the concomitant daily use of five or more medications) or the incorrect or inappropriate management of their medication (Virtudes et al., 2018). Combining the misuse of medication with alcohol use could lead to potentially serious alcohol–medication interactions and complications in older adults' health (Holton et al., 2019). Polypharmacy increases the risk of falls by as much as five times and could be a potentially modifiable fall risk factor (Montero-Odasso et al., 2019). However, the exact mechanism through which polypharmacy increases fall risk is unknown and the causal relationship between polypharmacy and gait disturbances is difficult to demonstrate conclusively (Montero-Odasso et al., 2019). The fall risk experts could have excluded this code from the essential list of relevant codes for the identification of fall risk factors in older adults. This is because little is known about the epidemiology of polypharmacy at population level and its prevalence is typically higher in the nursing home setting than among community-dwelling older adults (Morin et al., 2018), which was the focus of this study. Furthermore, should one not look after one's health, a multitude of difficulties could occur, all of which would pose their own consequences (Inzitari et al., 2011). Therefore, due to the vast number of conditions that could be associated with this code, it is relevant – but not critical – to the identification of fall risk factors in older adults.

Products and technology for culture, recreation and sport: This code is very specific to sport-related activities, but the included codes "products and technology for personal use in daily living" as well as "products and technology for personal indoor and outdoor mobility and transportation" could both include sports items such as golf carts, hiking/walking sticks or walking shoes (Maxwell et al., 2018). The expert participants possibly excluded this code, as the code set focused on fall risk factors. Sport equipment per se is not a typical consideration for HCPs, despite its potential value for prevention and management strategies.

Climate, Extended family and *Faith*: Day-to-day weather changes could have an impact on older adults who are more vulnerable to weather-related factors because of their limited mobility and social isolation, especially when rain or wet weather causes slippery surfaces (Clarke et al., 2015). Rain, and as a result, slippery walking surfaces, pose a high fall risk for older adults. Despite the importance of these factors to fall risk management in older adults, it is not necessarily relevant to the identification of fall risk factors in older adults, as it will most likely be a code to be addressed in management and intervention strategies. The fall risk experts excluded this code as the instruction was to determine relevance to fall risk factor identification, not management or intervention. For the same reason, codes "*extended family*" and "*faith*" are more relevant to intervention than identification of fall risk factors, and they should thus be excluded, as the fall risk experts have rightly done. Intervention strategies could be enhanced and produce increased positive response when the individual has the support of their family members (Miller & DiMatteo, 2013) and their faith (Fruh et al., 2018). Empirical studies have shown positive and significant relationships between social and familial support and intervention adherence, as social support from family provides patients with practical help and can buffer the stresses of living with a medical condition (Miller & DiMatteo, 2013).

Sex: This is a personal factor and not a prevention or variable code, but something the HCPs would note on the biographic information of the patient's chart for their own reference. There is no direct link between sex and fall risk in older adults, but it is recommended that clinicians note this as part of the case history and consider it when discussing early intervention and prevention strategies (Porta et al., 2020).

4.5.5 Delphi survey: Round 2

The aim of Round 2 was to determine the importance of the included codes. The same participants were included as for Round 1. The second round noted no attrition as all 11 participants completed the survey (Appendix 4I).

4.5.5.1 Round 2: Survey development

Based on the results of Round 1, the survey for Round 2 was developed to include all the codes not excluded in Round 1 (as earlier illustrated in Table 4.10), as well as the second-round red-herring codes (as illustrated in Table 4.8).

4.5.5.2 Round 2: Data collection and analysis

Data was collected and analysed in the exact same manner as in Round 1, save for the fact that informed consent and biographic information were not again collected. The researcher sent the survey individually to each of the participants, requesting that it be completed within seven days. The researcher sent follow-up reminders to four participants, who completed the survey within three days from the time the reminder was sent. For Round 2, Cronbach's alpha results again indicated a high correlation of α=0.96, denoting a strong relationship between the targeted variables, while the red-herring value was α=0.3, indicating above average content validity.

4.5.5.3 Round 2: Results, recommendations and discussion

After completion of Round 2, consensus was established on the included codes and, apart from the red-herring codes, the following number of codes were excluded based on the responses of the participants:

- For the 26 body function domain codes, three were excluded, resulting in 23 remaining codes.
- Five of the original 25 activities and participation domain codes, resulting in 20 codes.

No body structure domain codes, environmental factors domain or personal factors domain codes were excluded (see Table 4.11). No recommendations for codes to be added to the survey were obtained in Round 2.

Table 4.11: ICF codes excluded after Round 2 and the source they originated from

ICF domain	ICF code	ICF description and source
Body functions domain	b117	Intellectual functions (e.g., intellectual or mental retardation, dementia) *SR
	b139	Global mental functions (e.g., global cognitive or mental status) *SR; OA
	b480	Sensations associated with cardiovascular and respiratory functions (e.g., shortness of breath, oxygen requirements) *SR
Activities and participation domain	d110	Watching (e.g., looking at objects or people in the environment) *SR; OA; HCP
	d330	Speaking (e.g., requesting help, telling a story, talking while walking) *SR
	d630	Preparing meals (e.g., cooking food with heat or on an open fire, preparing cold drinks, serving food) *SR
	d650	Caring for household objects (e.g., watering plants) *SR
	d920	Recreation and leisure (e.g., visiting with friends, going out to social events, the gym or the museum) *SR; OA

*SR = Systematic review; OA = Focus groups with older adults; HCP = Focus groups with HCPs

From the total of 69 codes included in Round 2, eight codes (9% of the total codes) were excluded (refer to Table 4.13 for a detailed code reduction list for all three rounds), and no new codes were recommended. Of the eight excluded codes in Round 2, five came from one source (systematic review), two came from two sources (systematic review and focus groups) and only one came from all three sources. This finding confirms the importance of gathering rich qualitative data from different sources prior to commencing the modified Delphi process to distil the code list. Each of these excluded codes is discussed in more detail next.

Intellectual functions and *Global mental functions*: Older adults with dementia or cognitive dysfunctions are twice as likely to fall and sustain serious fall-related injuries than older adults with healthy cognition (Fernando et al., 2017; Lach et al., 2017). The fall risk experts excluded these two broad generic codes, but included the more descriptive "consciousness function", "orientation functions" and "perceptual functions", which could account for both intellectual and global mental functions. These two functions were included following the systematic review, which, apart from community-dwelling older adults, also included hospitalised older adults. *Intellectual functions* and *Global mental functions* could thus be more prominent in hospitalised patients (Park, 2017) and focus on broader aspects than what would typically be expected when considering community-dwelling older adults only. There is a dearth of research related to falls in mental health settings or among older adults with mental health problems, despite the high number of falls experienced by this population. More research could assist HCPs in developing and employing prevention strategies for older adults with mental health problems (Bunn et al., 2014).

Sensations associated with cardiovascular and respiratory functions: Shortness of breath could lead to the use of equipment to increase oxygen absorption (Ong et al., 2019). Such equipment could be a fall risk for older adults and would be included in the code "products and technology for personal use in daily living", which was included by the fall risk experts. Shortness of breath (dyspnea) is considered a factor for fall risk in older adults, but there is no direct, causative relationship between dyspnea and an increased fall risk or incidence in older adults (Salzman, 2011). Dyspnea does not have a precipitating effect on fall risk, although it contributes to progressive physical deterioration that may theoretically increase the risk for falls (Salzman, 2011). The participation experts could possibly have excluded this code as it is neither critical nor overtly important to consider when identifying fall risk factors in older adults. Moreover, they were considering only the most important codes to be included in a code set.

Watching: This was the only code excluded in Round 2, and its exclusion stemmed from all three sources. Although the fall risk experts excluded this code, "watching" could be related to two aspects, vision ("seeing function") and "focusing attention on the environment" (Barrett, 2005) – both of which were represented by other specific codes. These codes remained on the list of included codes, indicating their importance. The experts could have argued that the more generic code, "watching", was redundant, when both the specific codes, "seeing" and "focusing attention on the environment", were deemed relevant and important, and hence were retained.

Speaking: This code, which was obtained from the systematic review, included not only community-dwelling older adults, but also hospitalised patients. This is important, as "speaking" can be interpreted differently in different settings (Hemsley et al., 2019). For older adults in hospital settings, "speaking" most likely refers to requesting help verbally. Therefore, for older adults who cannot or will not "speak" and ask help, but rather opt to mobilise themselves, their potential fall risk is increased, while the risk for older adults who do ask for help, is decreased (Coussement et al., 2009). In both hospital and community-dwelling settings, "speaking" also relates to communicating with others, which includes a cognitive function as well as a communication partner. Talking while walking, for example, denotes a dual task activity that involves cognitive functions and gait (Ayers et al., 2015). It could result in decreased gait and possible falls, as gait performance could decrease while simultaneously conducting a cognitively demanding task. The challenge arising from two tasks interfering with each other and competing for the same brain resources, increases the risk of falls (Ayers et al., 2015). Although the act of speaking by itself does not increase an older adult's fall risk, there is an implied relationship between requesting help or walking while talking and falls in older adults. As explained earlier, "speaking" also involves a communication partner (Rourke et al., 2018), which might be interpreted as a facilitator rather than a barrier, as the other person could assist an older adult and prevent falls. However, this finding denotes a positive, implied relationship between speaking and falls. The experts possibly excluded this code, as it involves another person/s and the focus of the code set is on factors affecting the older adults themselves, not their communication partners. Although it is a relevant code, "speaking" is not necessarily critical to a code set on the topic.

Preparing meals, Caring for household objects and *Recreation and leisure*: These codes would be more relevant to intervention and management of fall risk factors than to their identification, as environmental aspects are typically considered during intervention strategies. The participants made a similar recommendation for *Climate*, *Extended family* and *Faith* in Round 1. Identifying factors in one's environment that could influence the outcome of the intervention (Khenti et al., 2016) agrees with the ICF principles, and extends the biomedical focus of intervention strategies. Hence, it is imperative to recognise the influence of daily tasks and activities (such as the three codes excluded) on the person's ability to successfully apply intervention strategies in their daily living (Khenti et al., 2016). Reducing older adults' fall risk during an intervention programme would therefore typically include factors in their environment and activities of daily life, such as preparing meals, caring for plants and participating in leisure activities.

4.5.6 Delphi survey: Round 3

The aim of Round 3 was to determine consensus on the codes included after Round 2, hence no red-herring codes were included in this round (Appendix 4J). The same participants were used as for the previous two rounds, and the third and final round noted no attrition, as all 11 participants completed the survey.

4.5.6.1 Round 3: Survey development

The survey for Round 3 was developed based on the results of Round 2. The survey excluded all the codes shown earlier in Table 4.11.

4.5.6.2 Round 3: Data collection and analysis

Data was collected and analysed in exactly the same manner as in Round 2. The researcher sent the survey individually to each of the participants, requesting that it be completed within seven days. The researcher sent follow-up reminders to three participants, who completed the survey within two days from the time the reminder was sent. In Round 3, the data was also analysed through importance ratings by means of a mean, standard deviation and associated range ranking for each ICF code. Thus, the data was calculated to show the degree of consensus for important codes between the experts, with lower mean values reflecting more important codes. For Round 3, Cronbach's alpha continued to indicate a high correlation of α=0.97, denoting a strong relationship between the targeted variables. Cronbach's alpha was used during each round of the Delphi process to determine the internal consistency of the survey items and a high score (>0.7) was considered to indicate consensus (Chamberlain et al., 2020). All three rounds indicated a strong reliability of α=0.96 – 0.97 and an average of α=0.966 for all three rounds. Although the number of codes decreased per round, the Cronbach's alpha scores did not increase dramatically, most likely as the reliability was already higher than 0.9 (Chamberlain et al., 2020).

4.5.6.3 Round 3: Results, recommendations and discussion

On completion of Round 3, consensus was established on the included codes and the following number of codes were excluded based on the responses of the participants:

- For the 23 body function domain codes, five were excluded, resulting in 18 remaining codes for the final code set.
- One of the original 20 activities and participation domain codes was excluded, resulting in 19 codes.
- Three of the 12 environmental factors domain codes were excluded, resulting in nine codes.

None of the four body structure domain codes or three personal factors domain codes were excluded (see Table 4.12). No recommendations for codes to be added to the survey were obtained in Round 3.

Table 4.12: ICF codes excluded after Round 3 and the source they originated from

ICF domain	ICF code	ICF description
Body functions domain	b126	Temperament and personality functions (e.g., confidence, non-compliance, impulsiveness, emotional stability) *SR; OA; HCP
	b134	Sleep functions (e.g., sleep disturbances, lack of sleep, quality of sleep, insomnia) *SR; OA
	b144	Memory functions (e.g., short- or long-term memory loss, amnesia, ability to remember) *SR; OA
	b152	Emotional functions (e.g., functions of appropriateness and regulations of emotions, fear of falling, happiness, sadness) *SR; OA; HCP
	b230	Hearing (e.g., localisation of sound, discriminating speech or words) *SR
Activities and participation domain	d330	Communicating with – receiving – spoken message (e.g., responding and comprehending questions or instructions) *SR
Environmental factors domain	e310	Immediate family (e.g., emotional or physical support from immediate family members) *OA
	e340	Personal care providers and personal assistants (e.g., emotional or physical support from non-family members) *SR
	e298	Support and relationships (e.g., physical support from non-family members) *HCP

*SR = Systematic review; OA = Focus groups with older adults; HCP = Focus groups with HCPs

From the total of 61 codes included in Round 3, nine (10% of the total codes) were excluded (refer to Table 4.13 for a detailed code reduction list of all three rounds). At the end of Round 3, the pre-determined criteria set out at the beginning of the Delphi process were met and the process was stopped. The excluded number of codes in the last round had a standard deviation of 1. Of the excluded codes, five were obtained from only one source, two codes were obtained from two sources (systematic review and focus groups) and two were obtained from all three sources. These excluded codes are discussed in more detail below.

Temperament and personality functions: Although non-compliance with medical intervention strategies could lead to serious consequences for older adults (including falls), this code is more suited to intervention and management strategies than to the identification of fall risk factors. Personality functions may influence older adults' risk of falls as well as their response to intervention strategies and willingness to modify future behaviour (Kloseck et al., 2009), especially in risk-taking personality types, suggesting that such individuals continue to be active despite falling (Zhang et al., 2004). There is scant research on the importance of personality factors for the recovery and rehabilitation of fallers, as risk taking may reflect the importance of personality factors in falling. Some people will take more risks than others in an attempt to accomplish what they perceive as important for them (Kloseck et al., 2009). Considering the person as a whole with various personality domains, points to a need for research that expands on what is known about the interaction between moods, emotional regulation, and risk-taking tendency as they apply to falls (Kloseck et al., 2009).

Sleep functions: Sleep deprivation is a code more suited to intervention strategies than to the identification of fall risk factors, as sleep may represent a modifiable behaviour to target during interventions aimed at reducing risk of falls in older adults (Stone, 2015). Medication used for sleep difficulties in older adults could have an influence on their sleep patterns as well as on their fall risk as most studies have not examined the independent effects that disturbed sleep and medication used to treat insomnia have on falls (Stone, 2015). The exact correlations between sleep and sleep disturbances and falls have not been established.

Memory functions: Cognitive impairment has been identified as a risk factor for falls in older adults, but this is not the case with memory impairment in healthy adults (Allali et al., 2017). Older adults with memory function impairments such as dementia, with a history of falls, are five times more likely to be institutionalised compared to older adults with dementia but without a history of falls (Fernando et al., 2017). The factors related to increased fall risk in people with dementia are not fully understood and possible explanations are that there are different underlying mechanisms for risk factors that are common to both people with dementia and cognitively intact older adults. Also, the magnitudes of association for risk factors shared with cognitively normal older adults are greater, and people with dementia may have unique risk factors that are not present in cognitively normal adults (Fernando et al., 2017; Smith, 2017). The assessment of memory functions in older adults is not necessarily critical when discussing fall risk factors in this population, as most HCPs would rather focus on this code during intervention as a potentially modifiable risk factor. Older adults with dementia or noticeable cognitive impairment would also more likely not be community dwelling, which is the focus of this code set.

Emotional functions: Fear of falling has been established a fall risk factor in older adults and is associated with negative physical and psychosocial consequences, including depression, activity restriction and even death (S. Lee et al., 2018). Fear of falling is less prominent in older adults who have not yet fallen (S. Lee et al., 2018) and more relevant to intervention and management of those older adults who have fallen. During the Delphi process, the experts included this code in Round 1 and 2 but excluded it in Round 3. One reason for this might be that they did not view emotional functions as critical for the identification of fall risk in older adults, or that HCPs tend to focus more on the positive, modifiable factors and do not necessarily want to focus on the fear of falling.

Hearing: As discussed previously, although hearing loss is relevant to falls in older adults, the code "hearing" is a positive code. "Hearing loss" could be incorporated in "vestibular function" and "sensations associated with hearing and vestibular function", all of which the fall risk experts included in the code set and which are more relevant to fall risk than the positive code "hearing".

Communicating with – receiving – spoken message: Comprehending and responding to questions relates to both listening and cognitive understanding of the spoken message and also involves a communication partner. Although there is some evidence of communication disorders that are associated with an increased risk of falls in older adults, there is no direct correlation between the two and further research is needed (Hemsley et al., 2019). The cognitive task of receiving the spoken message would imply that impaired cognitive function (which was a code the experts already excluded) could be related to falls in older adults. Impaired cognitive function has been associated with increased prevalence of falls in healthy older adults, but no definite evidence has been found on this topic (Allali et al., 2017). Receiving a spoken message is also dependent on the ability to hear the message. Older adults could benefit from spoken messages to decrease their own fall risk, such as when they can hear warnings or instructions to avoid certain areas or places.

Hearing loss increases the risk of falls in older adults, depending on the severity of the hearing loss, but a causal relationship can only be established once more research has been done on the extent and exclusion of concomitant vestibular and cochlear pathology (Jiam et al., 2016). In order to listen to instructions or warnings, such older adults would need a communication partner, which, as mentioned before, could be interpreted as a positive facilitator to fall risk and not a barrier. By excluding codes related to others (i.e., not involving only the older adults themselves), the experts systematically reduced the list of codes to those critical to the identification of fall risk in older adults.

Immediate family, *Personal care providers and personal assistants* and *Support and relationships*: All three these codes that are regarded as positive codes that serve as facilitators, are more suited to intervention and management of this population; yet this was not the focus of the questions to the fall risk experts. As discussed in Round 1, social support provides a positive and significant increase in intervention adherence as social support from family and other relationships provides patients with practical help and can buffer the stresses of living with a medical condition (Miller & DiMatteo, 2013). Once again, the experts excluded codes related to other people and kept only those related to the older adult who is being assessed.

The cumulative results of all three rounds are illustrated in Table 4.13, with the codes excluded in each round being colour coded.

Table 4.13: Summary of results from the three-round, modified Delphi process

ICF code	SURVEY ITEM	ROUND 1				ROUND 2				ROUND 3			
		N	%	Included	Excluded	N	%	Included	Excluded	N	%	Included	Excluded
	BODY FUNCTIONS												
b110	Consciousness functions (e.g., state of one's awareness or alertness; being post-operative)	11	100%	x		9	82%	x		10	91%	x	
b114	Orientation functions (e.g., knowing where you are, your orientation to the environment, what time it is)	11	100%	x		11	100%	x		9	82%	x	
b117	Intellectual functions (e.g., intellectual or mental retardation, dementia)	9	82%	x		8	73%		x				
b122	Global psychosocial functions (e.g., personal and interpersonal skills used during social interactions)	6	55%		x								
b126	Temperament and personality functions (e.g., confidence, non-compliance, impulsiveness, emotional stability)	9	82%	x		9	82%	x		7	64%		x
b134	Sleep functions (e.g., sleep disturbances, lack of sleep, quality of sleep, insomnia)	10	91%	x		9	82%	x		6	55%		x
b139	Global mental functions (e.g., global cognitive or mental status)	10	91%	x		8	73%		x				
b144	Memory functions (e.g., short- or long-term memory loss, amnesia, ability to remember)	9	82%	x		10	91%	x		7	64%		x
b147	Psychomotor functions (e.g., agitation)	8	73%		x								
b152	Emotional functions (e.g., functions of appropriateness and regulation of emotions, fear of falling, happiness, sadness)	9	82%	x		9	82%	x		5	45%		x
b156	Perceptual functions (e.g., lack of insight, altered awareness, illusions)	11	100%	x		11	100%	x		9	82%	x	
b210	Seeing function (e.g., clarity and quality of vision)	11	100%	x		11	100%	x		11	100%	x	
b230	Hearing (e.g., localising sound, discriminating speech or words)	9	82%	x		10	91%	x		7	64%		x
b235	Vestibular functions (e.g., sensory functions to keep your balance while moving)	11	100%	x		11	100%	x		11	100%	x	
b240	Sensations associated with hearing and vestibular function (e.g., sensations of dizziness / vertigo)	11	100%	x		11	100%	x		11	100%	x	
b260	Proprioception function (e.g., sense of joint position, functions to enable moving your hand or arm)	11	100%	x		11	100%	x		11	100%	x	
b279	Additional sensory functions (e.g., loss or dysfunction in any of the senses)	11	100%	x		11	100%	x		11	100%	x	
b280	Sensations of pain (e.g., pain in legs, pain affecting level of functioning)	11	100%	x		9	82%	x		11	100%	x	
b480	Sensations associated with cardiovascular and respiratory functions (e.g., shortness of breath, oxygen requirements)	9	82%	x		8	73%		x				
b525	Defecation function (e.g., frequency of defecation, constipation, incontinence)	7	64%		x								
b530	Weight management function (e.g., lack of appetite, weight loss, weight gain)	7	64%		x								
b545	Water, mineral and electrolyte balance functions (e.g., drinking at least 2 litres of water per day)	8	73%		x								
b610	Urination functions (e.g., stress, urge, dribbling, incontinence)	8	73%		x								
b710	Mobility of joint functions (e.g., function to bend knees, elbows and other joints easily, range of motion)	11	100%	x		11	100%	x		11	100%	x	
b715	Stability of joint function (e.g., function related to hip or shoulder stability)	11	100%	x		11	100%	x		11	100%	x	

Table 4.13: Summary of results from the three-round, modified Delphi process (cont.)

ICF code	SURVEY ITEM	ROUND 1				ROUND 2				ROUND 3			
		N	%	Included	Excluded	N	%	Included	Excluded	N	%	Included	Excluded
b730	Muscle power functions (e.g., contracting arm or leg muscle for movement)	11	100%	x		11	100%	x		11	100%	x	
b740	Muscle endurance functions (e.g., function related to keeping a single body position for a period of time)	11	100%	x		11	100%	x		10	91%	x	
b749	Muscle functions (e.g., muscles needed to transfer oneself from the bed to a chair)	11	100%	x		11	100%	x		11	100%	x	
b755	Involuntary movement reaction functions (e.g., functions related to postural reactions)	10	91%	x		10	91%	x		11	100%	x	
b760	Control of voluntary movements (e.g., bending the legs or lifting the arms)	11	100%	x		11	100%	x		11	100%	x	
b770	Gait pattern function (e.g., body functions used for walking or running)	11	100%	x		11	100%	x		11	100%	x	
b798	Neuromusculoskeletal- and movement-related functions (e.g., impaired mobility)	11	100%	x		11	100%	x		11	100%	x	
BODY STRUCTURE													
s260	Structures of the inner ear (e.g., vestibular apparatus and cochlea)	8	73%		x								
s430	Structures of respiratory system (e.g., trachea, lungs and muscles for respiration)	7	64%		x								
s610	Structures of urinary system (e.g., kidney, bladder)	4	36%		x								
s730	Structures of upper extremity (e.g., upper arm, forearm, hand)	4	36%		x								
s750	Structures of lower extremity (e.g., thigh, lower leg, ankle and foot)	11	100%	x		11	100%	x		11	100%	x	
s760	Structures of trunk (e.g., vertebrae, muscles and ligaments of the trunk)	11	100%	x		10	91%	x		10	91%	x	
s770	Additional musculoskeletal structure related to movement (e.g., structure of the legs, hips, trunk and arms)	11	100%	x		11	100%	x		10	91%	x	
s798	Structures related to movement (e.g., structure related to active movement such as leg muscles when walking)	11	100%	x		11	100%	x		10	91%	x	
ACTIVITES AND PARTICIPATION													
d110	Watching (e.g., looking at objects or people in the environment)	9	82%	x		7	64%		x				
d115	Listening (e.g., listening to conversations, the radio/TV, warning signals)	6	55%		x								
d160	Focusing attention on the environment (e.g., changes in physical or social stimuli, paying attention to the type of surfaces you walk on)	10	91%	x		11	100%	x		10	91%	x	
d230	Carrying out daily routine (e.g., completing activities of daily living, activity level, sedentary lifestyle)	11	100%	x		11	100%	x		10	91%	x	
d310	Communicating with - receiving - spoken message (e.g., responding and comprehending questions or instructions)	9	82%	x		10	91%	x		8	73%		x
d330	Speaking (e.g., requesting help, telling a story, talking while walking)	10	91%	x		8	73%		x				
d410	Changing basic body position (e.g., sitting down on a chair from a standing position, getting up from the dinner table into a standing position)	11	100%	x		11	100%	x		11	100%	x	
d415	Maintaining a body position (e.g., remaining standing in a queue at the bank, sitting on a bench)	11	100%	x		11	100%	x		11	100%	x	
d420	Transferring oneself (e.g., moving from bed to chair)	11	100%	x		11	100%	x		11	100%	x	
d429	Changing and maintaining body position (e.g., turn around while walking without losing balance)	11	100%	x		11	100%	x		11	100%	x	
d430	Lifting and carrying objects (e.g., lifting an object from the floor or a table to transport it from one place to another)	11	100%	x		11	100%	x		10	91%	x	

Table 4.13: Summary of results from the three-round, modified Delphi process (cont.)

ICF code	SURVEY ITEM	ROUND 1				ROUND 2				ROUND 3			
		N	%	Included	Excluded	N	%	Included	Excluded	N	%	Included	Excluded
d445	Hand and arm use (e.g., reaching for something, picking up an object, turning a door handle, opening or closing a door)	11	100%	x		10	91%	x		9	91%	x	
d450	Basic walking (e.g., short and long distances)	11	100%	x		11	100%	x		11	100%	x	
d450	Walking (e.g., walking on different surfaces, stepping over objects, walking forwards, backwards or sideways)	11	100%	x		11	100%	x		11	100%	x	
d455	Moving around (e.g., going up and down stairs, moving around obstacles)	11	100%	x		11	100%	x		11	100%	x	
d460	Moving around in different locations (e.g., walking inside or outside the home on different terrains or surfaces)	11	100%	x		11	100%	x		11	100%	x	
d465	Moving around using equipment (e.g., use of walking aids, canes)	11	100%	x		11	100%	x		11	100%	x	
d510	Washing oneself (e.g., taking a bath or shower)	11	100%	x		10	91%	x		10	91%	x	
d530	Toileting (e.g., planning and carrying out a trip to the toilet and cleaning yourself afterwards)	11	100%	x		10	91%	x		10	91%	x	
d540	Dressing (e.g., getting dressed, putting on shoes)	11	100%	x		10	91%	x		10	91%	x	
d570	Looking after one's health (e.g., maintaining a balanced diet, managing medication, avoiding risks of alcohol or drugs)	8	73%		x								
d598	Looking after one's safety (e.g., not taking unnecessary risks, avoiding harm to one's safely)	11	100%	x		11	100%	x		10	91%	x	
d620	Acquisition of goods and services (e.g., selecting and gathering food, fuel, household items or cooking necessities for daily living, going shopping)	11	100%	x		9	82%	x		10	91%	x	
d630	Preparing meals (e.g., cooking food with heat or on an open fire, preparing cold drinks, serving food)	9	82%	x		7	64%		x				
d640	Doing housework (e.g., sweeping, cleaning the house, collecting and washing clothes inside or outside the house)	11	100%	x		9	82%	x		10	91%	x	
d650	Caring for household objects (e.g., watering plants)	10	91%	x		8	73%		x				
d920	Recreation and leisure (e.g., visiting with friends, going out to social events, the gym or the museum)	10	91%	x		8	73%		x				
	ENVIRONMENTAL FACTORS												
e110	Products or substances for personal consumption (e.g., medication, alcohol)	10	91%	x		11	100%	x		9	82%	x	
e115	Products and technology for personal use in daily living (e.g., footwear, clothing, mats and furniture, kitchen and cleaning equipment, support handles, buckets or containers for gathering water)	11	100%	x		10	91%	x		10	91%	x	
e120	Products and technology for personal indoor and outdoor mobility and transportation (e.g., walking aids, crutches, canes)	11	100%	x		11	100%	x		10	91%	x	
e140	Products and technology for culture, recreation and sport (e.g., equipment used during sport or leisure activities)	8	73%		x								
e150	Design, construction and building products and technology of building for public use (e.g., public spaces, stairs, floor surfaces, public bathrooms, guardrails, accessibility of public areas)	10	91%	x		9	82%	x		10	91%	x	
e155	Design, construction and building products and technology of building for private use (e.g., bathrooms, railings, stairs in one's own home)	11	100%	x		11	100%	x		10	91%	x	
e225	Climate (e.g., excessive heat or cold, rain)	6	55%		x								
e140	Light (e.g., darkness, poor lighting)	10	91%	x		10	91%	x		11	100%	x	

Table 4.13: Summary of results from the three-round, modified Delphi process (cont.)

ICF code	SURVEY ITEM	ROUND 1				ROUND 2				ROUND 3			
		N	%	Included	Excluded	N	%	Included	Excluded	N	%	Included	Excluded
e298	Natural environment and human-made changes to environment, other specified (e.g., uneven surface, environmental hazard, crowding, land forms, bodies of water)	10	91%	x		9	82%	x		10	91%	x	
e310	Immediate family (e.g., emotional or physical support from immediate family members)	10	91%	x		9	82%	x		7	64%		x
e315	Extended family (e.g., emotional or physical support from relatives outside the immediate family)	8	73%		x								
e340	Personal care providers and personal assistants (e.g., emotional or physical support from non-family members)	11	100%	x		10	91%	x		8	73%		x
e350	Domesticated animals (e.g., indoor pets, small or large breed dogs, cats)	10	91%	x		9	82%	x		9	82%	x	
e398	Support and relationships, other specified (e.g., physical support from non-family members)	9	82%	x		9	82%	x		7	64%		x
e580	Health services, system and policies (e.g., having access to rehabilitation and other health services)	11	100%	x		9	82%	x		10	91%	x	
PERSONAL FACTORS													
	Age (e.g., being over 65 years old)	10	91%	x		11	100%	x		11	100%	x	
	Faith (e.g., trusting higher powers to provide in your needs and prevent you from falling)	3	27%		x								
	Fall history (e.g., previous falls in the last 12 months)	11	100%	x		11	100%	x		11	100%	x	
	Sex (e.g., being male or female)	2	18%		x								
	Medical conditions	11	100%	x		11	100%	x		11	100%	x	

At the end of the three rounds, 17 of the original 31 body function domain codes remained; four of the eight body structure domain codes remained; 19 of the 27 activities and participation domain codes remained; nine of the 15 environmental factors domain codes remained; and three of the five personal factors domain codes remained in the code set.

4.5.7 Delphi survey: Final review and feedback

The aim of this final communication to the experts was to provide feedback on the condensed ICF code set for fall risk factors in older adults that was compiled after the third and final Delphi round. This provided the experts with an opportunity to finally review the codes and provide feedback.

4.5.7.1 Final review: Content development

All the included codes were categorised in ICF domains, namely the body function domain; body structure domain; activities and participation domain; environmental factors domain; and the personal factors domain (Figure 4.2). Table 4.14 provides a summary of this condensed list of codes that were found to be relevant to the identification of fall risk factors in community-dwelling older adults. The code list serves as a universal reference containing the minimum amount of information needed to ensure clinical utility.

Table 4.14: Summary of the ICF codes included and excluded during the Delphi process

ICF domain	Round 1		Round 2		Round 3		Final ICF code set
	Included	Excluded	Included	Excluded	Included	Excluded	Included
Body function domain	n = 31	n = 6 (19%)	n = 26	n =3 (12%)	n = 23	n = 5 (22%)	n =17
Body structure domain	n = 8	n = 4 (50%)	n = 4	n = 0	n = 4	n = 0	n =4
Activities and participation domain	n = 27	n = 2 (7%)	n = 25	n = 5 (20%)	n = 20	n = 1 (5%)	n = 19
Environmental factors domain	n =15	n =3 (20%)	n = 12	n = 0	n =12	n = 3 (25%)	n = 9
Personal factors domain	n = 5	n =2 (40%)	n =3	n = 0	n =3	n = 0	n = 3

On completion of the modified Delphi process, the ICF code set consisted of a total of 49 ICF codes and three personal factors.

Figure 4.2: ICF code set presented according to the ICF framework

Fall risk factors in older adults: Distilled ICF code set

Body function domain

Consciousness functions[*SR;HCPs]
Orientation functions[*SR; OA; HCP]
Perceptual functions[*SR; HCP]
Seeing functions[*SR; OA; HCP]
Vestibular functions[*SR; OA; HCP]
Additional sensory functions[*SR]
Sensations of pain[*SR; HCP]
Sensations associated with hearing and vestibular functions[*SR; OA; HCP]
Sensations associated with cardiovascular and respiratory functions[*SR]
Mobility of joint functions[*HCP]
Stability of joint function[*SR; OA; HCP]
Muscle power functions[*HCP]
Muscle endurance functions[*SR]

Body structure domain

Structures of lower extremity[*SR; OA; HCP]
Structures of the trunk[*SR; HCP]
Additional musculoskeletal structures related to movement[*SR; OA; HCP]
Structures related to movement[*SR; OA; HCP]

Activities & participation domain

Focusing attention on the environment[*OA; HCP]
Carrying out daily routine[*SR; OA]
Changing basic body position[*SR; OA; HCP]
Maintaining a body position[*SR; OA; HCP]
Transferring oneself[*SR; OA]
Changing and maintaining body position, other specified and unspecified[*SR; OA; HCP]
Lifting and carrying objects[*SR; OA]
Hand and arm use[*SR; OA; HCP]
Basic walking[*SR; OA]
Walking[*SR; OA]
Moving around[*SR]
Moving around in different locations[*SR; OA; HCP]
Moving around using equipment[*SR]
Washing oneself[*SR]
Toileting[*SR]
Dressing[*SR]
Looking after one's safety[*SR]
Acquisition of goods and services[*SR]
Doing housework[*SR]

Environmental factors domain

Products or substances for personal consumption[*SR; OA; HCP]
Products and technology for personal use in daily living[*SR; OA; HCP]
Products and technology for personal indoor and outdoor mobility and transportation[*SR; OA]
Design, construction and building products and technology of buildings for public use[*SR; OA]
*SR Design, construction and building products and technology of buildings for private use[*SR; OA; HCP]
Natural environment and human-made changes to environment, other specified[*SR; OA; HCP]
Light[*SR; OA] Domesticated animals[*SR; OA; HCP] Health services, system and policies[*OA]

Personal factors domain

Age[*SR; OA; HCP]
Fall history[*SR; HCP]
Medical conditions[*SR;OA;HCP]

4.5.7.2 Final review: Data collection and analysis

The distilled ICF code set was sent to all participants individually via email. The participants were requested to comment on the code set and to exclude any codes they still did not consider to be critical. Each participant was provided with the opportunity to give their final comments and feedback on the condensed list of codes and request the final ICF code set on completion of the research study.

4.5.7.3 Final review: Results and recommendations

All participants received the final review email and acknowledged receipt thereof, with two participants reiterating that they had no further comments or exclusions. One participant suggested to review the layout and presentation of the code set data by expanding the included codes in each domain to also include the corresponding codes in the other domains. In light of these recommendations, the code set presentation was changed to include the matching codes for all the included codes in the other ICF domain. On review, only two codes had to be added, namely "Structures of the inner ear" and "Watching". Both these codes are marked to indicate their relevance, but they were not considered critical for inclusion in the developed code set (Figure 4.3).

Figure 4.3: Final ICF code set presented according to the ICF framework

Fall risk factors in older adults: Distilled ICF code set

Body functions domain

Consciousness functions
Orientation functions
Perceptual functions
Seeing functions
Vestibular functions
Additional sensory functions
Sensations of pain
Sensations associated with hearing and vestibular functions
Sensations associated with cardiovascular and respiratory functions
Mobility of joint functions
Stability of joint function
Muscle power functions
Muscle endurance functions
Muscle functions
Involuntary movement reaction functions
Control of voluntary movement functions
Gait pattern functions
Neuromusculoskeletal- and movement-related functions

Body structures domain

Structures of lower extremity
Structures of the trunk
Additional musculoskeletal structures related to movement
Structures of the inner ear*
Structures related to movement

Activities & participation doman

Watching*
Focusing attention on the environment
Carrying out daily routine
Changing basic body position
Maintaining a body position
Transferring oneself
Changing and maintaining body position, other specified and unspecified
Lifting and carrying objects
Hand and arm use
Basic walking
Walking
Moving around
Moving around in different locations
Moving around using equipment
Washing oneself
Toileting
Dressing
Looking after one's safety
Acquisition of goods and services
Doing housework

Environmental factors domain

Products or substances for personal consumption
Products and technology for personal use in daily living
Products and technology for personal indoor and outdoor mobility and transportation
Design, construction and building products and technology of buildings for public use
Design, construction and building products and technology of buildings for private use
Natural environment and human-made changes to environment, other specified
Light
Domesticated animals
Health services, system and policies

Personal factors domain

Age
Fall history
Medical conditions

*Code was added for completeness of the code set

4.6 Reliability and Validity

The following measures were taken to enhance reliability and validity during the modified Delphi process in this quantitative phase of the research study (Table 4.15).

Table 4.15: Reliability and validity of the modified Delphi process

Strategy	Technique	Application of technique in the current research study
Reliability	Selection of expert panel	Reliability refers to the consistency of the measure and the extent to which items on the survey are measuring the same thing (Bolarinwa, 2015). The reliability in the Delphi process depended on the selection of experts, panel size, and the credibility of the procedure – from designing the survey up until consensus was reached – as the results reached would be only as reliable as the sample that was selected (Skinner et al., 2015). As the aim of the Delphi process is to answer complicated questions, randomly selected samples from the general population are not feasible because the participants would most likely not have enough knowledge on the topic. As such, the reliability of the Delphi process was defined by the participants: reliability increased when experts were sufficiently knowledgeable and experienced to answer the research question (Yoon, 2013). Although there is no set number of participants recommended to participate in a Delphi survey, a minimum of 10 participants are needed to obtain sufficiently descriptive results (Keeney et al., 2006). By creating a weighting of the participants' expertise, the reliability of the method was increased and all participants could objectively be determined to be experts.
	Pilot study	Conducting a pilot study increased the reliability of the Delphi process, as it allowed the survey to be tested on a trial sample and thus to be fine-tuned before commencing with the main data collection (Leedy & Ormrod, 2014). Given the extensive feedback during the pilot study (Table 4.3), the researcher concluded that the survey had been thoroughly tested, evaluated and fine-tuned prior to the commencement of data collection.
	Internal reliability (Cronbach's alpha)	Internal consistency describes the extent to which all the items in a test measure the same concept or construct, and hence it is connected to the inter-relatedness of the items within the scale (Tavakol & Dennick, 2011). Internal consistency was computed independently for all three rounds of the Delphi process by means of Cronbach's alpha. Values of 0.97, 0.96 and 0.97 were reported for the three rounds respectively. These scores attest to excellent internal consistency.
Validity	Content validity	Content validity was established during the first two rounds of the Delphi process by using the experts' opinions to provide confirmative judgements on the codes selected (Hasson & Keeney, 2011). Content validity looks at whether the instrument adequately covers all

Strategy	Technique	Application of technique in the current research study
		the content that it should with respect to the variable (Heale & Twycross, 2015) – in this case, fall risk factor identification in older adults. Content validity and the ability to determine false positives were ensured by the use of red-herring codes (Lambert et al., 2003) that did not directly relate to known fall risk in older adults. A red-herring value below 1 is acceptable for surveys (Lambert et al., 2003) and for this Delphi survey, the red-herring score was α= 0.3 for both Round 1 and Round 2, indicating above average content validity. The Delphi process is based on the assumption that, the more people arrive at the same answer, the less likely it is for that answer to be wrong. Furthermore, the use of expert participants who have knowledge and interest in the field and outcome can enhance the content validity (Hasson et al., 2000).
	Face validity	Face validity is defined as the degree to which the respondents view the content of an instrument as relevant to the context in which it could be administered (Holden, 2010). In this case, face validity of the ICF code set was established in the pilot study.
	Generalisa-bility of results	The validity of the results can be assessed in terms of the generalisability and causality of the study results (Yoon, 2013). Generalizability is the extent to which the study results can be generalised to similar situations or people (Hasson & Keeney, 2011). In this research study, generalisability was ensured by carefully selecting experts based on specific criteria to ensure that they have the knowledge and experience to answer questions related to the complex constructs relevant to this study. Attrition is a significant factor contributing to low validity in Delphi studies (Ellingsen, 2011), but in this study no attrition occurred during the three rounds of the Delphi process.
	Member checking	Member checking was conducted as a reflective process by the participants (Birt et al., 2016) to increase the validity of the Delphi process. On completion of all three rounds, the final list of codes was sent to the participants, and they were provided with an opportunity to comment, give feedback and revise their earlier answers. On completion of the final round, no further codes were excluded by the experts.

By considering the impact of each of these strategies on the validity and reliability of the research study, the overall quality and correctness of the data obtained was enhanced.

4.7 Implications of Phase 2

During Phase 2 of the research study, both ICF and fall risk experts were used to distil the list of factors critical to the identification of fall risk factors in community-dwelling older adults in the form of an ICF code set. Developing a distilled set of codes that would define the standard minimum content critical to the identification of fall risk in older adults in each domain of the ICF, increased the clinical utility of the ICF.

This condensed ICF code set for fall risk factors in older adults could be used in clinical settings to guide the assessment and management strategies used by HCPs as well as the resulting interventions and preventive measures. Phase 2 demonstrated that the universal language of the ICF could be used to discuss fall risk factors among HCPs from different backgrounds, disciplines and contexts. The importance of obtaining comprehensive data from different sources was illustrated during the modified Delphi process, as the codes that were included were obtained not only from the systematic review, but also from the focus groups conducted with older adults and HCPs. Of the 34 codes that were excluded across the three rounds, only five were excluded that had been obtained from all three sources. Should the modified Delphi process only have included data from the systematic review, several factors obtained from the focus groups would have been excluded in the final ICF code set, resulting in an incomplete set of codes. Also, by including the data from the systematic review and not only from the focus groups, the researcher was able to distil the list of codes to be relevant to community-dwelling older adults only.

On completion of Phase 2, a final ICF code set for fall risk factors in older adults could be developed, as was illustrated in Figure 4.2.

4.8 Recommendations for Phase 3

Phase 2 determined the critical factors for the identification of fall risk in older adults, thus prevention strategies have to be determined by means of assessing the clinical utility of the condensed ICF code set. Utility, in general, describes the personal benefit a person gains from assessment and intervention, while clinical utility describes the relevance and usefulness of an intervention process in patient care (Lesko et al., 2010). There is no consensus on how to robustly demonstrate clinical utility to the satisfaction of multiple stakeholders, as it is often test, drug, or context dependent. Moreover, it is rarely easily quantifiable, and frequently rests on subjective judgement, depending on a certain stakeholder's perspective of the supporting evidence (Lesko et al., 2010). The ICF, as a conceptual framework, has not been widely applied to show its potential clinical utility for ordering, synthesising and categorising prevention and assessment strategies in a multitude of patients, other than the use of ICF core and code sets (González et al., 2017). Using a standardised language with clear objectives is feasible and helpful during daily clinical assessment and such a code set should consider a small number of categories with a clear proposal of methods to score the different items across domains. ICF code sets, using the ICF language and scoring categories, have clinical utility because they provide order, synthesis and a scoring of the impairment that limits functional mobility (González et al., 2017).

The distilled ICF code set provides a profile of the minimum amount of information needed to guide HCPs in applying prevention and management strategies in a multidisciplinary context. Code sets thus serve as a useful tool for HCPs who base their assessment and intervention planning on strategies related to the impairments of the body (including both structural and functional impairments), but who also consider the psychological aspects, the difficulties in participating and performing activities, and the impact of the environment on the individual's functioning (Kus et al., 2012). A code set also enables HCPs to gain confidence in their ability to assist a specific population and saves them time by using an universal and holistic set of codes to ensure that all aspects of the older adult's health condition are addressed during the assessment (Bilgili & Arpaci, 2014). A code set also has the potential to guide further referrals, if needed. In Phase 3 of this research study, the developed ICF code set for fall risk factors in community-dwelling older adults is administered on a specific cohort of HCPs to evaluate its clinical usability.

4.9 Conclusion

In Phase 2 of the current study, ICF experts evaluated the compiled list of fall risk factors for face and content validity in a pilot study. Next, a panel of fall risk experts completed a three-round, modified Delphi process to condense the list of codes that were critical to the identification of fall risk factors in older adults. On completion of the three rounds of the Delphi survey, the computed Cronbach's alpha results indicated a high reliability score (average of α=o.966). After the modified Delphi process, the ICF code set consisted of 52 codes, categorised as 19 activities and participation domain codes, 17 body function domain codes, four body structure domain codes, nine environmental factors domain codes, and three personal factors domain codes. The developed ICF code set for fall risk factors in older adults is administered in Phase 3 of the study (see Chapter 5) to determine the clinical utility of this code set.

CHAPTER 5: PHASE 3 – CODE SET ADMINISTRATION

Research methodology, results and discussion

This chapter presents the research methodology, results and discussion of the final phase of the three-phase exploratory sequential mixed method design employed for this study. Chapter 3 focused on Phase 1, which entailed the sampling and item compilation to develop a relevant, initial ICF code set for fall risk factors in older adults. Chapter 4 focused on Phase 2, in which the initial code set was distilled through item evaluation and reduced to obtain a standard minimum list necessary to accurately identify fall risk factors in older adults. These factors are in line with each of the ICF's domains (i.e., body function domain, body structure domain, activities and participation domain, environmental domain, and personal factors domains). Chapter 5 now focuses on Phase 3 and describes the administration of the code set to determine its clinical utility for audiologists and to present the final code set for HCPs. Chapters 3, 4 and 5 should thus be read in conjunction as indicated in the outline shown in Table 5.1.

Table 5.1: Summary of chapter outline

Chapter 3 - Qualitative Phase 1: Code set sampling and item compilation			
Research methodology, results and discussion			
Study main aim and sub-aims for the phase			
Research design			
Ethical considerations			
3.1 Literature perspective: Systematic review (de Clercq et al., 2020a)	3.2 Target population perspective: Focus groups with older adults (de Clercq et al., 2020b)	3.3. Clinical perspective: Focus groups with health care practitioners (de Clercq et al., 2020c)	3.4 Merging of the ICF codes
Chapter 4 - Quantitative Phase 2: Code set item evaluation and reduction			
Research methodology, results and discussion			
Study main aim and sub-aims for the phase			
Research design			
Ethical considerations			
Pilot study			
Modified three-round Delphi process			
Chapter 5 - Quantitative Phase 3: Code set administration			
Research methodology, results and discussion			
Study main aim and sub-aims for the phase			
Research design			
Ethical considerations			
Pilot study			
Main quantitative study			

As depicted in Table 5.1, Chapter 5 starts off by revisiting the main aim of the research and the sub-aims that were specifically set for Phase 3, and proceeds to critically discuss the relevant research design and ethical considerations. In this final phase, which is also the quantitative phase, the newly developed ICF code set for fall risk factors in older adults was administered to one group of HCPs, namely audiologists. Audiologists play an important role in the diagnosis and treatment of audiological and vestibular disorders, including fall risk, and therefore they were able to provide valuable information regarding the clinical utility of the code set (Khoza-Shangase et al., 2020). Details of the participants for Phase 3 are presented next, followed by the pilot study and main data collection process. Finally, the chapter summarises and discusses the results and main discussion points of this phase and presents the final ICF code set for fall risk factors in older adults.

Administering the developed code set to determine its clinical utility – as per the focus of Chapter 5 – included both practical criteria and feasibility measures (Peabody et al., 2019). Clinical utility is generally regarded as a multidimensional judgement by HCPs about the usefulness and benefits of a proposed tool (Smart, 2006). In the case of the current study, this judgement was reached by using the ICF code set in clinical practice to identify fall risk factors in older adults. For the purpose of the current thesis, clinical utility was adapted and expanded from the work of Lesko et al. (2010) and Smart (2006) to include the following five components (and the related information they provide about the code set):

(i) Appropriateness (the effectiveness and relevance of the code set)
(ii) Accessibility (financial considerations of the code set)
(iii) Practicability (functionality of the code set as well as the training needed to use it)
(iv) Acceptability (ethical considerations when using the code set)
(v) Professional utility (the HCP's perceived value of the ICF code set to their profession and to the lives of older adults they consult with)

These five components were used to determine the ICF code set's clinical utility, as perceived by audiologists.

5.1 Aims

5.1.1 Main aim

The main aim of this study was to develop an ICF code set for HCPs to identify fall risk factors in older adults, as the identification of fall risk factors is the first step of the assessment and management process in a multidisciplinary health context. Risk factors were identified by integrating information about the numerous multidisciplinary factors that influence fall risk, thereby creating a universal fall risk code set that contains the minimum amount of information needed to fulfil the three objectives of an ICF code set for this population. These objectives are to guide HCPs in identifying fall risk factors in older adults; determining which fall risk factors would justify further diagnostic assessment or intervention; and determining areas in which further assessment and/or intervention might be warranted which falls outside the particular HCP's scope of practice, thereby necessitating further referral.

In order to realise the main aim, specific sub-aims were set for each of the three phases. The focus of Phase 3 was to administer the newly developed ICF code set, thereby determining its clinical utility specifically for one group of HCPs, namely audiologists.

5.1.2 Sub-aims

The two specific sub-aims for Phase 3 were as follows:

(i) To describe the audiologists' clinical application of the code set by comparing their before code set answers (without the use of the ICF code set) and their post- code set answers (with the use of the ICF code set)

(ii) To determine the audiologists' perceptions regarding the clinical utility of the ICF code set after applying it to a written case study in terms of the components of the code set as mentioned earlier.

- *Appropriateness:* conceptualised as effectiveness and relevance
- *Accessibility:* conceptualised as financial considerations such as cost implications and reimbursement of using the code set
- *Practicability:* conceptualised as the functionality and suitability of the code set, as well as the training needed for clinical application of the code set

- *Acceptability:* conceptualised as the ethical considerations related to the use of the code set
- *Professional utility:* conceptualised as the perceived benefits and value of the code set for HCPs as well as for their patients.

5.2 Research Design

As elaborated on in Chapter 3, this study employed a three-phase exploratory, sequential, mixed method research design (Creswell & Creswell, 2018), combined with the recommended practices for developing ICF core sets (Selb et al., 2015). The focus of Phase 3, the quantitative phase, was not on the participant's clinical knowledge, but rather on the clinical utility of the code set. However, the latter could not be established unless the participants had some experience of using the ICF code set with a "real client" (in this case by means of a written case study). Therefore, clinical application of the code set was needed before its clinical utility could be determined.

Phase 3 commenced with a pre-post group design that focused on the clinical application of the code set (O_1), followed by a questionnaire focusing on perceptions (O_2) to gauge the clinical utility of the developed ICF code set (X). This was done by requesting participants to first read a written case study (Appendix 5A) and then to complete the clinical application section of the questionnaire (pre-code set – O_1). Next, they were provided with the ICF code set (the independent variable X) (Parmin et al., 2016), and asked to re-answer the same clinical application section of the questionnaire (post-code set – O_1). The design for Phase 3 can be visually represented as follows:

Clinical application section: O_1 (pre-code set)…X (independent variable)…O_1(post-code set)

Perceptions section: ……………………...X (independent variable)....O_2 (questionnaire)

One of the main advantages of using a pre-post group design relates to the ease of making comparisons between the same participants in a group format (Christensen et al., 2014; Marshall et al., 2007). This allows for a description of change (in perceived clinical application) between two measuring points, using the same material – in this case, the written case history (Appendix 5A) with clinical application questions – before having access to the independent variable (ICF code set as shown in Appendix 5B) and again thereafter. There are, however, some disadvantages to using this type of design, such as the possible inability to assess whether or not differences occur due to the addition of other unexpected independent variables (in this case beyond the ICF code set) or due to unforeseen, confounding extraneous variables (e.g., time differences) (Marshall et al., 2007). The researcher aimed to control these possible variables by combining the pre-code set and post-code set questions in one questionnaire so that the participants would most likely complete the questions in the same session.

An advantage of using a questionnaire in this design was that neither the researcher's bias nor the participants' characteristics were known to the other party, while only the selection criteria and biographic information were known to the researcher (Apuke, 2017). Other advantages of a questionnaire included cost efficiency; less labour-intensive data collection; participant anonymity; standardised questions across all participants; easier coding of close-ended questions; increased participant flexibility (they could answer at their own pace); ease of replication when using the same questionnaire; and heightened suitability for collecting data from a remote location via the internet (Nardi, 2015).

Disadvantages of using a quantitative questionnaire mainly involved the limited interaction between the researcher and the participants, and the possibility of low response rates for completing questionnaires (Jones et al., 2008). Typically, the most likely response rates for questionnaires could be as low as 5% to 30% (Nix et al., 2019). In order to address this latent threat, the researcher contacted potential participants personally to invite them to participate in the study. According to Nix et al. (2019), high levels of motivation to complete the questionnaire or personal contact between the researcher and the respondents is likely to increase the response rate.

5.3 Ethical Considerations

The following ethical considerations were specifically relevant to this phase of the thesis, as outlined in the Declaration of Helsinki (World Medical Association, 2001) and in the ICF (World Health Organization, 2002). It ensured that stringent ethical principles for research were upheld, and the rights of the participants were protected.

5.3.1 The principle of confidentiality and anonymity

Ensuring confidentiality and anonymity during any data collection process is a core ethical principle (World Medical Association, 2001) and an important part of enhancing the quality of the study. Participants have the opportunity to answer questions truthfully and honestly when they are reassured that they cannot be identified and therefore will not suffer any adverse consequences due to their involvement in the research (Petrova et al., 2016). During Phase 3, the participants' anonymity was preserved as all questionnaires were completed anonymously on a web-based application. In those instances where the participants provided their email addresses to receive more information on the ICF and/or fall risk assessment, the information was treated confidentially and never shared or noted in the data collection process. Although the questionnaire did capture some biographic information, none of the participants could be identified based on such information and their names were not recorded on the questionnaire. Participant numbers were used for anonymity and to avoid duplicate entries. Only the researcher had access to the data and completed questionnaires, which were stored in a password-protected file on a secure computer.

5.3.2 The principle of informed consent

Informed consent, as a fundamental and thoughtful process, was obtained from all participants prior to participation (Appendices 5C & 5D). This ensured their optimal participation as they were aware of the aims of the research as well as of their role in the study and the data collection process from the beginning (Locher et al., 2006; World Medical Association, 2001). The informed consent letter included the study's topic, aims, information on the benefits and risks of participating in the questionnaire, and what would be expected of participants during data collection procedures.

5.3.3 The principle of voluntary participation

Voluntary participation is closely related to informed consent. It specifically refers to the choice that a participant has to perform certain tasks or actions without being influenced by others, or without being subjected to compelling external influences. Voluntary participation as a rule leads to more reliable data (Kilinç & Firat, 2017). In this study, none of the participants were forced or coerced into participation and the researcher did not apply any pressure on potential participants to agree to participate. The participants who were invited telephonically to participate in the study were contacted only once so as to ensure that they would not feel pressured or obliged to participate. As expert participants, they could also be regarded as the researcher's peers, which suggests equal relationships without confounding power or authority challenges.

Furthermore, participants are usually motivated to participate actively if they feel they will obtain valuable information as a result of the process. This 'received value' needs to be at least equal in their minds to the effort expended to contribute information (Millar et al., 2006). The researcher informed all participants that, on completion of the research, they would be eligible to receive the final ICF code set for their own professional and clinical use, should they wish to do so. The researcher did not offer any incentives to the participants to participate in the research.

5.3.4 The principle of deception and clinical use

The researcher did not intentionally mislead any of the potential participants regarding the aims and scope of the research study, or regarding their role in the data collection process. All expectations were communicated in the informed consent letter, prior to their participation in the study. The researcher also guarded against any deception in the collecting and reporting of the data by ensuring that no data was falsified in any way, all answers were coded directly from the questionnaires, and results were not exaggerated (Kilinç & Firat, 2017; World Medical Association, 2001). All data was discussed with the researcher's supervisors and with PhD peers to ensure accountability during the process.

5.3.5 The principle of non-maleficence and beneficence

The researcher did not cause any harm during the data collection process (non-maleficence) and actually aimed to bring benefit to the participants and their patients (beneficence) by providing the audiologists with the developed ICF code set to be used in clinical practice (Dixon & Quirke, 2018). In addition, due to the global COVID-19 pandemic, all data collection was done electronically. Thus, there was no person-to-person contact between the researcher and the participants, which limited the potential spread of the coronavirus.

5.4 ICF Code Set Administration: Pilot Study

The process of administering the code set included a pilot study before commencement of the main study. By conducting a pilot study, the likelihood of meaningful data collection and analysis in the main study was enhanced, which had a positive impact on the quality of the main study (Thabane et al., 2010).

5.4.1 Aim

The aim of the pilot study was to pre-test the clinical utility questionnaire (shown in Table 5.7) to detect and remediate any deficiencies (ambiguous instructions; inadequate time limits, etc.) prior to the main study. This would enhance the quality and reliability of the final questionnaire to be used for further evaluation and analysis (Wolf et al., 2016). The pilot study helped to determine if any changes were required to any of the three proposed materials, namely the clinical utility questionnaire (Appendix 5E), the written case history (Appendix 5F) and the developed ICF code set (Appendix 5G).

The above aim was addressed (see Table 5.3 for a detailed account of the specific aims, results and recommendations) to determine if any changes were needed in terms of the following:

- Methodological aspects of the clinical utility questionnaire
- Feasibility of the clinical utility questionnaire
- Clinical aspects of the written case history
- Completeness and clarity of the written case history and ICF code set

5.4.2 Participants

Four participants were purposively selected and recruited for the pilot study. The same participant criteria as used for the main study (see Table 5.4) applied, and experience in vestibular assessment was used to stratify them. Two of the recruited participants had experience of vestibular testing and the other two did not conduct vestibular assessments in their practice. Stratification was done to ensure that the proposed clinical utility questionnaire would be suitable for both audiologists with and without experience of vestibular assessments. It also ensured that audiologists across the spectrum of vestibular experience would be able to engage with the questions, and that the questionnaire was not over- or under-simplified.

Four participants completed the pilot study, and their biographic information and self-reported clinical experience are reported in Table 5.2.

Table 5.2: Description of pilot study participants (N=4)

Questionnaire aspect	Participant responses
Biographic information	
Registered with the HPCSA	Yes (n=4)
Qualification and type of HPCSA registration	Dual qualification as Audiologist and Speech-Language Therapist (n=3) Audiologist (n=1)
University from where graduated	University of the Witwatersrand (n=3) University of Pretoria (n=1)
Year of bachelor's graduation	2007 (n=1) 2009 (n=1) 2015 (n=1) 2016 (n=1)
Years of clinical practice as an audiologist	1 – 5 years (n=2) 6 – 10 years (n=1) 11 – 15 years (n=1)
Self-reported clinical experience	
Number of older adults consulted per week	1 – 5 older adults (n=3) 6 – 10 older adults (n=1)
Routine assessment of older adults for fall risk in their practice – formally or informally	Yes (n=2) No (n=2)
Use of tool/s or strategies to identify fall risk factors in older adults consulted with in their practice	Yes (n=3) No (n=1) – participant states that she has not received any training in fall risk screening
Examples provided	***Formal*** Timed Up and Go Test (n=3) Fall risk assessment tool / questionnaires (n=2) Berg Balance Scale (n=1) Chair Stand Test (n=1) GANS Sensory Observation Performance (n=1) Physio-sensing Balance Board Tests (n=1) Tinnetti Falls Efficacy Scale (n=1) ***Informal*** Gait observation (n=2) Standing to sitting and sitting to standing (n=2) General mobility (n=1) Identifying risk factors (n=1) Standing on one foot (n=1) Tandem gait (n=1)
Familiarity with the International Classification of Functioning, Disability and Health (ICF)	Used the ICF before (n=2) Heard about the ICF before (n=1) Regularly uses the ICF as part of clinical practice (n=1)
Frequency with which any ICF core/code set is used in their practice	Never (n=2) Rarely (n=1) Sometimes (n=1)
Would like more information on the ICF and its clinical application	Yes (n=3) No (n=1)
Would like more information on fall risk assessment	Yes (n=2) No (n=2)

As indicated in Table 5.2, the four pilot study participants obtained their degrees over a span of ten years, which most likely included participants from before and after the original dual degree was separated into two distinct degrees (Bachelor's degree in Audiology and a Bachelor's degree in Speech-Language Therapy). Both these degrees enable registration as an audiologist with the HPCSA, a requirement for rendering clinical audiology services in South Africa. Two participants routinely assess older adults for fall risk in their practice. Since three participants were using formal or informal tools to identify fall risk factors in the older adults they consult with in their practices, they might be able to identify the fall risk factors in the case history more easily than the one participant who did not use any FRATs and received no training in fall risk screening.

5.4.3 Materials

During the pilot study, the informed consent letter (Appendix 5C), biographic and clinical utility questionnaire (Appendix 5E), written case history (Appendix 5F) and ICF code set (Appendix 5G), as suggested for the main study (see Table 5.6), were used for data collection. In addition, a feedback survey to document additional feedback from the pilot study participants (Appendix 5H) was compiled and used.

The feedback questionnaire was used to evaluate the proposed data collection material and process. It contained eleven questions and focused on the technical aspects, layout and visual representation, feasibility and content of the clinical utility questionnaire, as well as on the clinical aspects, completeness and clarity of the written case history and solicited suggestions regarding the developed ICF code set. Evaluating the proposed materials as well as the data collection process prior to the main study increased the internal validity of the data collection process (Secomb & Smith, 2011). The feasibility of the main study was assessed by establishing whether the compiled material was easy to use and could provide the researcher with the necessary information to collect relevant data from the participants. Preliminary data was also collected to establish if changes were needed to improve the data collection procedures (Evans et al., 2018).

5.4.4 Data collection procedures

Four potential participants who were identified for the pilot study were invited by the researcher to participate. These four participants then received an email containing the link to the informed consent letter (Appendix 5C) and the clinical utility questionnaire (Appendix 5E). In addition, the email contained the questionnaire in which participants were requested to provide reflective feedback on completion of the online questionnaire. They were requested to return the completed material to the researcher within one week. The researcher furthermore logged in to the Qualtrics platform (Qualtrics, 2019) prior to and during the collection of the pilot data to ensure technical integrity of the process (e.g., that all the participants' responses were recorded on the software), and that no unexpected technical difficulties (e.g., as a result of load shedding) had been present during data collection. The responses of the pilot study participants are presented in Table 5.3 and show all the changes that were required prior to data collection for the main study.

5.4.5 Results and recommendations

The specific aims of the pilot study, as well as the results and recommendations following the study, are presented in Table 5.3. All aims that required changes have been highlighted.

Table 5.3: Aims, results and recommendations of the pilot study

Aim	Results of the pilot study	Recommendations and changes made to the questionnaire
	Methodological aspects of the clinical utility questionnaire	
1. To determine the ease and reliability of the Qualtrics link to access the questionnaire across different browsers.	• None of the participants experienced any technical difficulties in opening the Qualtrics link. • Participants mentioned the web browser they used (Google Chrome) and reported no difficulties. As no pilot participants used any of the other browsers (e.g., Firefox, Internet Explore), these were tested by the researcher to ensure that they worked effectively.	• No changes were made related to the Qualtrics link that was used for accessing the questionnaire.
2. To determine if all the supplementary information embedded in the questionnaire could be accessed and downloaded by the participants.	• All of the additional material embedded in the questionnaire (e.g., the case study) could be accessed and downloaded by the participants without technical disruptions.	• No technical changes were required or made to the questionnaire.
3. To determine if the questionnaire could be completed on different devices (e.g., laptop, desktop computer or on a mobile device).	• All participants completed the questionnaire using a laptop computer. As none of the participants completed the questionnaire on a mobile device, the researcher accessed and completed the questionnaire on her own mobile device and experienced no technical difficulties.	• No changes were made to enhance the accessibility of the questionnaire on different devices.
4. To determine the clarity of the clinical utility questions.	• All participants noted that the clinical utility questions were clear and easy to understand.	• No changes were made to the clinical utility questions to enhance the clarity of the questionnaire.
5. To determine if the questionnaire contained any clinical utility questions that could be repetitive.	• One participant commented that the last section appeared repetitive with regard to the use of the ICF in practice and suggested that it could be relooked at or integrated with other questions.	• The last section contained questions regarding the professional utility of the ICF code set. The questions were evaluated and although they appeared similar to other clinical utility questions, the focus of each question was different, based on the aspects measured. As such, no changes were made to this section.
	Feasibility of the clinical utility questionnaire	
1. To determine the amount of time needed to complete the questionnaire and to include this information in the informed consent letter of the main study.	• The mean time recorded to complete the questionnaire was 27 minutes (range of 22 to 38 minutes). Three participants were satisfied with 30 minutes to complete the questionnaire, while one participant suggested 40 minutes.	• The mean time for completion met the expectation of the researcher. In the informed consent letter, the estimated time to complete the questionnaire was documented as 30 to 40 minutes, hence no changes were required.
2. To determine if the quality of the data obtained was sufficient for analysis.	• All four participants completed the questionnaire in full and the researcher was able to analyse the data obtained.	• No changes were needed to enhance the quality of the data obtained from the questionnaire.

Table 5.3: Aims, results and recommendations of the pilot study (cont.)

Aim	Results of the pilot study	Recommendations and changes made to the questionnaire
3. To determine if the layout of the questionnaire and flow of the items were intuitive and logical.	• One participant suggested that the open-ended answer blocks could be enlarged to make typing and copying the ICF codes easier and to ensure that items were not accidentally omitted.	• Since the space in which to type the responses are determined by the Qualtrics software, they can unfortunately not be changed by the researcher. Thus, no changes were made to the questionnaire.
Clinical aspects of the written case history		
1. To determine if any changes were required regarding the clinical aspects contained in the written case history.	• One participant commented that the case history should preferably not be a vestibular case, as audiologists know that vestibular patients are at increased risk of falling. She explained that, generally, when patients present with these symptoms, audiologists who are not comfortable with vestibular audiology will refer them to other professionals. A generic geriatric case was suggested to ensure that any audiologist would feel that they are capable of conducting fall risk screening and referring appropriately. • A comment was made that the first paragraph of the case history alternates between referring to the patient in first person and in third person. • One participant commented that the sentence "*we do not have animals in the house*" was random and suggested that it could perhaps be added to the section that explains the logistics of the patient's house – there it would be a more natural fit. • One participant felt that the description of activities of daily living in the case history was contradictory – the patient stated that he helped his wife with housework, but then also explained that doing basic household tasks was a problem. She suggested that the sentence be adjusted to say that the patient cannot do housework "alone" to avoid this confusion.	• After careful consideration, this suggestion was incorporated and the written case history was changed from a vestibular case history to a generic case history of an older adult, based on the IDA Institute's case history form (obtained from www.idainstitute.com). This case history was aligned to the broader aim of the ICF code set as it was intended for use by all audiologists (not only those who specialise in vestibular cases) to identify fall risk factors in all older adults. • The wording of the written case history was changed to ensure consistency in using the first person throughout. • The information about the animals was included in a section where this information fits more naturally with the rest of the case history. • The contradicting activities of daily living were changed to indicate that Mr Smith had a problem conducting basic household tasks independently. He was not able to assist his wife with some tasks without assistance because he felt dizzy. A sentence was also added in which he queried whether his dizziness could be related to his ears.
Completeness and clarity of the written case history and ICF code set		
1. To determine the clarity of the instructions related to the clinical case history questions and the ICF code set	• It was suggested that the sentence indicating that "the same four questions need to be asked and answered" should be highlighted to ensure that it does not feel repetitive when participants glance over the instructions. • Using the ICF framework with only a written case history felt frustrating as many of the items (e.g., "*Structures related to movement*") were vague and audiologists could be unsure about the exact meaning of the codes. Audiologists performing a vestibular	• As suggested, the instructions before and after the case history and the ICF code set (relating to the four questions asked regarding the fall risk factors) were highlighted. • Due to the nature of the data collection process, a written case history was provided to the participants in lieu of an actual assessment on their patients, as not all audiologists conducted vestibular assessments. The aim of the ICF code set was the early identification of fall risk factors during the initial consultation with older adults. A recommendation

Table 5.3: Aims, results and recommendations of the pilot study (cont.)

Aim	Results of the pilot study	Recommendations and changes made to the questionnaire
	assessment would only be able to observe these items during the assessment and not when reading a case study.	for further research could be to provide a video-recorded assessment of an older adult, which could be used instead of or in addition to a written case history. Although the ICF core/code set does not traditionally have examples to clarify the codes, examples to each code were added. This enhanced the clarity of the code set, and the same examples were used as during the Delphi process in Phase 2. After the additional examples had been included in the code set, both the ICF code set with and without the examples were sent to the four pilot study participants to determine which layout they prefer. All four participants preferred the ICF code set with examples.
	Further suggestions	
1. To determine if the participants had any additional suggestions or comments.	• A grammatical error was noted "*you will have again to*" instead of "*you will have to again*".	• Grammatical error was corrected.
	• The ICF code set should include the psychological effect of falling on the patient (fear of falling) in the case history under personal factors or under "Consciousness functions".	• There is a known correlation between fear of falling and an increased fall risk. The ICF allows for psychological effects on a person, e.g., "emotional functions", under which fear of falling would be categorised. During the Delphi process in Phase 2 of this study, the experts included emotional functions in Round 1 and 2 but excluded them in Round 3. Reasons for this might be that they did not view the item (fear of falling) as critical for the identification of fall risk factors in older adults, or that HCPs tend to focus more on the positive, modifiable factors and not necessarily on the fear of falling. As such, emotional functions were excluded from this ICF code set.
	• A participant highlighted that the progress bar is not obvious and only became noticeable halfway through the questionnaire. She suggested that a note be included at the beginning to explain that the red bar on top of the page shows one's progress with the questionnaire.	• The progress bar is generated by the Qualtrics software and although it cannot be changed, the number of questions per page was reduced from five questions per page to three questions to reduce scrolling. In addition, a sentence was added to the instructions indicating that the progress bar is displayed at the top of each page.

As indicated in Table 5.3, the participants suggested no changes to the methodological aspects of the clinical utility questionnaire, but several changes to the feasibility of the questionnaire, the written case history and the code set. On completion of the pilot study, the recommendations were implemented to refine the material, thereby increasing its internal validity and contributing positively to the quality of the code set administration process.

5.5 Main Quantitative Study

5.5.1 Aim

The overall aim of the ICF code set administration process (Phase 3) was to determine the clinical utility of the developed ICF code set (see Section 5.1 for a detailed account of the specific sub-aims).

5.5.2 Participants

Although the developed ICF code set is intended for a range of HCPs, only audiologists were involved as participants in Phase 3 for both the pilot study and the main data collection process. This specific HCP group was selected because, according to the American Academy of Audiology (AAA) (American Academy of Audiology, 2019), audiologists have a critical role to play in risk factor identification in older adults. With over 12,000 members, AAA is regarded as the world's largest professional organisation of, by and for audiologists. AAA highlights several reasons as to why the audiologist's role in the prevention, identification, assessment and management of fall risk as part of vestibular disorders in older adults should be considered as important and critical. The reasons include that audiologists are the primary HCPs who evaluate, diagnose, treat and manage hearing loss, balance disorders and fall risk in patients of all ages, especially older adults. Audiologist are one of the primary disciplines in the identification and management of hearing loss, which has been proven to be a modifiable risk factor for falls in older adults (Tiase et al., 2020). Older adults with an untreated hearing loss are more likely to experience a fall than those with normal hearing or even a compensated hearing loss (Tiase et al., 2020). In addition, audiologists provide key information for the appropriate management of patients with dizziness and balance disorders, as specified in their scope of practice. They do this through preventive screening of patients for potential fall risks and identifying fall risk factors that warrant assessment, management and referral.

From the above discussion it is clear that audiologists have a prominent role to play in the identification, screening, assessment, prevention and management of falls and fall risk in older adults. A study by Patterson and Honaker (2014) confirmed this important role. They reported that most audiologists (87%) consider fall risk factor identification to be important in their practices and part of the audiologist's role. However, despite it falling within their scope of practice, only 28% of the audiologists perceived themselves to be sufficiently trained in fall risk factor identification and felt comfortable to identify an older adults' fall risk. A common reason put forward in their study was a lack of available resources that audiologists perceived as time-efficient and user friendly (Patterson & Honaker, 2014). Bassett and Honaker (2016) later expanded on this study and reported several additional reasons why many audiologists do not conduct fall risk factor identification in their practices:

(i) It is not a billable procedure in all clinical practices.

(ii) There is no homogeneity regarding the tools that should be used (i.e., different tools and procedures are used in different practices).

(iii) There is confusion and audiologists are unable to conduct all the assessments when they had not specifically been trained to use the tools.

(iv) There is a lack of guidelines regarding which areas are important to consider for fall risk.

(v) There is uncertainty regarding where to refer patients outside of their own scope of practice for further management.

Given the important role of audiologists in the prevention, identification, assessment and management of fall risk in older adults, a measure to identify fall risk factors and highlight appropriate referrals will empower them to manage older adults more effectively. An ICF code set that guides the audiologist to identify relevant fall risk factors and referral pathways would serve as a valuable addition to the consulting process. The code set would be freely available (reducing costs to the practices) and would also use the universal language of the ICF. The latter aspect would make the code set applicable to various practices and disciplines, thus reducing the need to be trained on several different tools. Moreover, such a code set could be adapted for use as a guideline to audiologists, specifically to refer patients for treatment that falls outside the audiologists' scope of practice.

Since the researcher is also a practising audiologist, conducting research in her own field of clinical practice could well benefit the research process even more. For example, practitioner-researchers typically seek to better understand and improve their own practice while at the same time developing knowledge for the field as a whole. They are able to identify hidden issues that might be present within the discipline, and are usually more willing and able to develop and systematically administer innovative instruments that could benefit the profession (Donk & Lanen, 2018).

Finally, the selection of audiologists as the targeted HCP group is also a result of the global COVID-19 pandemic. Since audiologists are not considered "frontline workers" in the fight against Covid-19 (Swanepoel, 2020), they were more readily available to participate in the research, despite being allowed to continue consulting with patients. At the time, South Africa was adhering to Level 2 lockdown requirements and data collection had to be adapted to ensure that it could be done electronically to avoid all unnecessary person-to-person contact. As older adults are considered a vulnerable population to be infected with COVID-19 (Centres for Disease Control and Prevention, 2020), the researcher chose to use a written case study in the data collection process – instead of clinical patients – to limit the spread of COVID-19.

5.5.2.1 Participant sampling and recruitment

Non-probability purposive sampling was used to invite potential participants for Phase 3 (Leedy & Ormrod, 2014). The HPCSA was the preferred avenue for participant recruitment for this study, as all practising audiologists in South Africa have to be registered with the HPCSA. However, due to legislation changes in South Africa that came into effect in 2017, the HPCSA may no longer provide researchers with the contact information of their members for data collection purposes (Protection of Personal Information Act, 2013). Therefore, a three-pronged approach was used for recruitment. Participants were recruited firstly via the email list of the South African Association of Audiologists (SAAA), consisting of 310 members, secondly through the SAAA Facebook page, and thirdly, by means of snowball recruiting. All participants who indicated an interest in the research study, as well as the clinical colleagues of the researcher and her supervisors were phoned to request the contact details of their colleagues who they thought would also be interested in participating in the research study. By using electronic and/or telephonic methods of recruitment, the researcher was able to contact the audiologists and still adhere to South Africa's lockdown regulations to minimise person-to-person contact. Snowball recruiting proved to be an efficient and cost-effective way to access more participants who might otherwise have been difficult to contact.

5.5.2.2 Participant selection criteria

Participants were eligible for participation based on the three selection criteria as outlined in Table 5.4 (obtained from the biographic section of the questionnaire).

Table 5.4: Participant selection criteria

Criteria	Method	Theoretical justification
Registered with the HPCSA as either an audiologist or a dually qualified and registered Speech-Language Therapist and Audiologist	Biographic section of questionnaire	Audiologists registered with the HPCSA are expected to be informed about and competent in their relevant scope of practice. They routinely see older adults and are able to identify, diagnose and provide treatment options for patients with vestibular disorders that lead to dizziness and imbalance, including fall risk (Republic of South Africa, 2009). This study included only participants registered with the HPCSA as either audiologists or as speech-language therapists and audiologists. Before 2015, some universities in South Africa offered a dual degree (in both Speech-Language Therapy and Audiology), as well as a single degree (only in Audiology). Since 2018, all five universities offering this degree have split the dual degree into two separate degrees where students are qualified as either Speech-Language Therapists or as Audiologists (Pillay et al., 2020). Registration with the HPCSA as an audiologist is based on the completion of one of these degrees and a subsequent year of mandatory community service in the national health care system. The community service year was instituted in 2003, meaning graduates have an additional year of in-service training before they are licensed to practise independently in the profession of audiology and/or speech-language therapy (Swanepoel, 2006). No age or year of graduation limit was included in the study, therefore the audiologists who graduated some time ago would have been registered with a dual degree, whereas those who graduated more recently, might have completed an audiology degree only. By not limiting the type of degree obtained, both groups would be included in the study without any differentiation between them, except for description purposes.
At least one year of experience as an audiologist	Biographic section of questionnaire	Only audiologists who have completed their degree and at least one year of community service are eligible to register with HPCSA as independent practitioners. Audiologists who currently practise as independent practitioners were eligible to participate in the study.
Consult with older adults in clinical practice	Biographic section of questionnaire	The study focuses on fall risk factors in older adults and the participants should thus consult with older adults in their clinical practice to be able to evaluate the clinical application and utility of the ICF code set for fall risk factor identification in older adults (Femdal & Solbjør, 2018). The study would also sensitise participants towards the identification of fall risk factors in older adults, as their awareness of fall risk in older adults would be heightened, which could

Criteria	Method	Theoretical justification
		be useful in clinical practice. In addition, participating audiologists would receive the ICF code set on request, and they could then use it in their clinical practice.

All potential participants who met the eligibility criteria and consented to participate were included in the data collection process. Due to the electronic nature of data collection, no restrictions were placed on the geographical area or the sector (private or public) in which the audiologists practised.

5.5.2.3 Participant description

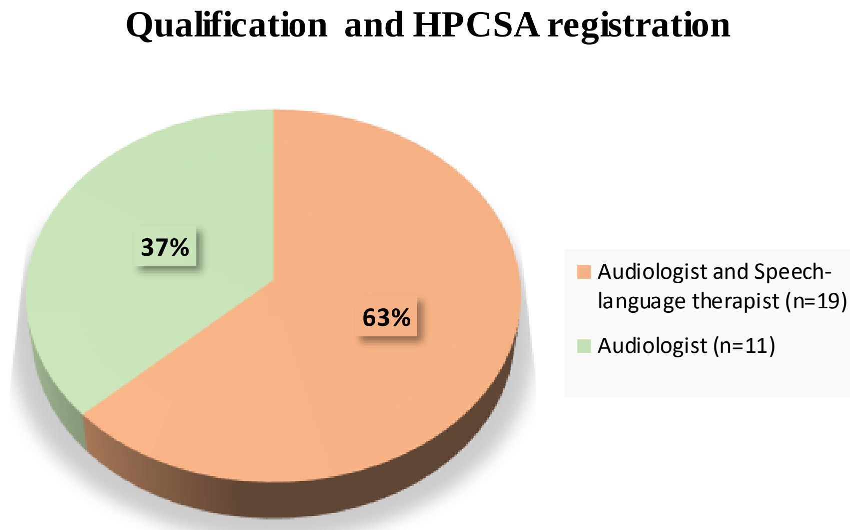
A total of 37 participants agreed to participate in the research study, two of whom did not meet the inclusion criteria (one participant did not consult with older adults and one did not state her HPCSA registration or qualification) and hence their responses were not captured. Five of the remaining 35 participants completed the questionnaire only partially (two did not complete the clinical utility section at all and three completed less than 50% of the clinical utility section) and therefore their responses were also deleted from the data. The remaining 30 participants completed the questionnaire in full and only their responses were used and analysed in this study. The biographic information of these 30 participants is indicated in Table 5.5.

Table 5.5: Participant biographic information (N=30)

Result	Participants' responses

Qualification and HPCSA registration

Almost two thirds (63%) of participants held a dual qualification and registration as Audiologist and Speech-language therapist.

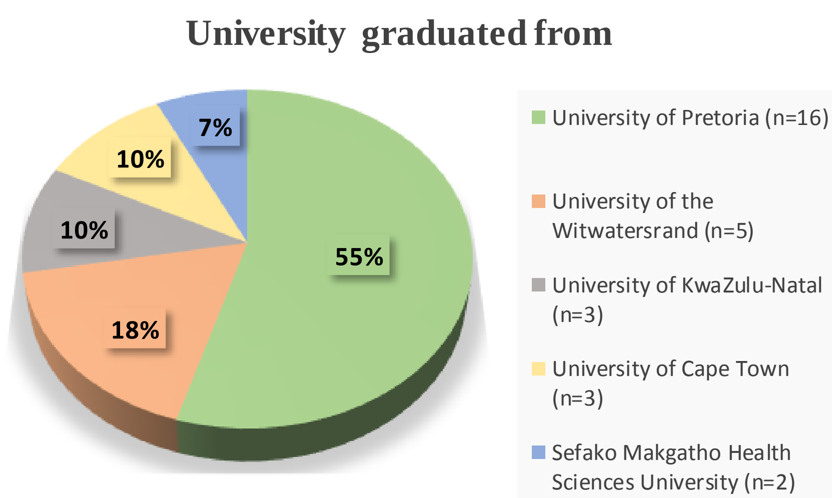


Discussion

This could be expected as the majority of the participants obtained their degree prior to the mandatory split of the dual qualification into two individual degrees (2015 – 2018). A recent study by Dahrouge et al. (2019) found that HCPs who participate in research studies are more likely to be female, to practise in larger practices or under a salaried model, and to routinely spend several hours per day providing direct patient care. In contrast, HCPs who have less professional ambition are less likely to participate in research studies. All of the audiologists who participated in this study were female and most likely high-performance individuals, with the majority having several years of experience practising as an audiologist.

University graduated from

Although just over half of the participants (55%) obtained their degree from the University of Pretoria, all five South African universities currently offering a degree in Audiology was represented in this study.



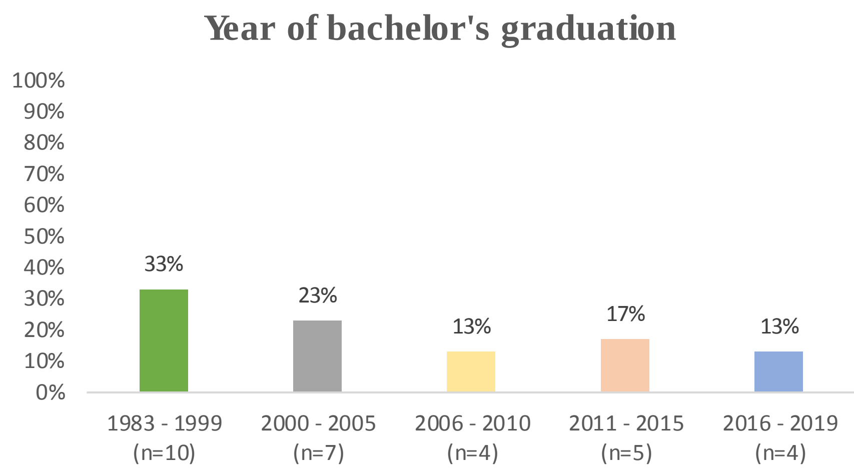
Discussion

As the exit level outcomes of the degree are similar across universities, a well-representative sample was obtained of the training received by the participants. When a representative sample is used for data collection, the results obtained are more representative of the greater population and may be interpreted with confidence (Wilkie & Dyer, 2020).

Result	Participants' responses

Year of bachelor's graduation

A third of the participants (33%) obtained their degree before 2000, with more than a third (36%) obtaining their degree between 2000 and 2010, and the last third (30%) obtaining their degree between 2011 and 2019.

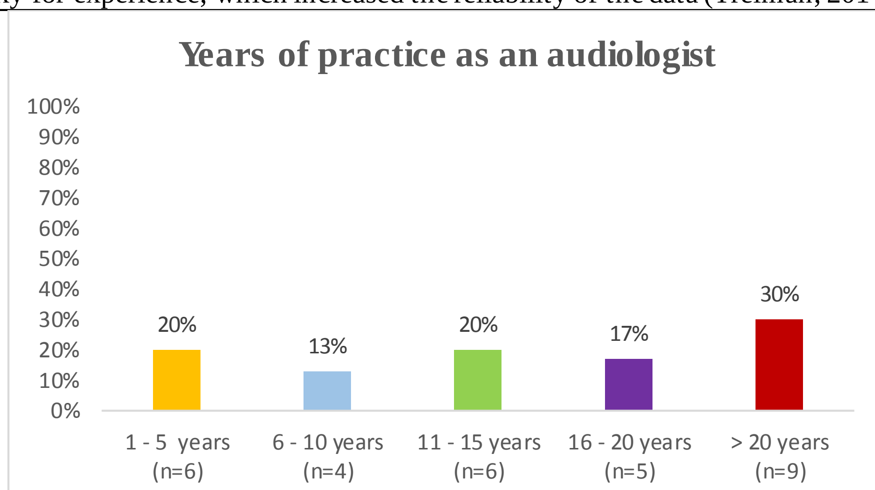


Discussion

A relatively equal distribution of participants' year of obtaining their degree was recorded. The number of years since graduation could be interpreted as a proxy for experience, which increased the reliability of the data (Treiman, 2014).

Years of practice as an audiologist

The years of practice correlated with the graduation period, showing that a third (30%) had 20 years or more experience practising as an audiologist, the second third had 10 years' experience or less (3%), and the last third (37%) had 11-20 years of experience.



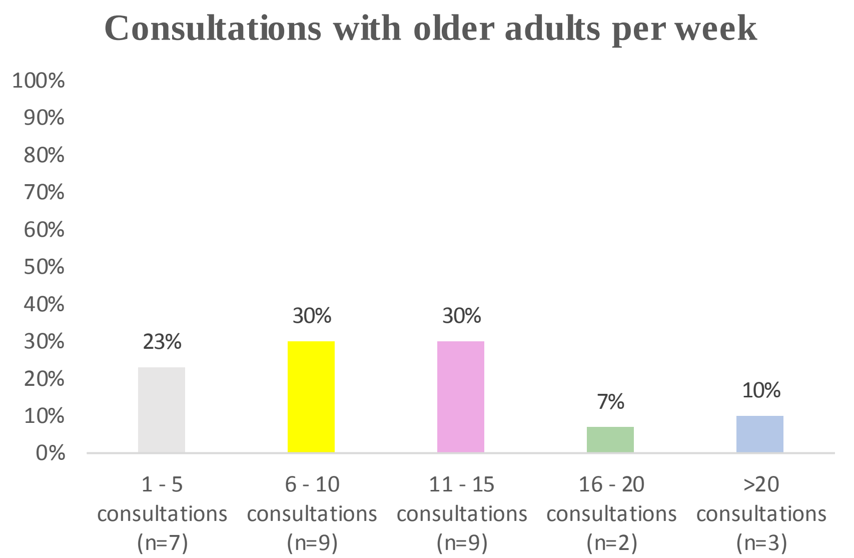
Discussion

This result implies that the participants continued working as audiologists following graduation. The audiologists with the least (1 to 5 years') experience were compared to the audiologists with six or more years' experience to determine if their experience influenced their clinical application or their clinical utility scores (see Section 5.5.6 for details).

Result | **Participants' responses**

Number of older adults consulted with per week

Almost two thirds of the participants (60%) consult with 6 to 15 older adults on average per week.

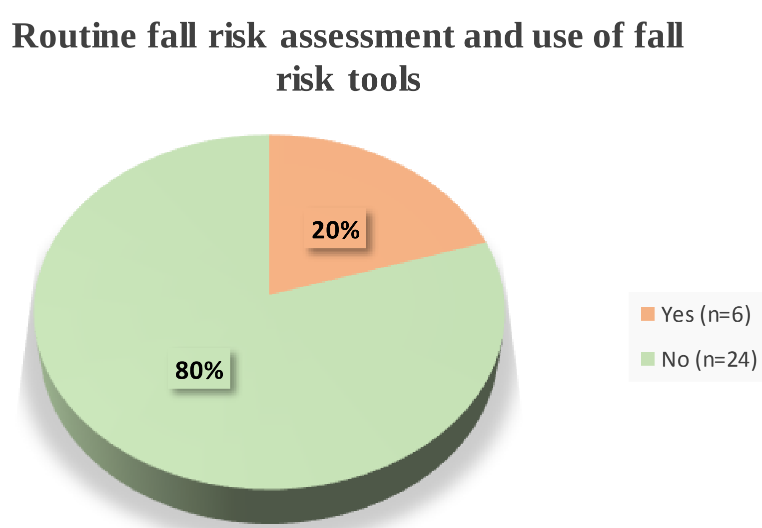


Discussion

Not only was consultation with older adults one of the study's eligibility criteria, but the more experience the participants had of consulting with older adults, the better they would be equipped to answer the clinical application and utility questions as the older population has a higher fall risk than younger adults. By ensuring all participants consult with older adults, the distribution of the group's number of consultations could be determined, which was very wide and spanned across 20+ years. By including specific inclusion criteria, the data was more likely to yield useful results that could be applied when making further clinical recommendations and decisions (Stern et al., 2014).

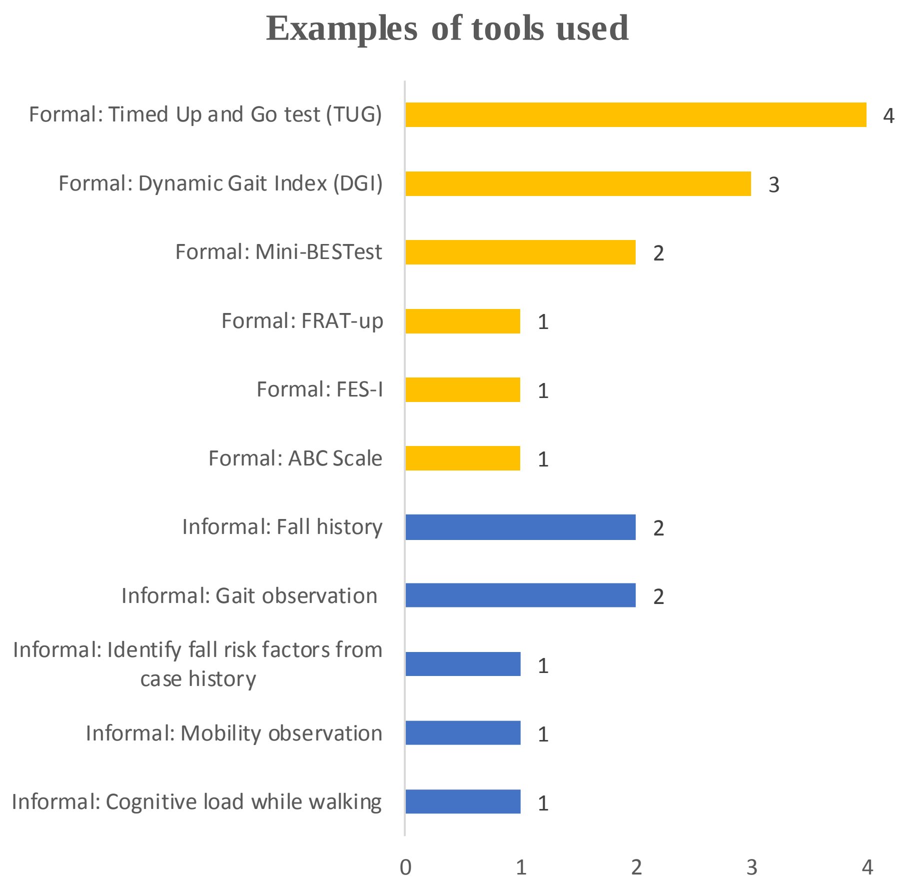
Routine assessment of fall risk in older adults in practice using formal or informal tools

The majority of the participants (80%) do not routinely screen for fall risk factors in older adults and also do not use fall risk tools to identify fall risk factors in older adults.



Discussion

The 20% of participants who routinely assess fall risk in older adults probably had more knowledge and insight into the clinical application questions. However, the ICF code set explicitly aims to be usable by all HCPs, regardless of specific experience in fall risk factors assessment. The participants' assessment of fall risk was analysed to determine if this variable influenced their clinical application scores. The participants who routinely used FRATs in their practice might have been able to identify fall risk factors more accurately in the provided case history – even without using the ICF code set – than those who did not routinely assess fall risk in their patients (see Section 5.5.6 for details).

Result	Participants' responses
Examples of formal and informal tools used to identify fall risk factors The six participants (20%) who indicated that they perform fall risk screening or use fall risk tools, mostly mentioned formal tools (12 times in total), which included six formal FRATs. The informal tools were mentioned less frequently (7 times in total) and included fall history, gait and mobility observations, and observing cognitive load while walking.	

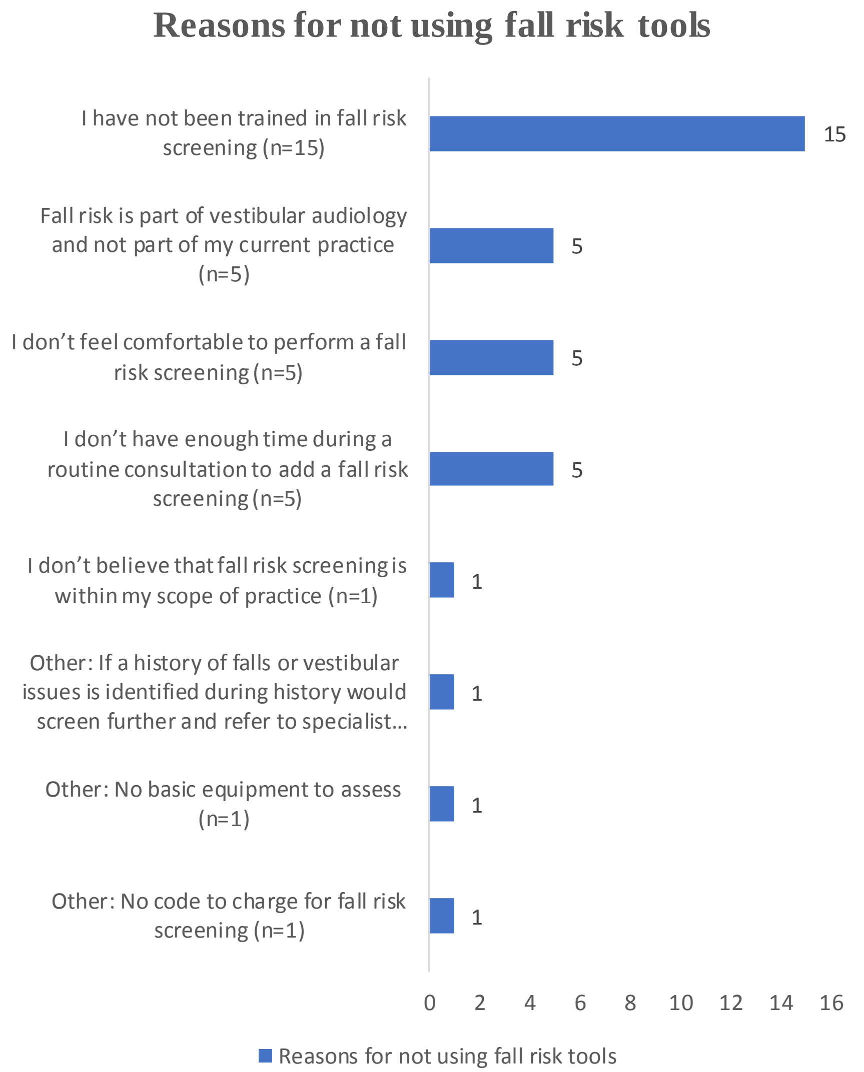
Discussion

The three most used tests (TUG, DGI and Mini-BESTest) that have been validated for patients with vestibular dysfunction, have age-appropriate norms and can easily be administered by HCPs (Franchignoni et al., 2015; Herman et al., 2009; Ibrahim et al., 2017). This could account for why these tests were used most frequently by the participants. Informal tools such as taking a fall history and observing a patient's gait could give the audiologist information about possible fall risk factors without having to conduct any additional tests or assessments.

Result	Participants' responses

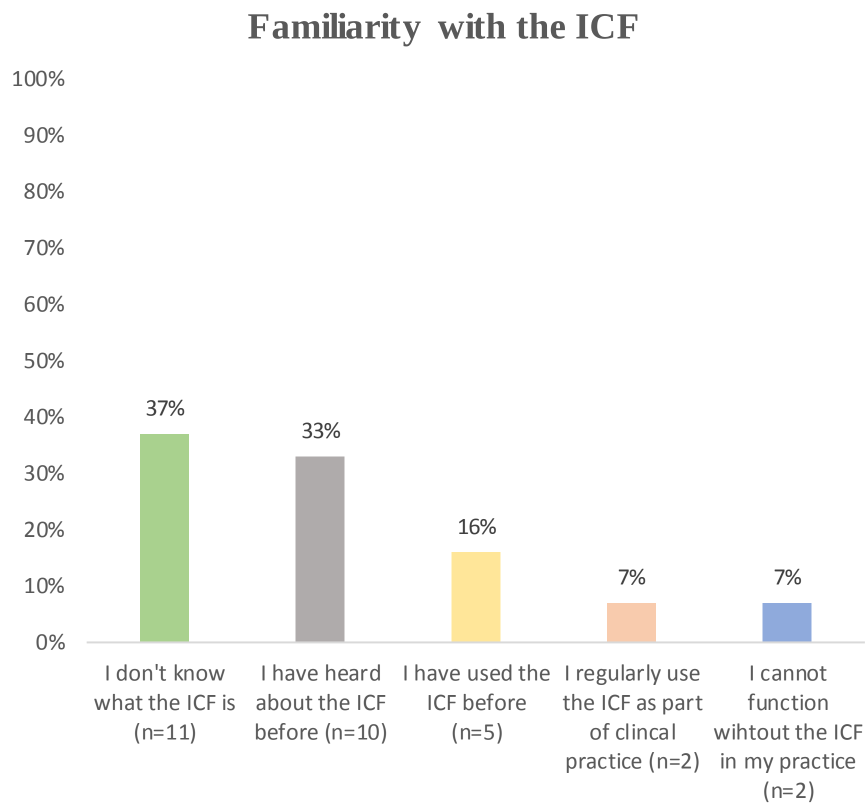
Reasons for not using any tools to identify fall risk factors

Of the 24 participants (80%) who did not use fall risk tools in their practice, the overwhelming majority (75%) listed no prior training as the main reason. They also indicated that they did not conduct vestibular assessments in their practice (n=5), that they did not feel comfortable performing fall risk screenings (n=5) and that they did not have the time to conduct fall risk assessments during routine consultations (n=5). Participants could select more than one reason, hence the sum of the reasons exceeds 24.



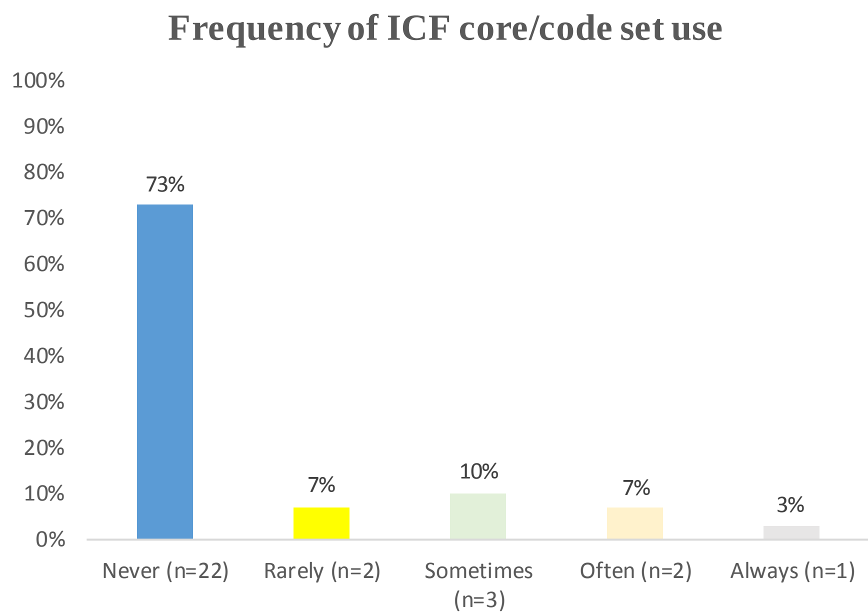
Discussion

The majority of the participants indicated that they do not perform fall risk assessments due to lack of training, which correlates with recent literature indicating that audiologists in South Africa are in need of training in the assessment and management of vestibular disorders in older adults (Khoza-Shangase et al., 2020; Seedat et al., 2018). An alarming finding was that one participant indicated that she did not believe fall risk screening was within her scope of practice. This is in stark contrast to audiologists' scope of practice (Republic of South Africa, 2009). If audiologists do not have the confidence to assess and manage vestibular disorders or do not believe that doing so is part of their scope of practice, older adults who are seen by audiologists might not receive the necessary intervention when they have vestibular disorders. This could lead to older adults having to visit several HCPs until they find an HCP who is able to treat such disorders, resulting in increased cost and time before the appropriate diagnosis and correct treatment are received.

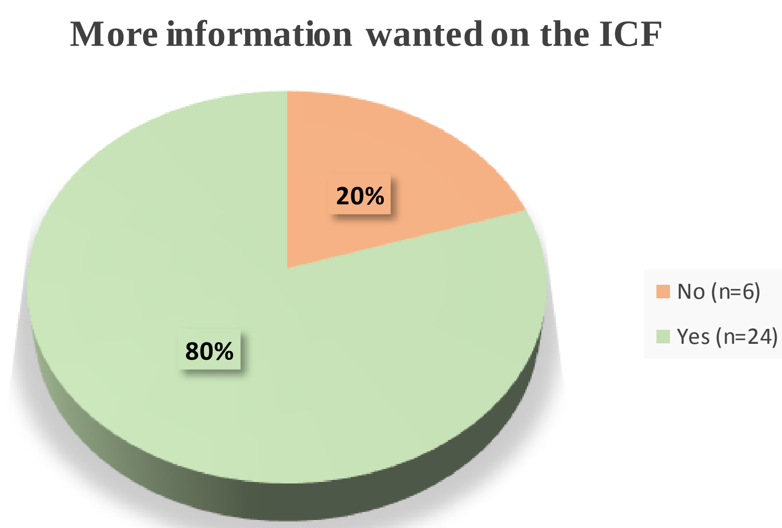
Result	Participants' responses
Familiarity with the International Classification of Functioning, Disability and Health (ICF) The majority of the participants (70%) indicated that they either do not know what the ICF is or have only heard about it before. Of the four participants who were using the ICF in their practice, three had more than 16 years' experience as an audiologist and all four of them graduated from the University of the Witwatersrand.	

Discussion

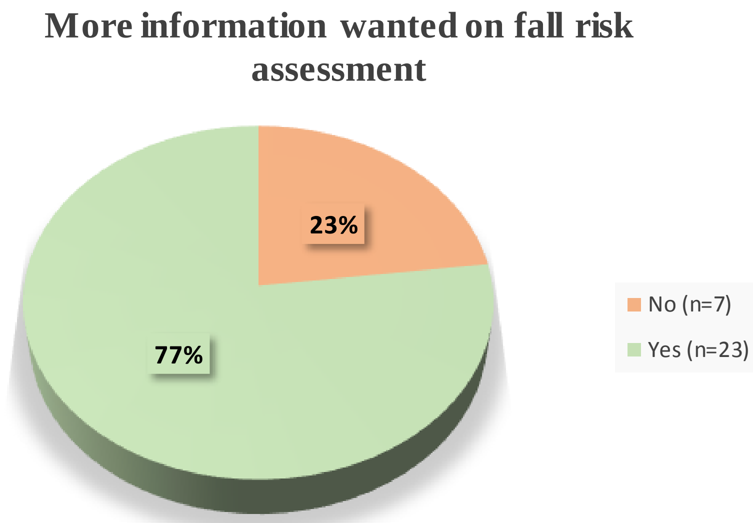
This result could relate to the year the participants obtained their degree, as more than half of the participants obtained their degree before 2005 – the ICF was only introduced in 2001 and it was only included in HCP training after 2003. Despite this, HCPs have an obligation to keep up with current research and clinical tools that could enhance their service delivery, such as using the ICF in their clinical practices. This also justifies the reasoning as to why it was decided to first give the participants an opportunity to use the ICF code set during the data collection process before asking them to evaluate the clinical utility of the code set.

Result	Participants' responses
Frequency with which any ICF core set or ICF code set is used in their practice In line with their limited familiarity with the ICF, it was not surprising that 73% of the participants had never used an ICF core/code set before. Only three participants (10%) indicated that they used a core/code set often or always.	

Discussion
The limited ICF familiarity highlights the need to provide participants with the opportunity to use the developed ICF code with a case study during the data collection process.

Requests more information on the ICF and its clinical application The high percentage of participants requesting more information (80%) was a positive indication of their willingness to learn and grow as audiologists. It also indicated a need for training among audiologists regarding the ICF and its applications. Five of the six participants who did not request more information on the ICF currently do not use the ICF in any form in their clinical practices. Four of these participants had graduated before the introduction of the ICF in HCP training programmes.	

Discussion
As explained by Maslow's hammer theory, a cognitive bias exists in humans and involves an over-reliance on a familiar tool (Alexander et al., 2011). The audiologists who participated in the study probably did not incorporate the ICF in their practice, as it was not a tool they had specifically been trained to use and hence, they preferred to use other tools that were familiar to them. However, the basis of continuing professional development (CPD) training for HCPs is to ensure they continuously grow as professionals in their skills and knowledge. Therefore, not wanting more information on the ICF was a concerning result as there appeared to be a clear need for broad training among

Result	Participants' responses
audiologists that would highlight the benefits and uses of the ICF in clinical practice, beyond merely assessing fall risk in older adults.	
Requests more information on fall risk assessment The majority of the participants (77%) also indicated that they would like more information on fall risk assessment, implying a keenness to participate in CPD activities. Only one of the seven participants who did not request more information on fall risk assessment was currently screening for fall risk factors in their practice and used any type of fall risk assessment tools.	
Discussion The four participants who did not request more information on fall risk assessment were the same participants who also did not request more information on the ICF and its clinical applications and who were not routinely assessing fall risk in their practice. One possible reason why they did not request more information was that they might feel that since they were not currently conducting vestibular assessments, they would not need more information on the subject. Unfortunately, by not keeping up with current research and all relevant aspects of audiologists' scope of practice, a degree of indifference about expanding their own knowledge and skills was noted in these participants.	

The participants' biographic information provided useful data on their experience, skills and knowledge. This information was also used when interpreting the main data, as possible trends could be identified and comparisons be made between sub-groups to determine any significant differences between these groups (e.g., years of experience or the routine use of FRATs in their practice).

5.5.3 Materials and equipment

A number of different materials were used during Phase 3 to determine the clinical utility of the developed ICF code set as set out in Table 5.6.

Table 5.6: Materials for main study

Materials	Aim	Rationale	Method
Informed consent letter (Appendix 5D)	The main purpose of the informed consent process is to protect the participants as the consent letter is a legal document that ensures that participants understand what the researcher needs from them and what the study entails (Nijhawan et al., 2013).	Informed consent is critical in ensuring ethical data collection (Leedy & Ormrod, 2014). The right to personal autonomy is paramount and by providing participants the opportunity to provide consent with complete knowledge of the risks and benefits of participation, they can choose the risks they are comfortable with taking. Furthermore, by providing the participants with the necessary and sufficient information about the study, researcher deception is reduced (Farrugia, 2019).	Participants completed the informed consent letter prior to completing the clinical utility questionnaire.
Clinical utility questionnaire: Section 1: Biographic and clinical experience section (Appendix 5I)	To ensure the participants are meeting the selection criteria; to obtain professional information about the participants; to document their self-reported clinical experience; and to provide descriptive information.	The biographic questionnaire is a quick and easy way to ensure participants meet the eligibility criteria (Sargeant, 2012) as well as a method of obtaining additional information to describe the participants.	Participants first completed the biographic section of the questionnaire via the Qualtrics platform.
Section 2: Clinical utility section (Appendix 5I)	To determine the audiologists' perceptions regarding the clinical utility of the ICF code set in terms of its appropriateness, accessibility, practicability, acceptability and professional utility.	A questionnaire provides an effective way to document participants' answers and recommendations regarding a topic – in this case, the clinical utility of the developed ICF code set (Jones et al., 2015).	The participants' responses on Section 2 of the questionnaire were captured on an online platform (Qualtrics).
Written case history (Appendix 5A)	To provide participants with the opportunity to use the ICF code set prior to answering questions on its clinical utility. This gave them practical experience of using the code set.	A written case study was used to provide the participants with the necessary information to use the ICF code set. The researcher was able to control the information provided to the participants (Cant & Cooper, 2010) and could ensure that all the necessary and relevant factors were included to enable the participants to answer the clinical application questions.	The participants' answers were documented, and the case history was a method of ensuring that the participants use the ICF code set.
ICF code set (Appendix 5B)	To be used by the audiologists to establish the fall risk for the patient presented as a written case history. This allowed the administration of the developed ICF code set in accordance with the aim of Phase 3 of the study.	The aim of this stage of the study was to administer the ICF code set and establish its clinical utility. The participants were provided the opportunity to use the code set prior to evaluating its clinical utility. They had to use the code set to evaluate the fall risk of a patient as presented in the written case history.	The ICF code set provided the participants the opportunity to evaluate their own use of it when answering the clinical utility questions. According to Lund (2001), usability is more accurately measured when a tool is used in practice. Thus, by gaining first-hand

Materials	Aim	Rationale	Method
			experience of the usability of the ICF code set, the participants were better equipped to answer the clinical utility questions.
Qualtrics software (Qualtrics, 2019)	To compile the questionnaire and record and analyse the participants' responses electronically.	Having to use an electronic survey platform, the participants were more likely to complete all the questions and not to leave some questions unanswered, as can be done with paper-based surveys (Tella, 2015). However, participants could still quit at any time, which would also lead to incomplete data.	The participants' responses were recorded on the software, and the researcher downloaded, accessed and analysed the responses for analysis.

The materials discussed above enabled the researcher to gather information regarding the audiologists' perceptions on the clinical utility of the ICF code set for fall risk factors in older adults. Literature provides scant information on the quantitative measurement of clinical utility, especially when not testing a specific drug or procedure. Due to the current COVID-19 restrictions in South Africa, HCPs were not able to physically test a patient and therefore a written case history had to be employed to determine the clinical utility of the developed ICF code set. This challenge was addressed by adapting and expanding the work of Smart (2006) and Lesko et al. (2010) to construct a usable definition and quantitative measure of clinical utility. The four components of clinical utility suggested by Smart (2006) – appropriateness, accessibility, practicability and acceptability – were adapted to suit the current study, specifically by including an operational definition for each component. Moreover, it was expanded by adding a fifth component – professional utility – as introduced by Lesko et al. (2010). This is reflected in Table 5.7. For each of the five components, specific questions were compiled to measure the relevant aspects on a 5-point Likert scale. By using a 5-point Likert scale (rather than the less sensitive 3-point scale) the participants were able to better understand which option they agree with the most. Also, they did not have too many options (as would have been the case with a 7-point Likert scale) that could unnecessarily increase the difficulty of choosing an option (Finstad, 2010). The clinical utility questionnaire employed the same 5-point Likert scale for agreement throughout the questionnaire.

A Likert scale was chosen as the means of data collection as this method has several advantages. It is recognised as a universal method for survey data collection and easily understood;

the responses are quantifiable; it does not force participants for yes/no answers, but rather allows for a degree of agreement; it makes it easier for participants to answer questions as it gives the option of neutral or undecided answers (Finstad, 2010). Numerical values were assigned to each of the five points, namely: 1 = strongly agree; 2 = agree; 3 = neutral; 4 = disagree; and 5 = strongly disagree, for each of the 54 questions,

The clinical utility questionnaire comprises of two distinct sections, namely the biographic section (Section 1) and the clinical utility section (Section 2) (see Table 5.7).

Table 5.7: Clinical utility questionnaire (conceptualised from Lesko [2010] and Smart [2006])

SECTION 1: BIOGRAPHIC INFORMATION		
Question number	**Question formulation**	**Theoretical justification**
1	Are you registered with the HPCSA? Yes / No	Registration with the HCPSA as an audiologist or audiology and speech-language therapist is based on the completion of a four-year degree as well as a subsequent year of community service in the national health care system (Swanepoel, 2006). Thereafter audiologists are licensed to practise independently within their scope of practice. Annual registration with the HPCSA as well as the accumulation of Continued Professional Development (CPD) hours are mandated for professional practice in South Africa (Republic of South Africa, 2009). As such, audiologists registered with the HCPSA should be up to date with their CPD hours and aware of the latest developments in the field. These questions ensured that all participants were registered with the HPCSA with the necessary qualification to complete the questionnaire.
2 2a	How are you qualified? As an audiologist As an audiologist and speech-language therapist (dual qualification) How are you registered with HPCSA? As an audiologist As an audiologist and speech-language therapist (dual registration)	Before 2015, most universities offered a dual bachelor's degree in Audiology and Speech-Language Therapy, but since 2018 there was an official mandate from the HCPSA that the dual degree should be split into two separate degrees, Audiology and Speech-Language Therapy (HPCSA, 2016). Although there was no distinction in training between the single and dual degrees, the degree in Audiology offered more in-depth training in aspects related to Audiology (such as fall risk) than did the dual degree (Pillay et al., 2020). This change may have had an influence on the knowledge and skills of the graduates. Some universities, for instance the University of the Witwatersrand, offered audiology as a single qualification even prior to the official mandate from the HPCSA. The results of this study indicated no difference between the responses from the participants with a single or dual degree.
3	At which University did you complete your bachelor's degree in Audiology or dual Audiology and Speech-language Therapy? Sefako Makgatho Health Sciences University University of Cape Town University of Johannesburg University of Pretoria University of the Witwatersrand Other	The exit level outcomes of the bachelor's degree in Audiology or in Audiology and Speech-Language Therapy at the different South African universities are similar (Swanepoel, 2006). The current study aimed to include participants from all the universities that offer a degree in Audiology to ensure a well-represented sample of participants and to ensure that all the universities offering the degree were represented in the study.
3a	In which year did you obtain your bachelor's degree in Audiology or dual Audiology and Speech-language Therapy?	Depending on the year of graduation, audiologists' scope of practice has expanded to include aspects such as vestibular assessment and wax removal, which had not been included when the degree was introduced in the 1980s (Republic of South Africa, 2009). By not limiting the year in which the audiologists obtained their degree, a wider spread of participants could be obtained, resulting in a wider distribution of data.

Table 5.7: Clinical utility questionnaire (conceptualised from Lesko [2010] and Smart [2006]) (cont.)

SECTION 1: BIOGRAPHIC INFORMATION		
Question number	**Question formulation**	**Theoretical justification**
4	How long have you been practising as an audiologist? 1 – 5 years 6 – 9 years 10 – 14 years 15 – 19 years 20+ years	Clinicians with less experience (less than five years) were likely to attend more closely to their patients as they could perhaps overcompensate for their limited experience. On the other hand, clinicians with more experience tended to diagnose and identify abnormalities in their patients more easily and in less time (Raveesh et al., 2016). Therefore, audiologists with more experience (6+ years) might be able to identify fall risk factors in older adults more easily and perceive the clinical utility of the ICF code set as higher than would those audiologists with less experience (1 - 5 years).
5	Do you consult with older adults (65 years and older) in your practice? Yes / No	Eligibility criteria as described in Table 5.2.
5a	If yes, on average how many older adults do you consult with per week? 1 – 5 older adults 6 – 10 older adults 11 – 15 older adults 16 – 19 older adults 20+ older adults	The study focused on fall risk factors in young older adults – 65 to 75 years of age – because 35% of adults 65 years and older fall at least once a year (Muir-Hunter & Wittwer, 2016). Audiologists with experience in routinely consulting with this population are more likely to have insight into this risk. They could provide and discuss fall prevention strategies specific to this population as its members might not be aware of their own fall risk (Barmentloo et al., 2020). As an eligibility criterion for the study, consultation was included to describe the distribution of the data and to ensure all participants actually consult with older adults in their practice.
6	Do you routinely screen to identify fall risk factors in older adults – formally or informally – in your practice? Yes / No	Routine screening for fall risk in older adults could address the risk of future falls by reducing the fall risk factors in this population (Phelan et al., 2015). Identifying older adults by screening for fall risk factors is a cost-effective method, though not always successfully implemented in practice (Barmentloo et al., 2020). HCPs, including audiologists, could play an important role in this process from research to practice, as they are involved in consulting with older adults who have a higher risk of falling than the younger population (Barmentloo et al., 2020). The audiologist who routinely screened for fall risk factors would have more knowledge of and insight into the fall risk factors affecting older adults, which might affect the answers obtained in the clinical utility questionnaire.
7	Do you currently use any tool/s to identify fall risk factors in older adults you consult with in your practice? Yes / No	HCPs from various disciplines are involved in the task of determining which patients are at risk of falling. Audiologists, as one discipline in the field of health care, can play an integral role in determining fall risk in older adults. Audiologists should have the knowledge and skills to determine older adults' fall risk and to implement strategies to reduce those risks (Bassett, 2018; Patterson & Honaker, 2014). Audiologists who are experienced at using fall risk factor identification methods in their practice could be used to better explain the results and potentially draw comparisons between participants' responses, especially regarding the appropriateness and clinical use of the ICF code set.
7a	If YES, please specify the type of the tool/s you use? Formal method to identify fall risk factors (e.g., Berg Balance Scale, STRATIFY, etc.) – please specify: ____ Informal method to identify fall risk factors (e.g., gait observation, general mobility, ability to transfer oneself) – please specify: ___	

Table 5.7: Clinical utility questionnaire (conceptualised from Lesko [2010] and Smart [2006]) (cont.)

SECTION 1: BIOGRAPHIC INFORMATION		
Question number	**Question formulation**	**Theoretical justification**
	Other: _______	
7b	If NO, please indicate why not (choose as many of the following options as you deem relevant)? ◦ I don't believe that fall risk assessment is within my scope of practice. ◦ I don't feel comfortable to perform a fall risk assessment. ◦ I have not been trained in fall risk assessment. ◦ There is no code to charge for fall risk assessment. ◦ I don't have enough time during a routine consultation to add a fall risk assessment. ◦ Fall risk is part of vestibular audiology and not part of my current practice. ◦ Other (please specify)	The reason(s) why some audiologists do not use tools to identify fall risk factors in older adults in their practice could be used to better describe and compare the questionnaire results obtained from the participants. This could also indicate the areas where further education and knowledge are needed. Possible reasons why audiologists are currently not using any tools to identify fall risk factors in the older adults they consult with are described in the literature and were provided as a checklist to gain an understanding of the reasons provided by South African audiologists (Bassett & Honaker, 2016; Patterson & Honaker, 2014). However, as some reasons might not have been anticipated and were not described in earlier research, a category for "*Other: please specify*" was created where participants could indicate any other possible reasons.
8	How familiar are you with the World Health Organization's (WHO) International Classification of Functioning, Disability and Health (ICF)? ◦ I don't know what the ICF is. ◦ I have heard about the ICF before. ◦ I have used the ICF before. ◦ I regularly use the ICF as part of my clinical practice. ◦ I cannot function without the ICF in my practice.	Application of the ICF (World Health Organization, 2002) in audiology provides for a common language to be used among HCPs in both clinical and research settings. Furthermore, since the ICF is promoted as a means of facilitating patient-centred care, audiologists need knowledge of the ICF and skill to effectively apply it in clinical practice (Meyer et al., 2016). The audiologists' knowledge and experience of using the ICF would influence their skill in using the developed ICF code set and how it can be applied to their own practice. Audiologists who obtained their degree prior to the development and implementation of the ICF (before 2001) could be less knowledgeable and confident in applying the ICF in their own clinical practice.
9	How often do you use any ICF core or code set in your practice? ◦ Never ◦ Rarely ◦ Sometimes ◦ Often ◦ Always	It was anticipated that audiologists who routinely use any type of ICF code or core set would be able to use the newly developed ICF code set for fall risk more easily than those audiologists who had never used an ICF code set or core set before. The audiologist with previous experience in using ICF code or core sets would be able to provide more detailed and in-depth information on the clinical utility of the developed code set (Danermark et al., 2013).
10	Would you like more information on the ICF and its clinical application? Yes / No	This ICF code set is a practical tool that could be used by audiologists in clinical practice to increase screening of fall risk factors in older adults. Fall risk is highly associated with vestibular and balance dysfunction, the assessment of which is within the audiologist's scope of practice (Patterson & Honaker, 2014). By providing the audiologists with an opportunity to obtain more information regarding fall risk assessment and/or the ICF, the researcher can help to bridge the
10a	If YES, please provide your email address or send an email to hendrika@hdcinc.co.za	

Table 5.7: Clinical utility questionnaire (conceptualised from Lesko [2010] and Smart [2006]) (cont.)

SECTION 1: BIOGRAPHIC INFORMATION		
Question number	**Question formulation**	**Theoretical justification**
11	Would you like more information on screening for fall risk factors? Yes / No	gap between research and clinical application (Barmentloo et al., 2020), as well as fulfil her ethical responsibility to provide feedback to study participants. According to Bullard (2001), the researcher should provide them with a benefit owing to their participation and not only solicit information from them.
11a	If YES, please provide your email address or send an email to hendrika@hdcinc.co.za	

SECTION 2: CLINICAL UTILITY INFORMATION			
Component aspects	**Operational definitions of components**	**Aspects to measure**	**Questions** (Answer all questions on a 5-point Likert scale: 1 = strongly disagree to 5 = strongly agree)
Appropriateness – this component includes questions about a measure being effective and relevant (Smart, 2006)			
Effectiveness	Effectiveness, in a broad sense, refers to the assessment of whether a specific measure/treatment – in a setting as close as possible to typical patient care – does what it was intended to do and whether it has a potentially meaningful impact on the patient's HRQoL (Atkins et al., 2005).	• Ability to identify fall risk factors	1. Using this ICF code set enabled me to identify fall risk factors more easily than without using it. 2. I do not think this ICF code set could assist me to identify fall risk factors in older adults.
	In the current study, clinical effectiveness refers to the clinical indicators of the measure, such as the ability to identify fall risk factors; the use of the measure in clinical practice settings; application of the measure during the consultation process; compatibility with other clinical measures; as well as the beneficial outcomes of using the measure for patients, such as referring to other practitioners and potentially improving patients' HRQoL (NHS Foundation Trust, 2018).	• Use of the measure in clinical practice settings	3. I would be able to use this ICF code set to identify fall risk factors in older adults prior to the use of further assessment methods. 4. I do not think using this ICF code set would increase the time spent on consulting with older adults. 5. I can see myself implementing the ICF code set in routine daily practice.
		• Applying the measure during the consultation process	6. I would be able to seamlessly integrate this ICF code set in my existing consultations with older adults. 7. I do not think using this ICF code set is something I would routinely use in my consultations with older adults.

Table 5.7: Clinical utility questionnaire (conceptualised from Lesko [2010] and Smart [2006]) (cont.)

SECTION 2: CLINICAL UTILITY INFORMATION			
Component aspects	**Operational definitions of components**	**Aspects to measure**	**Questions** (Answer all questions on a 5-point Likert scale: 1 = strongly disagree to 5 = strongly agree)
		• Compatibility with other clinical measures	8. In my experience this ICF code set is compatible with existing fall risk assessment tools (e.g., Berg Balance Scale / STRATIFY). 9. I would be able to use this ICF code set as a standard tool to document the fall risk factors of all the older adults I consult with in the practice.
		• Referring to other relevant practitioners	10. This ICF code set would assist me to identify the fall risk factors that warrant further referrals to other practitioners. 11. This ICF code set would enable me to more easily identify the type of health care disciplines to refer a patient to. 12. This ICF code set provides me with a common list of terminology to identify fall risk factors when communicating with other team members about specific patients.
Relevance	Clinical relevance indicates whether the results of using a specific measure are meaningful (or not) for a specific HCP (Armijo-Olivo, 2018). In the current study, this would refer to the consequential or meaningful information provided to the audiologists when using the ICF code in clinical practice.	• Discussing fall risk factors that could potentially improve HRQoL • Consequential information (meaningfulness)	13. Using this ICF code set would enable me to discuss specific fall risk factors with each older adult I consult with in my practice. 14. Discussing fall risk factors with the older adults I consult with could potentially decrease their fall risk and impact their HRQoL positively. 15. This ICF code set provides me with a tool to enrich the clinical process of identifying the fall risk factors relevant to the older adults I consult with in my practice. 16. This ICF code set could be a unique addition to the formal or informal clinical measures I use in practice. 17. This ICF code set failed to provide me with enough information to identify fall risk factors in older adults.

Table 5.7: Clinical utility questionnaire (conceptualised from Lesko [2010] and Smart [2006]) (cont.)

SECTION 2: CLINICAL UTILITY INFORMATION			
Component aspects	**Operational definitions of components**	**Aspects to measure**	**Questions** (Answer all questions on a 5-point Likert scale: 1 = strongly disagree to 5 = strongly agree)
			18. I was able to answer the questions regarding the case study quicker without using this ICF code set. 19. I consider spending extra time to use this ICF code set worthwhile as I think it increases the number of fall risk factors that I am able to identify.
Accessibility – this component includes questions about the financial considerations (e.g. cost implications, reimbursement) of using the measure (Smart, 2006)			
Financial considerations	Financial considerations are related to the value that is either given or received, directly or indirectly by using the specific measure (Napolitano & Saini, 2014; Smart, 2006). In the current study, this section refers to the cost of using the ICF code set in clinical practice and the reimbursement by the patient (or by their medical aid) for using the code set during consultations.	• Cost implications	20. I would use this ICF code set during consultations with older adults even if it increases the length of consultation time. 21. I do not think using this ICF code set should increase the cost of consulting with older adults. 22. I would use the code set in my practice if it is provided as a free resource.
		• Reimbursement	23. It is important to me that patients or medical aids would reimburse me for using this ICF code set during consultations in addition to my usual procedures in the practice. 24. I would not use this ICF code set during consultations with older adults if I was not reimbursed for doing so. 25. Considering that there is currently no procedure code for using this code set, I would ask the patients to pay me for using this code set out of their own pocket.
Practicability – this component includes questions about the functionality of the measure as well as the training needed to use the measure (Smart, 2006)			
Functionality	Functionality of a measure refers to the description of the measure, its goals or functions, as well as whether the measure meets these goals or functions (Alkhaldi et al., 2018). Functionality also refers to the practicability of the measure (Reiman & Manske, 2011).	• Meeting its goal of identifying fall risk factors	26. This ICF code set provided me with all the information I need to identify fall risk factors in older adults. 27. There are certain fall risk factors that are not included in this ICF code set that I think are important when consulting with older adults. 28. I find the layout of this ICF code set logical and clear.

Table 5.7: Clinical utility questionnaire (conceptualised from Lesko [2010] and Smart [2006]) (cont.)

SECTION 2: CLINICAL UTILITY INFORMATION			
Component aspects	**Operational definitions of components**	**Aspects to measure**	**Questions** (Answer all questions on a 5-point Likert scale: 1 = strongly disagree to 5 = strongly agree)
	In this study, functionality relates to whether the ICF code set meets its goal of identifying fall risk factors in older adults, as well as the practicability of the ICF code set in terms of its intuitiveness and the audiologist's ability to obtain the code set.	• Intuitiveness of using the measure • Obtaining the ICF code set	29. I find the fall risk factors used this ICF code set clear and easy to understand. 30. I do not routinely search online or at libraries for new audiological measures or tools. 31. I regularly keep myself informed about current research and new publications in the field of audiology. 32. I would know where to find this resource once it is available for use.
Suitability	The audiologist's perceived fit of using the code set in clinical practice.	• Perceived fit of the code set	33. I do not think this ICF code set should be an integral part of an audiologist's scope of practice. 34. This ICF code set is something I should use with every older adult I consult with in clinical practice.
		• Ease of use in clinical practice	35. I found that using this ICF code set was easy for me. 36. I think this ICF code set would be easy to use for health care practitioners in other disciplines (e.g., physiotherapy, ENT) who consult with older adults. 37. I find this ICF code too complex to be used effectively in my everyday clinical practice.
Training needed	The training needed for audiologists to use this ICF code set refers to their ability to easily use the code set in clinical practice.	• Additional training needed	38. I do not think I would need any additional training to be able to use this ICF code set in my practice. 39. I would only be able to use this ICF code set in my practice if I undergo additional training on the use of the ICF.

Table 5.7: Clinical utility questionnaire (conceptualised from Lesko [2010] and Smart [2006]) (cont.)

SECTION 2: CLINICAL UTILITY INFORMATION			
Component aspects	**Operational definitions of components**	**Aspects to measure**	**Questions** (Answer all questions on a 5-point Likert scale: 1 = strongly disagree to 5 = strongly agree)
Acceptability – this component includes questions about the ethical or social aspects of using the measure (Smart, 2006)			
Ethical considerations	Ethical beliefs include a person's personal moral code and individual beliefs of what is considered to be right or wrong. An ethical dilemma arises when a situation contains moral reasons both for and against a certain action, and reasons that challenge one's ethical beliefs (Davis et al., 2012). The four main ethical aspects considered in this questionnaire were autonomy, non-maleficence, beneficence and justice, as each one of these have the potential to influence the use of this code set by audiologists.	• Autonomy	40. I think each patient should give informed consent before I use this ICF code set to perform a fall risk factors screening. 41. I do not think each patient should be given the choice whether they want me to use this ICF code set on them, as it forms part of my clinical judgement.
		• Non-maleficence	42. In my opinion, this ICF code set could potentially cause harm to the older adults I consult with in my practice. 43. In my opinion, not performing a fall risk assessment using this ICF code set on every older adult in my practice could potentially cause harm to them.
	In this study, ethical considerations include the audiologists' sensitivity to potential ethical concerns in using the ICF code set in their scope of practice.	• Beneficence	44. I think using this ICF code would not assist me in playing an active role in potentially reducing falls in older adults and potentially increasing their HRQoL. 45. I think using the ICF code set would enable me to play an active role in advocating for the use of fall risk identification measures by audiologists.
		• Justice	46. In my opinion, this ICF code set could help me to fulfil my role of educating patients regarding the reduction of fall risks. 47. I would be able to use this ICF code set to ensure a continuity of care of my patients when they consult with other audiologists in the practice.
Professional utility – this component includes questions about the perceived benefits to the audiologist, as well as to their patients, of using this ICF code set (Lesko et al., 2010).			
Audiologist's view on the perceived benefit of the	Perceived value contains two aspects: on the one hand it refers to the clinician's overall assessment of the benefit of a measure to the patient (Chen & Chen,	• Perceived benefit of using the ICF code set for patients	48. Using this ICF code set in my practice would not be advantageous to my patients as it would not enable me to provide a higher quality service to them.

Table 5.7: Clinical utility questionnaire (conceptualised from Lesko [2010] and Smart [2006]) (cont.)

SECTION 2: CLINICAL UTILITY INFORMATION			
Component aspects	**Operational definitions of components**	**Aspects to measure**	**Questions** (Answer all questions on a 5-point Likert scale: 1 = strongly disagree to 5 = strongly agree)
code set to the patient	2010); on the other hand it refers to the smallest change that the HCP considers to be meaningful and worthwhile to use the measure (Nwachukwu et al., 2017).		49. I think using this ICF code set could assist me in educating the older adults I consult with regarding fall risk factors and could potentially reduce their risk of falling.
Value of the code set to the audiologist	In this study, the professional utility of the ICF code set includes the perceived benefit for the audiologist as HCP when using this code set in a clinical setting, as well as the benefit for their patients.	• Perceived benefit for audiologists of using the ICF code set	50. This ICF code set is a desirable measure for identifying fall risk factors in older adults. 51. Using the code set would establish me as a leader in the field of vestibular audiology. 52. Using the code set and performing fall risk assessments could ensure more referrals to my practice.
		• Value of code set for intervention strategies	53. I think this ICF code set could assist me in determining the factors that need further intervention strategies. 54. By using this ICF code set, I would be able to implement further intervention strategies more easily than would have been possible without this code set.

The clinical utility questionnaire was used in both the pilot study (after which some revisions were made as described in Section 5.4.5) and the main study. In addition to it, the ICF code set developed in Phase 2 was used, together with a written case history to measure the audiologists' clinical application of the code set (see Table 5.8).

In a study by Stewart and Chambless (2010), HCPs described their own clinical knowledge and experiences as the most important influences when answering questions or sharing knowledge that affect their treatment decisions and prediction of future intervention outcomes. These authors also highlighted that although evidence-based practice emphasises the use of research to guide clinical practice, the clinician's own experiences are vitally important when gathering data and should therefore be used to gain insight into the topic at hand during the research process. Therefore, the current study employed a written case history for the audiologists on which to base their responses. This case history closely represents a typical case and offers the usual information an audiologist would be confronted with in clinical practice. In answering the questions regarding the clinical utility of the developed ICF code set, the participants are allowed to apply their own clinical experience as they usually would when consulting with older adults. The questions asked in the clinical application section were aligned to the previously identified three objectives of the ICF code set (see Table 5.8).

Table 5.8: ICF code set objectives and clinical application questions

ICF code set objective	Clinical application question
1. Identifying factors (barriers and facilitators) that could increase fall risk in older adults	• Identify the fall risk factors, if any, that could potentially increase Mr Smith's fall risk. • Identify the positive factors, if any, that could potentially assist in reducing Mr Smith's fall risk.
2. Determining fall risk factors that would justify assessment by the audiologist	• Determine the specific fall risk factors, if any, that would warrant assessment by an audiologist.
3. Determining areas in which further assessment and/or intervention might be warranted (since this fell outside the audiologist's scope of practice, referral to other HCPs was required)	• Identify the different health care disciplines, if any, to which Mr Smith should be referred.

To determine the relevance of the responses from the participants, a scoring sheet was compiled for the four clinical application questions related to the case study in the first part of the clinical utility questionnaire (see Section 5.5.5).

5.5.4 Data collection procedures

Data was collected by recruiting potential participants via the SAAA email database and a social media platform (https://web.facebook.com/groups/audiologysa/). The deadline for submission of questionnaires was set for three weeks from the beginning of the data collection process. An email containing information on the research study as well as the link to the clinical utility questionnaire was sent out to the 310 SAAA members on their database as part of the informed consent procedure. Only one email was sent so as to reduce the number of emails and communication sent to potential participants. Due to the anonymity of the survey, the researcher simultaneously commenced with snowball recruiting until the deadline had passed in order to ensure that a minimum of 30 complete responses were obtained. Thirty respondents are the recommended minimum number needed from the population of interest, in this case audiologists, to obtain reasonable and reliable statistical results (Johanson & Brooks, 2010). This is approximately 10% of the number of potential participants who received the initial request to participate in the research study. Snowball recruiting was done by contacting the researcher and supervisors' academic and clinical contacts. Eventually, the same email containing information on the research study and the link to the clinical utility questionnaire was sent to all the participants who agreed to participate in the study. The questionnaire was designed in such a way that one could not proceed to any of the later sections (biographic, clinical experience, clinical application or utility sections) without first completing the informed consent section.

Possible reasons for the relatively low response rate in this study could be the time of the year during which the data was collected (i.e., towards the end of the calendar year). In South Africa, December is the beginning of the summer break that lasts up to four weeks, and most companies close during this time. In addition, the fatigue of HCPs at the end of 2020 was exacerbated by the global COVID-19 pandemic, and this could have an impact on the response rate. Furthermore, the questionnaire focused on fall risk identification, which not all audiologists routinely conduct in their practices (Patterson & Honaker, 2014) – still, the informed consent specifically stated that no previous experience in fall risk identification was required to complete the questionnaire. Long and complicated questions could also lead to participant fatigue (Nardi, 2015), hence the researcher aimed to restrict the anticipated completion time to no more than 40 minutes. The participants were reassured that they could complete the questionnaire at their own pace and this could even span several sessions if so needed or preferred.

5.5.5 Data analysis and statistical procedures

In order to perform statistical inference, a one-sided hypothesis was used as an alternative hypothesis for the first sub-aim.

H_0: Per question (each presenting a separate category), there is no difference between the number of answers provided across the group *before* receiving the ICF code set and *after* having been provided the code set.

H_1: Per question (each representing a separate category), more preferred responses are provided *after* receiving the ICF code set than *before* receiving the code set.

This hypothesis implied that the percentage of preferred responses after receiving the ICF code set would be higher than before receiving the ICF code set. The data for the clinical application and the clinical utility sections was analysed separately.

5.5.5.1 Clinical application section

In order to analyse the clinical application data, a scoring sheet was designed to compare the code set scores of the participants before and after receiving the ICF code set. For each question, the participants; answers were evaluated and those that were relevant, were allocated one point (+1 point). Answers that were irrelevant were allocated a zero score and did not influence the results (e.g., ‘medical diagnosis’, which does not specify any type of diagnosis, in response to Question 1 which focused on the patient’s fall risk factors).

Only answers that could cause harm, such as over-referral of the patient, were allocated a negative score (-1 point). This was in line with the two primary ethical principles for HCPs which are applicable in this section, namely non-maleficence and beneficence. These principles state that one should not only not cause harm, but also actively prevent harm and promote doing good (Motloba, 2019). Based on the written case history provided (the case of Mr Smith), there is no indication that would warrant referral to a cardiologist or psychologist for this specific patient, hence a -1 point score was indicated. For other patients, this might be an appropriate referral as referral to other HCPs for further assessment and intervention is certainly indicated as part of the HCP's role of adhering to these principles. However, over-referral or unnecessary referral of patients could cause harm (such as undue stress and financial obligations for the patients) and the misuse of available resources (Atwal & Caldwell, 2003). Ethical decision making is paramount in health care and, as such, over-referral of patients was regarded as an ethical violation and scored negatively. The scoring sheet for the clinical application section is presented in Table 5.9.

Table 5.9: Scoring sheet for clinical application section

Question	Scoring criteria and point allocation for relevant answers
Question 1: Factors that would increase fall risk	• Dizziness / vertigo / spinning (+1 point) • High blood pressure / hypertension (+1 point) • Age / elderly (+1 point) • Diabetes (+1 point) • Hearing loss / lack of amplification (+1 point) • Medication / polypharmacy (+1 point) • Assistive devices (e.g., IV drip, mobile oxygen tank) (+1 point) • Previous falls / fall history (+1 point) • Tinnitus (+1 point) • Body functions (+1 point) • Environmental factors (+1 point) • Personal factors (+1 point) • Watching / sight (+1 point)
Question 2: Factors that would decrease fall risk	• Walking stick / self-ambulatory (+1 point) • Safety railings (+1 point) • Hearing aids (+1 point) • Medication adherence (+1 point) • Panic / medic alert button (+1 point) • Awareness (+1 point) • Investigation of dizziness / consultation with audiologist / conducting a fall risk assessment / access to health care services (+1 point) • Consciousness (+1 point) • Feeling steady on his feet (+1 point)

Question	Scoring criteria and point allocation for relevant answers
Question 3: Factors that audiologists would evaluate	• Home evaluation (+1 point) • Motivation (+1 point) • Environmental factors (+1 point) • Dizziness / vertigo (+1 point) • Hearing loss (+1 point) • Age (+1 point) • Tinnitus (+1 point) • Fall history (+1 point) • Medication adherence (+1 point)
Question 4: Referrals to other HCPS for further assessment/intervention	• ENT / GP / Medical doctor / specialist (+1 point) • Physiotherapist (+1 point) • Vestibular audiologist (+1 point) • Occupational therapist (+1 point) • Neurologist (+1 point) • Biokineticist (+1 point) • Optometrist (+1 point) • Podiatrist (+1 point) • Cardiologist (-1 point) • Psychologist (-1 point)

Based on the scoring sheet, each participant's score per question (both pre- and post-code set) was determined. The raw data was exported to a Microsoft Excel spreadsheet.

5.5.5.2 Clinical utility section

For the clinical utility section of the questionnaire (Section 2), raw data was exported to a Microsoft Excel spreadsheet. As explained earlier, each of the 54 questions were scored according to a 5-point Likert scale (1 = strongly agree; 2 = agree; 3 = neutral; 4 = disagree; 5 = strongly disagree). The first two categories ('strongly agree' and 'agree') were combined and indicated as 'agree' and the last two ('strongly disagree' and 'disagree') were combined as 'disagree'. The middle category was indicated as 'neutral'. Every question was analysed and either 'agree', 'disagree' or 'neutral' was indicated for each participant's answer.

A preferred response for each question – either 'agree' or 'disagree' – was selected by the researcher based on the specific question (see Table 5.14). All neutral responses were categorised as an 'unpreferred' response. Thereafter, the participants' answers were analysed in terms of the preferred response. If the preferred response was selected, a score of 1 was given for that specific question. If anything other than the preferred response was selected, including 'neutral', a score of 0 was given for that specific question.

5.5.5.3 Statistical procedures

All statistical data analysis procedures were performed by a statistician who used SAS (SAS Institute Inc., 2020) to calculate both parametric and non-parametric inferential statistics.

(i) Inferential statistics: Parametric tests

The paired t-test was used to compare the means of the code set scores of the participants for the four questions related to the written case study before and after using the ICF code set. The aim was to determine whether the differences between the means were statistically significant or not (Rietveld & van Hout, 2017).

(ii) Inferential statistics: Non-parametric

No assumptions were made regarding the form of the sample population or the values of the distribution and as such, non-parametric statistics were used to test the significance of the finding. The Kruskal Wallis test was used as a one-way analysis of variance and the Bonferroni correction method was applied to adjust the *p*-values (Jafari & Ansari-Pour, 2019). Fisher's Exact Test was employed as a statistical significance test used in the analysis of contingency tables for small samples (Kim, 2017).

5.5.6 Results and discussion

The results of Phase 3 are presented in accordance with the two sub-aims of the phase:

(i) Describing the audiologists' clinical application of the code set by comparing their pre-code set answers (without the use of the ICF code set) and their post-code set answers (with the use of the ICF code set)

(ii) Determining the audiologists' perceptions regarding the clinical utility of the ICF code set, after applying it to the written case study in terms of the appropriateness, accessibility, practicability, acceptability, and professional utility of the code set

The results of each sub-aim are discussed critically before presenting the results of the following section.

5.5.6.1 Clinical application: Results

The main aim of this section is to compare the audiologists' answers pre-code set and post-code set , so as to determine if the use of the ICF code set increased the number of preferred answers for each question. For each of the four clinical application questions, the range and mean scores were determined as well as the number of preferred answers per question (see summary in Table 5.10).

Table 5.10: Number of preferred answers, range and mean scores per question

	Number of preferred answers		**Range**		**Mean**		**Gain**
	Pre code set	**Post code set**	**Pre code set**	**Post code set**	**Pre code set**	**Post code set**	
Question 1: Factors that would increase fall risk	73	81	1 – 7	1 – 7	2.43	2.70	+9.87%
Question 2: Factors that would decrease fall risk	70	68	1 – 5	1 – 6	2.33	2.26	-2.90%
Question 3: Factors that audiologist would evaluate	46	49	1 – 3	1 – 3	1.53	1.63	+6.12%
Question 4: Referrals to other HCPs for further assessment/intervention	57	63	1 – 4	1 – 4	1.90	2.10	+9.52%
Total	246	261			8.20	8.70	+5.75%

The results indicated that the mean scores for each question increased, resulting in an overall increase (gain) in preferred responses given by the participants when using the ICF code set. However, due to the small number of participants, the mean scores obtained were, not necessarily an accurate reflection of the results. In fact, they should be interpreted in conjunction with the overall scores obtained by the participants, which indicated an increase in the scores for all but one question.

The total number of preferred answers showed a gain of 5.75% when the participants used the ICF code set to answer the clinical application section. Since the same group of participants and the same set of questions were used, the gain was recorded as a percentage score per question to determine if the number of preferred responses increased or decreased for each question when using the code set. The biggest increase was seen in Questions 1 and 4, with the smallest increase in Question 3 and a minimal decrease in correct answers in Question 2. The latter was the direct result of only one participant whose score decreased.

Twenty-three (76.67%) of the participants' scores remained the same pre- and post- code set, with six participants' scores increasing post-code set. As alluded to earlier, only one participant's score decreased post-code set. Two participants obtained the maximum total score pre- and post-code set (Participant #1 and #20), with five participants obtaining a score of 10 to 16 out of 17 pre-code set (59 – 94%) and seven participants obtaining this score (59-94%) post-code set.

Next, the specific answers provided by the participants for each question, pre- and post-code set, are presented in Table 5.11. It expands on Table 5.10 by showing the specific answers that were provided, rather than a mere quantification thereof.

Table 5.11: Participant responses: clinical application section

Question 1: Factors that would increase fall risk			Question 2: Factors that would decrease fall risk			Question 3: Factors that audiologists would evaluate			Question 4: Referrals to other HCPs for further assessment/intervention		
Answer	**Pre code set**	**Post code set**	**Answer**	**Pre code set**	**Post code set**	**Answer**	**Pre code set**	**Post code set**	**Answer**	**Pre code set**	**Post code set**
Dizziness / vertigo / spinning	29	23	Walking stick	24	23	Dizziness / vertigo	30	29	ENT / GP / Medical doctor / specialist	28	26
High blood pressure / hypertension	14	13	Safety railings	14	13	Hearing loss	10	9	Physiotherapist	13	15
Age / elderly	10	12	Hearing aids	8	6	Age	4	5	Vestibular audiologist	7	9
Diabetes	6	7	Medication adherence	8	8	Tinnitus	2	2	Occupational therapist	5	6
Hearing loss	6	7	Panic / medic alert button	6	5	Fall history	0	1	Neurologist	2	3
Medications / polypharmacy	5	8	Awareness	3	5	Medication adherence	0	3	Biokineticist	1	1
Assistive devices	1	1	Investigation of dizziness / consultation with audiologist / conducting a fall risk assessment / access to health care services	3	3				Optometrist	1	2
Previous falls / fall history	1	3	Consciousness	1	1				Podiatrist	0	1
Tinnitus	1	1	Feels steady on his feet	1	0						
Body functions	0	1	Home evaluation	1	0						
Environmental factors	0	1	Motivation	1	1						
Lack of amplification	0	1	Environmental factors	0	1						
Personal factors	0	1	Self-ambulatory / use of assistive devices	0	2						
Watching / sight	0	2									
Total:	**73**	**81**		**70**	**68**		**46**	**49**		**57**	**63**
									Cardiologist (-1 point)	0	2
									Psychologist (-1 point)	1	1

GP = General Practitioner; ENT = Ear-Nose and Throat specialist; HCP = Health Care Practitioner

As shown in Table 5.11, almost all of the participants (29 pre-code set and 23 post-code set) correctly indicated dizziness/vertigo as a fall risk factor in Question 1 (Factors that would increase fall risk). However, five fall risk factors that were scored as relevant answers (body functions, environmental factors, lack of amplification, personal factors and watching / sight), were only indicated as such when using the ICF code set. For Question 2 (Factors that would decrease fall risk), most of the participants (24 pre-code set and 23 post-code set) indicated a walking stick as a protective factor to decrease fall risk. Two protective factors (i.e., the environment and being self-ambulatory) were added when the participants consulted the code set. In Question 3 (Factors that audiologists would evaluate), all of the participants listed dizziness or vertigo as a fall risk factor. Two new factors that would warrant assessment by an audiologist were given post-code set, namely completing a fall history and inquiring about the patient's medication adherence. For Question 4 (Possible referrals of the patient to other HCPs for further assessment/intervention), the majority of the participants (28 pre-code set and 26 post-code set) indicated referral to an ENT specialist / General medical practitioner. Referral to a podiatrist was added as a possible referral post-code set.

In order to determine whether the gain achieved by using the code set was related to experience or to whether they were conducting fall risk assessments, 3 x 2 contingency tables were drawn: experience and gain between with and without the code set (Table 5.12), and conducting fall risk assessments and gain between with and without a code set (Table 5.13). For the first comparison, the post-code set scores of the six participants with the least experience (1 – 5 years) were compared to the post-code set scores of the 24 participants with six or more years' experience, using Fisher's Exact Test to determine significance. The same method was followed to draw 3 x 2 contingency tables for comparisons between the six participants who indicated that they routinely assess fall risk and the 26 who do not, and the gain experienced with and without the code set.

Table 5.12: Comparison between experience and clinical application scores

		Years of experience		**Total**
		1 – 5 years	6+ years	
Gain	Negative gain	-	1	1
	No gain	5	18	23
	Positive gain	1	5	6
Total		6	24	30

Based on the results obtained in Table 5.12, the statistical significance was determined using Fisher's Exact Test (which is ideal for small, uneven sample sizes, as was the case in this study), resulting in a *p*-value of 0.7167. This indicated no significant association between years' experience and an improvement in the clinical application of the code set. However, from Table 5.12 it is evident that of the six participants with positive gain, five had experience of six years or more. Had the participant numbers been larger, a significant result might have been possible. Next, a comparison was made between the participants who routinely assess fall risk and those who do not conduct fall risk assessments (Table 5.13).

Table 5.13: Comparison between routine fall risk assessments and clinical application scores

		Assess fall risk		**Total**
		Yes	No	
Gain	Negative gain	-	1	1
	No gain	5	18	23
	Positive gain	1	5	6
Total		6	24	30

The significance of these groups was determined and a *p*-value of 0.7167 was obtained, which again indicates no significance between the routine assessment of fall risk and an improvement in clinical application scores using the code set. Five of the six participants whose scores improved with using the ICF code set did not routinely assess fall risk. These results suggest that neither more experience as an audiologist nor conducting fall risk assessments in clinical practice influenced their use of the ICF code set. Such use included successfully identifying factors that would increase or decrease fall risk, considering the factors that should be evaluated by audiologists, and making appropriate referrals. This finding clearly suggests that without skill in routine assessment of fall risk, audiologists still benefited from the code set, and if participant numbers had been larger, a significant result might have been achieved.

It should be reiterated that the aim of the clinical application section was not to test the participants' knowledge, but to provide them the opportunity to use the developed ICF code set before having to answer the clinical utility section. Overall, the results obtained in the clinical application section were positive in that they indicated an overall increase – albeit small and non-significant – in preferred responses by the participants when using the ICF code set.

5.5.6.2 Clinical application: Discussion

Considering the fact that significantly more patients seen in audiology practices, compared to those not seen by an audiologist, fall on an annual basis, preventive action on the part of audiologists is needed to identify older adults who are at risk of falling (Criter & Honaker, 2016). The first step in identifying fall risk would be to identify the fall risk factors relevant to each patient who sees the audiologist in their practice (de Clercq et al., 2020a). Fall risk factor identification is categorised under vestibular assessment and management, with vertigo or dizziness being one of the primary vestibular fall risk factors in older adults (Kalula et al., 2016). Approximately 90% of individuals over the age of 65 years have visited an HCP at least once with vertigo as their primary complaint, but not all of these patients have undergone a vestibular assessment (Seedat et al., 2018). In South Africa, equipment for vestibular testing is expensive, reimbursement rates for testing are low and the majority of audiologists do not conduct these tests routinely – whether in the private or public sector (Seedat et al., 2018). This could potentially result in a large number of audiologists not continuing their training and updating their knowledge of vestibular disorders and the management thereof. The HPCSA also does not differentiate fall risk as a specific part of an audiologist's scope of practice and only states that vestibular testing is included (Republic of South Africa, 2009).

In the results of the clinical experience section of this study, one audiologist indicated that not only does she not consider vestibular assessments as part of her current clinical practice, she also does not consider fall risk assessment in general to be part of an audiologist's scope of practice. She further explained that she had not received sufficient training in vestibular assessments to enable her to conduct fall risk assessments independently. This participant obtained her degree in 1993, which was prior to the introduction of vestibular testing as part of the training programme for audiologists. This finding is consistent with findings from a recent study by Seedat et al. (2018) who reported inadequate training as one of the main barriers to vestibular testing and management among audiologists in South Africa. Khoza-Shangase et al. (2020) concurred and reported that the majority of audiologists in South Africa – particularly those who work in the public sector – are not confident in performing any vestibular assessments, including fall risk factor identification.

The results obtained in the current study, together with those of Seedat et al. (2018) and Khoza-Shangase et al. (2020), support the notion that training of audiologists in vestibular assessments (including fall risk identification), as well as encouraging audiologists to conduct fall risk identification in the older adults they consult with in their practice, is needed in South Africa. By using the developed ICF code set for fall risk factors, more audiologists would be able to provide preventive health care to their patients by identifying their fall risk factors, even if they did not routinely conduct fall risk assessments. The findings from the 3 x 2 contingency tables show that the use of the code set is contingent neither on the audiologists' work experience nor on whether they routinely perform fall risk assessments. The use of the ICF code set could enable audiologists to assist more of the older adults they consult with, either by conducting the assessments themselves or by referring them to other HCPs based on the information obtained from the ICF code set.

The majority of the audiologists participating in the current study had limited knowledge of and experience in the use of the ICF or any core/code sets, regardless of their level of work experience. Despite this, the results of the clinical application section indicated that the exposure to a code set (without any accompanying training) improved the audiologists' ability to identify fall risk factors and confirmed the ease of use of the developed ICF code set. Although the study was conducted on a small number of participants, the results suggest that the usability of the developed ICF code set would be transferable to other HCPs. The universal language used in the ICF, which is often claimed as one of its strengths (World Health Organization, 2001, 2002), possibly contributed to this.

Overall, the participants' scores when using the ICF code set to answer the four clinical application questions visibly improved, with the largest gain seen in the question related to the identification of fall risk factors and the referral to other HCPs. Identifying both risk and protective factors related to fall risk, was indicated as one of the main objectives of the code set, and the results indicated that this objective was met during this study. By using the developed ICF code set, audiologists (regardless of their experience in vestibular assessments) would be able to identify the fall risk factors applicable to each patient for whom they use the code set. The code set includes fall risk factors in all the domains of the ICF, and this is critical when considering a patient's total functioning to ensure optimal outcomes, especially in audiology practices where ear and hearing health is often only understood from a medical perspective (Van Leeuwen et al., 2018). The results suggest that the use of the ICF code set could sensitise audiologists to focus beyond the body function and body structure perspective when considering fall risk factors in older adults.

When using the ICF code set to guide their clinical decision making, the participants were able to correctly identify other HCPs to whom they would refer the patient. This was noted in the almost 10% gain when provided with a code set, compared to when they did not use the ICF code set available to them. As the majority of the participants did not routinely conduct fall risk assessment or use fall risk tools in their practices, it could be surmised that most of them did not have extensive experience in vestibular assessments. Thus, if audiologists are not able to conduct fall risk assessments themselves when they consult with older adults who have a risk of falling, it is imperative that they correctly identify fall risk factors and refer their patients to other HCPs, including to fellow audiologists who routinely conduct fall risk assessment (Bennett et al., 2020). Referral of patients to other HCPs requires a partnership between different HCPs and is a vital part of the successful holistic management of patients, especially older adults, as advocated for in the ICF (Bennett et al., 2020). Guiding HCPs in terms of the appropriate referral of patients in whom they have identified fall risk factors, is one of the valuable contributions of the developed ICF code set. The possible disciplines that patients could be referred to were added to the code set, based on the recommendations obtained during the pilot study. This addition greatly increased the usability of the code set.

Results also indicated that the participants were able to correctly identify the fall risk factors that audiologists should be able to assess when using the ICF code set. Although the main role of the audiologists is to assess hearing and vestibular disorders, they should consider the patient's age, fall history and medication adherence (regarded as environmental and personal factors in the ICF) as part of their scope of practice when identifying fall risk factors in older adults. Before using the ICF, none of the participants mentioned fall history or medication adherence as potential fall risk factors that the audiologist should consider when screening older adults. This again highlights the ability of the ICF (and the code set) to focus on the patient in a more holistic manner, as all the factors related to a person's functioning are considered, and not only those related to their medical condition (World Health Organization, 2002).

The ICF encourages HCPs to consider not only the factors that can impede functioning and participation, but also those that can enhance functioning and participation (which is one of the strengths of the ICF) (World Health Organization, 2002). Capturing specific information about a patient's functioning is important in the early stages of a consultation and using a relevant ICF code set as a method of identifying what should be included in the assessment and management processes is a useful way of doing this. Although they could identify more fall risk factors and referrals to other HCPs when they used the ICF code set, participants were not able to improve their score when identifying the protective factors (facilitators) in the case history. One explanation might be that participants had already managed to identify almost all of the protective factors prior to using the ICF code set. Thus, they had beforehand been able to focus on the factors that could improve a patient's functioning and participation – the so-called ceiling effect (Lim et al., 2015).

The majority of the participants indicated that they did not routinely use the ICF or any of the other relevant ICF core/code sets in their practice. They also did not routinely identify fall risk factors in the older adults they consult with or use tools to assess fall risk in their practice. Therefore, providing them with the developed code set to identify fall risk factors as well as areas for further assessment and referral could be considered as novel for most participants. Despite having neither received training in using the ICF code set nor having extensive clinical experience in using a ICF code set, the results from the current study emphasised that audiologists found the ICF code set to be both easy and comprehensive enough for use in the clinical context. A further advantage of the ICF is that it is a common language that all HCPs understand and can use to describe fall risk for each other (World Health Organization, 2002). Providing the participants with an opportunity to use the code set enabled them to evaluate its clinical utility more accurately.

5.5.6.3 Clinical utility: Results

This section is related to the second sub-aim of Phase 3. The results were analysed based on the number of questions each participant scored as their preferred response. Table 5.14 presents the results as follows:

- Firstly, according to the specific questions across the five clinical utility components, namely appropriateness, accessibility, practicability, acceptability, and professional utility
- Secondly, by means of a discussion, following the same component structure

Table 5.14: The preferred responses and unpreferred responses per question (N=30)

Nr	Question	Preferred response according to scoring	Preferred responses (n=30)	Unpreferred responses (n=30)
	Appropriateness			
1	Using this ICF code set enabled me to identify fall risk factors more easily than without using it.	Agree	**100% (n=30)**	0% (n=0)
2	I do not think this ICF code set could assist me to identify fall risk factors in older adults.	Disagree	**100% (n=30)**	0% (n=0)
3	I would be able to use this ICF code set to identify fall risk factors in older adults prior to the use of further assessment methods.	Agree	**100% (n=30)**	0% (n=0)
4	I do not think using this ICF code set would increase the time spent on consulting with older adults.	Agree	36.67% (n=11)	**63.33% (n=19)**
5	I can see myself implementing the ICF code set in routine daily practice.	Agree	**83.33% (n=25)**	16.67% (n=5)
6	I would be able to seamlessly integrate this ICF code set in my existing consultations with older adults.	Agree	**80.00% (n=24)**	20.00% (n=6)
7	I do not think using this ICF code set is something I would routinely use in my consultations with older adults.	Disagree	**83.33% (n=25)**	16.67% (n=5)
8	In my experience, this ICF code set is compatible with existing fall risk assessment tools (e.g., Berg Balance Scale / STRATIFY).	Agree	**93.33% (n=28)**	6.67% (n=2)
9	I would be able to use this ICF code set as a standard tool to document the fall risk factors of all the older adults I consult with in the practice.	Agree	**100% (n=30)**	0% (n=0)
10	This ICF code set would assist me to identify the fall risk factors that warrant referrals to other practitioners.	Agree	**100% (n=30)**	0% (n=0)
11	This ICF code set would enable me to identify the type of health care disciplines to refer a patient to more easily than without using the code set.	Agree	**100% (n=30)**	0% (n=0)
12	This ICF code set provides me with a common list of terminology to identify fall risk factors when communicating with other team members about specific patients.	Agree	**100% (n=30)**	0% (n=0)
13	Using this ICF code set would enable me to discuss specific fall risk factors with each older adult I consult with in my practice.	Agree	**93.33% (n=28)**	6.67% (n=2)
14	Discussing fall risk factors with the older adults I consult with could potentially decrease their fall risk and impact their health-related quality of life positively.	Agree	**96.67% (n=29)**	3.33% (n=1)

Table 5.14: The preferred responses and unpreferred responses per question (N=30) (cont.)

Nr	Question	Preferred response according to scoring	Preferred responses (n=30)	Unpreferred responses (n=30)
15	This ICF code set provides me with a tool to enrich the clinical process of identifying the fall risk factors relevant to the older adults I consult with in my practice.	Agree	**96.67% (n=29)**	3.33% (n=1)
16	This ICF code set could be a unique addition to the formal or informal clinical measures I use in practice.	Agree	**93.33% (n=28)**	6.67% (n=2)
17	This ICF code set failed to provide me with enough information to identify fall risk factors in older adults.	Disagree	**100% (n=30)**	0% (n=0)
18	I was able to answer the questions regarding the case study quicker without using this ICF code set.	Disagree	**73.33% (n=22)**	26.67% (n=8)
19	I consider it worthwhile to spend extra time on using this ICF code set, as I think it increases the number of fall risk factors I am able to identify.	Agree	**76.67% (n=23)**	23.33% (n=7)
		Total* (n=570)	**89.82% (n=512)**	**10.18% (n=58)**
	Accessibility			
20	I would use this ICF code set during consultations with older adults even if it increases the length of consultation time.	Agree	**76.67% (n=23)**	23.33% (n=7)
21	I do not think using this ICF code set should increase the cost of consulting with older adults.	Agree	**80.00% (n=24)**	20.00% (n=6)
22	I would use the code set in my practice if it is provided as a free resource.	Agree	**80.00% (n=24)**	20.00% (n=6)
23	It is important to me that patients or medical aids should reimburse me for using this ICF code set during consultations – in addition to my usual procedures in the practice.	Disagree	36.67% (n=11)	**63.33% (n=19)**
24	I would not use this ICF code set during consultations with older adults if I am not reimbursed for doing so.	Disagree	**86.67% (n=26)**	13.33% (n=4)
25	Considering that there is currently no procedure code for using this code set, I would ask the patients to pay me out of their own pocket for using the code set.	Disagree	**100% (n=30)**	0% (n=0)
		Total* (n=180)	**76.67% (n=138)**	**23.33% (n=42)**
	Practicability			
26	This ICF code set provided me with all the information I needed to identify fall risk factors in older adults.	Agree	**96.67% (n=29)**	3.33% (n=1)
27	I feel there are certain fall risk factors that are not included in this ICF code set and that I consider important when consulting with older adults.	Disagree	**73.33% (n=22)**	26.67% (n=8)

Table 5.14: The preferred responses and unpreferred responses per question (N=30) (cont.)

Nr	Question	Preferred response according to scoring	Preferred responses (n=30)	Unpreferred responses (n=30)
28	I find the layout of this ICF code set logical and clear.	Agree	**96.67% (n=29)**	3.33% (n=1)
29	I find the fall risk factors used in this ICF code set clear and easy to understand.	Agree	**96.67% (n=29)**	3.33% (n=1)
30	I do not routinely search online or at libraries for new audiological measures or tools.	Disagree	**56.67% (n=17)**	43.33% (n=13)
31	I regularly keep myself informed about current research and new publications in the field of audiology.	Agree	**90.00% (n=27)**	10.00% (n=3)
32	I would like to know where to find this resource once it is available for use.	Agree	**56.67% (n=17)**	43.33% (n=13)
33	I do not think this ICF code set should be an integral part of an audiologist's scope of practice.	Disagree	**90.00% (n=27)**	10.00% (n=3)
34	This ICF code set is something I should use with every older adult I consult with in clinical practice.	Agree	**90.00% (n=27)**	10.00% (n=3)
35	I found it easy to use this ICF code set.	Agree	**100% (n=30)**	0% (n=0)
36	I think this ICF code set would be easy to use for health care practitioners in other disciplines (e.g., physiotherapy, ENT) who consult with older adults.	Agree	**100% (n=30)**	0% (n=0)
37	I find this ICF code too complex to be used effectively in my everyday clinical practice.	Disagree	**100% (n=30)**	0% (n=0)
38	I do not think I would need any additional training to be able to use this ICF code set in my practice.	Agree	**73.33% (n=22)**	26.67% (n=8)
39	I would only be able to use this ICF code set in my practice if I undergo additional training on its use.	Disagree	**66.67% (n=20)**	33.33% (n=10)
		Total* (n=420)	**84.76% (n=356)**	**15.24% (n=64)**
	Acceptability			
40	I think each patient should give informed consent for me to perform a fall risk factors screening before I use this ICF code set.	Agree	**80.00% (n=24)**	20.00% (n=6)
41	I do not think each patient should be given the choice whether they want me to use this ICF code set on them, as it forms part of my clinical judgement.	Agree	**70.00% (n=21)**	30.00% (n=9)
42	In my opinion, this ICF code set could potentially cause harm to the older adults I consult with in my practice.	Disagree	**100% (n=30)**	0% (n=0)
43	In my opinion, not performing a fall risk assessment using this ICF code set on every older adult in my practice could potentially cause harm to them.	Agree	**93.33% (n=28)**	6.67% (n=2)
44	I think using this ICF code would not assist me to play an active role in potentially reducing falls in older adults and potentially increasing their health-related quality of life.	Disagree	**100% (n=30)**	0% (n=0)

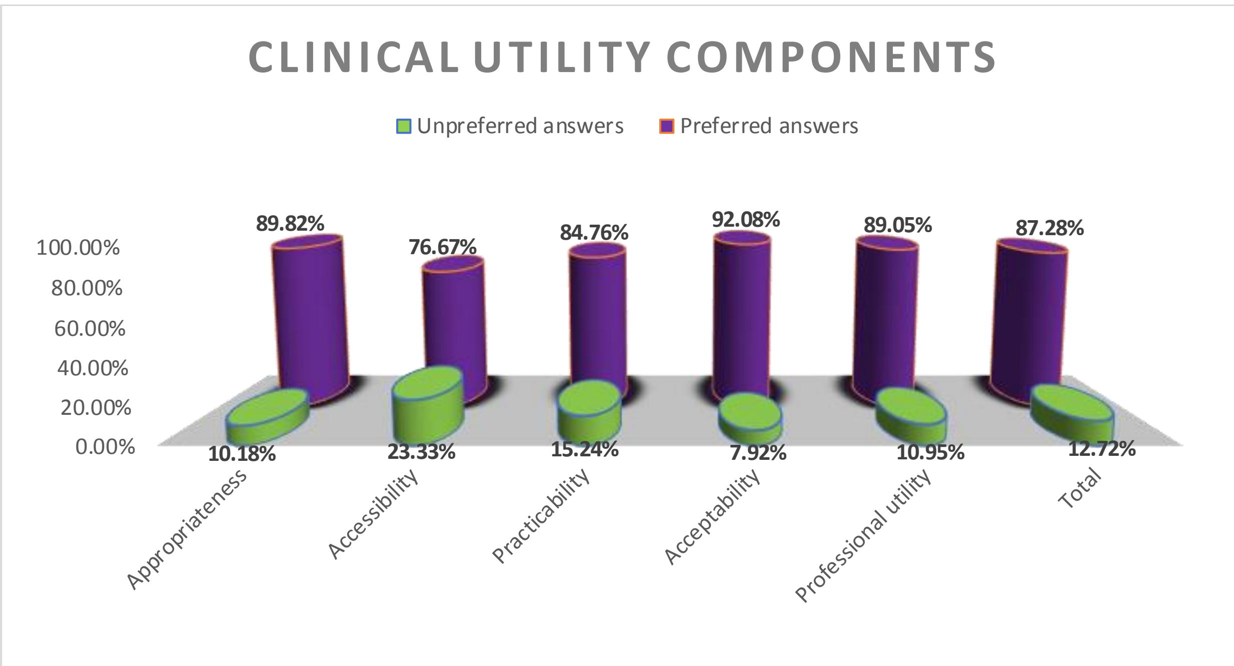
Table 5.14: The preferred responses and unpreferred responses per question (N=30) (cont.)

Nr	Question	Preferred response according to scoring	Preferred responses (n=30)	Unpreferred responses (n=30)
45	I think using the ICF code set would enable me to play an active role in advocating for the use of fall risk identification measures by audiologists.	Agree	**100% (n=30)**	0% (n=0)
46	In my opinion, this ICF code set could aid me in fulfilling my role of educating patients on how to reduce their fall risks.	Agree	**93.33% (n=28)**	6.67% (n=2)
47	I would be able to use this ICF code set to ensure continuity of care of my patients when they consult with other audiologists in the practice.	Agree	**100% (n=30)**	0% (n=0)
		Total* (n=240)	**92.08% (n=221)**	**7.92% (n=19)**
	Professional utility			
48	Using this ICF code set in my practice would not benefit my patients, as it would not enable me to provide a higher quality of service to them.	Disagree	**100% (n=30)**	0% (n=0)
49	I think using this ICF code set could assist me in educating the older adults I consult with regarding fall risk factors to potentially reduce their risk of falling.	Agree	**100% (n=30)**	0% (n=0)
50	This ICF code set is a desirable measure for identifying fall risk factors in older adults.	Agree	**100% (n=30)**	0% (n=0)
51	Using the code set would establish me as a leader in the field of vestibular audiology.	Agree	**53.33% (n=16)**	46.67% (n=14)
52	Using the code set and performing fall risk assessments could ensure more referrals to my practice.	Agree	**73.33% (n=22)**	26.67% (n=8)
53	I think this ICF code set could assist me in determining the factors that need further intervention.	Agree	**100% (n=30)**	0% (n=0)
54	By using this ICF code set, I would be able to implement further intervention strategies more easily than I would have been able to do without this code set.	Agree	**96.67% (n=29)**	3.33% (n=1)
		Total* (n=210)	**89.05% (n=187)**	**10.95% (n=23)**
	TOTAL ACROSS FIVE COMPONENTS	**(n=1620)**	**87.28% (n=1414)**	**12.72% (n=206)**

*Total = The total number of preferred responses for each clinical utility component

As indicated in Table 5.14, for all but two questions, namely Question 4 ("*I do not think using this ICF code set would increase the time spent on consulting with older adults*") in the Appropriateness component, and Question 23 ("*It is important to me that patients or medical aids should reimburse me for using this ICF code set during consultations – in addition to my usual procedures in the practice*") in the Accessibility component, the majority of the participants selected the preferred response. This resulted in a total score of 87% preferred responses across the five components. The results for each of the five clinical utility components are illustrated in Figure 5.1.

Figure 5.1: Results of the clinical utility components



As illustrated in Figure 5.1, the component with the highest clinical utility as indicated though preferred responses was 'acceptability', closely followed by 'appropriateness' and 'professional utility', while 'accessibility' scored the lowest clinical utility based on the participants' responses.

Next, the number of preferred responses was analysed per participant. A maximum score of 100% could be obtained if all the 54 questions indicated the preferred responses.

Table 5.15: Results of the preferred responses per participant (N=30)

Participant #	Preferred responses	Unpreferred response	Participant #	Preferred responses	Unpreferred response
1	74.07%	25.93%	16	92.59%	7.41%
2	90.74%	9.26%	17	96.30%	3.70%
3	98.15%	1.85%	18	83.33%	16.67%
4	90.74%	9.26%	19	92.59%	7.41%
5	81.48%	18.52%	20	87.04%	12.96%
6	92.59%	7.41%	21	88.89%	11.11%
7	72.22%	27.78	22	83.33%	16.67%
8	92.59%	7.41%	23	79.63%	20.37%
9	90.74%	9.26%	24	72.22%	27.78
10	77.78%	22.22%	25	90.74%	9.26%
11	96.30%	3.70%	26	92.59%	7.41%
12	83.33%	16.67%	27	94.44%	5.56%
13	88.89%	11.11%	28	88.89%	11.11%
14	92.59%	7.41%	29	81.48%	18.52%
15	83.33%	16.67%	30	88.89%	11.11%

The number of preferred responses for each participant ranged from 72.22% (Participant #24) to 98.15% (Participant #3), with a mean score of 87.28%. None of the participants had a higher score for unpreferred responses. Results indicated that the responses were comparable and no outliers were observed, with almost half of the participants (n=14) obtaining a score of ≥90%, eleven obtaining a score of 81 – 89% and only five participants scoring less than 80% (72 – 79%).

Next, the number of preferred responses in each component was calculated using the Kruskal Wallis test as a one-way analysis of variance to determine statistical significance. The Bonferroni adjusted *p*-value was calculated (p<0.005) and compared for significance (Table 5.16).

Table 5.16: Comparison of *p*-values for clinical utility component pairs

Component pair	***p*-value**	**Component pair**	***p*-value**
Appropriateness vs Accessibility	*p<0.0001***	*Accessibility vs Acceptability*	*p<0.0001***
Appropriateness vs Practicability	*p*=0.0188	*Accessibility vs Professional utility*	*p=0.0016**
Appropriateness vs Acceptability	*p*=0.3598	Practicability vs Acceptability	*p*=0.0070
Appropriateness vs Professional utility	*p*=0.7914	Practicability vs Professional utility	*p*=0.1775
Accessibility vs Practicability	*p*=0.0196	Acceptability vs Professional utility	*p*=0.3300

*Statistically significant on the 5% level of confidence: $p<0.05$

**Statistically highly significant on the 99% level of confidence: $p<0.001$

Based on these results, only three component pairs had clinically significant differences when the three components with the highest scores were compared. These components were Appropriateness, Acceptability and Professional utility, and the component that achieved the lowest score overall was Accessibility.

In addition, to determine whether the gain achieved in the clinical utility score was related to the experience of the audiologist or to whether they were conducting fall risk assessments, Fisher's Exact Test was conducted to determine significance (as was done in the previous section). A comparison was made between the mean score of the audiologists with 1 to 5 years' experience (mean score of 85.18) and those with 6+ years' experience (mean score of 87.80). The resulting *p*-value of 0.4287 indicated no significant difference between the mean clinical utility scores of the two groups based on their experience. This suggests that experience as an audiologist did not influence the participants' ability to identify the preferred responses for the five clinical utility components.

On the same basis, the mean clinical utility scores of the participants who routinely assess fall risk in their practices (mean score of 86.41) were compared to the scores of those participants who do not assess fall risk in their practices (mean score of 87.49). The *p*-value for this comparison was determined at p=0.7455, indicating no significant difference between the two groups, based on whether they conduct fall risk assessments or not. The finding confirmed that this variable did not influence the scores obtained in the clinical utility section.

5.5.6.4 Clinical utility: Discussion

The overall results and the high agreement to the questions posed in this section show that almost all the participants agreed that the developed ICF code set has clinical significance across the five components measured. The three components with the highest scores were appropriateness, acceptability and professional utility. Thus, the components that provided information about the ethical considerations of using the code set (acceptability), the effectiveness and relevance of the code set (appropriateness), and the benefit and value that using the code set had for both the HCPs and the patients (professional utility) were deemed the most critical by the participants in determining the clinical utility of the code set. The component with the lowest clinical utility score provided information about financial considerations regarding the code set (accessibility), which might change if the audiologists were to be reimbursed for using the ICF code set during consultations. Each of the five components are now discussed in more depth.

(i) Appropriateness

The appropriateness component specifically focused on aspects such as relevance and effectiveness (Smart, 2006). The 19 questions included in the appropriateness component make it the component with the most questions about the ability of the ICF code set to identify fall risk factors, its use in clinical practice settings, its application during consultations, its compatibility with other clinical measures, its effectiveness in referring a patient to other relevant practitioners, and finally, its meaningfulness (in other words whether it provides consequential information).

All the participants agreed that the ICF code set would enable them to identify fall risk factors in older adults more easily than without the use of the code set. This implies that the aim of the code set to identify fall risk factors in older adults was actually achieved. Most participants selected the preferred response for all the questions, except for one question, namely "*I do not think using this ICF code set would increase the time spent on consulting with older adults".* Time management is an important consideration, especially in private audiology practices where cost and reimbursement are key considerations (Taylor, 2019). A study by Tucker (2001) found that audiologists spend on average six to seven hours per day in patient consultations. Increasing the time needed with each patient could potentially have a negative impact on audiologists' workflow. Although the majority of the participants indicated that using the developed ICF code set would increase the time spent with each patient, they did not indicate that this would deter them from using it. In fact, the majority of the participants considered the extra time spent with each patient worthwhile. Furthermore, almost all the participants agreed that they would be able to implement the ICF code set in their routine daily practice and seamlessly integrate it with existing consultations, as they saw the code set as compatible with the use of other FRATs.

The participating audiologists were keen to use the ICF code set, and agreed that it equipped them with a standard tool to document fall risk factors in older adults. It also provided a common list of terminology to use when identifying risk factors and communicating them to other HCPs. One of the main strengths of the ICF that is often mentioned, is that it could promote a common, unifying international language between HCPs if it were to be widely adopted. Hence it would potentially facilitate communication and scholarly discourse across disciplines as well as across national boundaries, and it would stimulate interdisciplinary research, improve clinical care, and ultimately inform better patient care (Björck-Åkesson et al., 2010; Jette, 2006; Jette et al., 2003; Soh et al., 2020).

The use of the ICF code set furthermore presents to the audiologist a tool to discuss the relevant fall risk factors with their patients. Part of fall prevention and management in older adults is to identify and discuss the specific risk factors relevant to each patient and to suggest how these risk factors can be managed (Pfortmueller et al., 2014). By involving the patient in the process of identifying, decreasing and managing their own fall risk, they could be equipped to better handle these risks in their everyday life and consequently improve their HRQoL.

The ICF code set managed to provide the audiologists with meaningful information to enrich the clinical process of identifying fall risk factors and to use it as a unique and highly appropriate addition to the current measures they use in their practices.

(ii) Accessibility

The accessibility component is related to the cost of using the ICF code set in clinical practice and being reimbursed for using it during consultations – either by the patient or by their medical aid. In this section, six questions (three related to cost implications and three related to reimbursement) were asked to determine the ICF code set's accessibility to audiologists. The accessibility component scored the lowest overall rating, perhaps due to the fact that it consisted of the least number of questions (only six compared to the other components) and included one of the two questions (Question 23) where the majority of participants did not select the preferred response. In order to protect participants' privacy, they were not asked to indicate whether they were practising in the public or private sectors (which have quite different fee structures). A significant number of older adults in South Africa who do not belong to a medical aid have to make use either of public health care (Kelly et al., 2019) or of private health care, and bear the full cost of it themselves. In private health care, patients who consult with audiologists would typically belong to a medical aid scheme that would be responsible for payment of the consultation. In the public sector, patients who consult with audiologists often do not belong to a medical aid scheme and the services would either be completely free, or patients would incur a minimal fee based on their income. The discussion of accessibility (in terms of financial accessibility) should thus be interpreted against this backdrop.

In clinical practice, brief, inexpensive and easy-to-use measures are the most desirable (Swanenburg et al., 2015). Almost all the participants indicated that they would use the ICF code set if it was provided as a free resource and if using the code set would not increase the cost of their consultation fees. However, still the majority of the participants indicated that they would use the ICF code set even if they were not reimbursed by the medical aids. They all agreed that, considering that there was currently no procedure code for conducting a fall risk assessment, they would not ask their patients to pay for the ICF code set from their own pocket without reimbursement from their medical aid. More than half also indicated that it was important to them to be reimbursed for using the ICF code set to perform fall risk factor identification. One reason for this almost contradictory finding could be that recent changes in the suggested fee structures for the audiology profession as a whole highlighted the seemingly opposing goals of HCP practices – to provide selfless services to patients and simultaneously be a profitable South African health care business (Hunter et al., 2016). Audiologists have a responsibility to be transparent and ethical in all their dealings with patients (Republic of South Africa, 2009), but this does not mean that their practices may not be profitable. Reimbursement for services delivered is important, but it is ultimately a decision that each audiologist has to make for themselves, guided by their ethical responsibility. These results indicate the high integrity of the participating audiologists and their intention to do good in their professional capacity, namely to practise audiology in a beneficent way.

(iii) Practicability

The practicability component included 14 questions regarding the functionality (seven questions) and suitability (five questions) of the code set, as well as the need for training to be able to use the developed ICF code set (two questions). Functionality relates to whether the ICF code set met its goal of identifying fall risk factors in older adults, the intuitiveness of using the code set, as well as the audiologists' ability to obtain the code set. Suitability measured the audiologists' perceived fit of using the code set in clinical practice. It also determined whether further training was needed for audiologists to be able to use the code set in their daily consultations with older adults.

Although almost all the participants indicated that they regularly keep themselves informed about new developments and current research publications in the field of audiology, almost half of the participants admitted that they do not routinely search libraries for new measures or tools and do not feel they would be able to find this code set, once it has been made available for use. This could imply a need for education among audiologists about finding and using new resources, as measures such as the developed ICF code set would be published in academic journals. There is a demand on HCPs to critically review their skills and knowledge, and to continuously keep abreast of changes in practice and research in their field through CPD activities (Filipe et al., 2014). Currently, HPCSA requires practising audiologists to accumulate a specific number of CPD units per year by attending CPD activities to ensure that they sustain their knowledge and skills (HPCSA, 2016). There are no other guidelines about the type of CPD activities HCPs should be completing or the topics of these activities, since CPD is currently completely self-driven. HCPs can complete their CPD activities on any topic within their scope of practice (Filipe et al., 2014).

Besides having to continue their own professional development, researchers have the responsibility to communicate with professional boards and institutions to distribute new tools and to disseminate research that could assist HCPs in their clinical decision making and improve their skills and knowledge. By producing meaningful research and results that are applicable and directly to the benefit of others, basic discoveries can be used quickly and efficiently in clinical practice, benefiting not only HCPs, but also their patients (Fort et al., 2017). In this study, the ICF code set was made available not only to the audiologists who participated in the study, but also to

SAAA to distribute to their members, thereby increasing the number of audiologists who would be able to benefit from this research.

The participants agreed that the code set should be an integral part of an audiologist's scope of practice, which is in line with current literature indicating that audiologists have an integral role to play in the assessment of fall risk in older adults (Bassett & Honaker, 2016; Patterson & Honaker, 2014). Furthermore, the participants agreed that the code set should be used routinely with every older adult they consult with in their practice. One of the aims of the code set is to identify fall risk factors in older adults, prior to conducting additional assessment and employing intervention strategies. The participants' responses indicated that the code set is a suitable measure to meet this goal.

The last aspect addressed in the practicability component is the need for training in the effective use of the ICF code set. The biographic information obtained from the participants revealed that the majority of them had limited knowledge about the ICF and its accompanying code /core sets, and consequently they have not used it in their practice. The ICF should be operationalised in audiology to be used by audiologists as a tool and as part of their clinical assessments (Van Leeuwen et al., 2020). For example, despite the wide availability of the ICF core set for hearing loss (Granberg et al., 2014), it not known how many audiologists make use of this core set in clinical practice.

Despite their limited knowledge of and exposure to the ICF, all the participants found the code set easy to use and did not consider it too complex to be used effectively in everyday practice. This finding may well be attributed to the universal language of the ICF and the practical use of a code set to document a patient's functioning in a way that is clear and easy to understand (Pan et al., 2015).

(iv) Acceptability

The acceptability component is related to eight questions about ethical considerations and explores the audiologist's sensitivity to potential ethical concerns in using the ICF code set, as well as the ethical use of the ICF within their scope of practice. In this section, the acceptability of the ICF code set was the component that received the highest overall score. Four fundamental professional ethical principles were included in this section, namely autonomy, non-maleficence, beneficence and justice (Jahn, 2011). As part of the CPD points required for audiologists, a specific number of these points should specifically relate to ethics in the profession, to ensure that their ethnical sensitivity skills are developed alongside practical and clinical skills.

Autonomy of the patient requires the absence of controlling actions by HCPs or other parties, as it is a norm that obliges HCPs to respect their patients' informed decisions and their right to be self-determining and direct their own lives (Jahn, 2011; Osamor & Grady, 2018). In respect of this principle, the participants had contrasting opinions. The majority felt that each patient should give informed consent prior to the ICF code set being used to perform a screening of fall risk factors during the consultation process. At the same time, a large percentage disagreed with the notion that each patient should be given a choice whether they want the audiologist to use the ICF code set during the consultation process, as it forms part of the audiologist's clinical judgement. One reason for these seemingly contradictory answers could be that the participants evaluated each question on its own merits and answered what they believed to be the correct response for each individual question. A type of socially desirable response (also known as the Hawthorne effect) might thus have occurred (Sedgwick & Greenwood, 2015).

Multiple factors influence HCPs' decision making and clinical judgement, one of which is doing the best for the patient (the beneficence principle) based on the HCP's own professional experience and training (Wancata & Hinshaw, 2016). The audiologist could decide to include fall risk screening as an additional measure in their practice, to be administered as part of the routine test battery normally used in their practice for audiological assessment. Such battery typically includes pure tone and speech testing as well as immittance measurements, for which the patient gives informed consent as a whole – not for each individual test or procedure performed. Thus, although each procedure is still explained to the patient during the consultation process, specific consent to perform each test or assessment is not required from the patient and no additional informed consent for using the code set is needed for each patient.

Non-maleficence requires from HCPs not to cause harm, pain, suffering or offense to a patient and not to deprive patients of their quality of life (Jahn, 2011). All of the participants agreed that using the ICF code set would not cause harm to their participants, whereas not using the code set could potentially cause harm. As indicated before, although informed consent is needed prior to consulting with patients, the selection of clinical tests included in a standard test battery is largely left to the audiologist's discretion and clinical judgement. By not screening their patients for fall risk factors, audiologists could potentially cause harm as these patients might have decreased their own risk if they had been made aware of the factors that could increase their fall risk. Identifying fall risk factors during the routine screening of all older adults constitutes an important starting point in the intervention and prevention process and could well serve to decrease falls and fall risk in older adults.

As stated earlier, the beneficence principle obliges HCPs to act for the benefit of their patients and to actively do good (Snape et al., 2014). This corresponds with the previous statements that audiologists have an obligation to educate their patients on potential fall risk and to suggest appropriate prevention measures. Several fall risk prevention programmes have been developed (Miake-Lye et al., 2013). The ICF code set could be used as a starting point for audiologists to identify fall risk factors in older adults and to discuss these factors with their patients as part of their obligation to improve the latter's HRQoL. All of the participants agreed that using the ICF code set would assist them in actively reducing fall risks, increasing HRQoL in the older adults they consult with in their practice, as well as advocating for the use of fall risk identification measures by other audiologists.

The principle of justice obliges HCPs to distribute resources, care and effort equitably to each patient they consult with and to ensure the continuing of care of these patients (Jahn, 2011). Almost all of the participants indicated that the code set could aid them in fulfilling their role of educating patients regarding their fall risk. Audiologists should not only offer a variety of treatment options related to hearing disorders, they should also educate their patients on possible causes, interventions and methods of preventing balance and dizziness disorders, including fall risk, as indicated in their scope of practice (ASHA, 2018; HPCSA, 2016; Republic of South Africa, 2009).

All the participants agreed that they would be able to use the code set to ensure continuity of care to their patients when consulting with other audiologists in their practice. This again speaks to one of the main strengths of the ICF, namely its use as a common language between HCPs to transcend individual differences between professional disciplines.

(v) Professional utility

The last component in the clinical utility section focused on the professional utility of the developed ICF code set. This includes the benefits and value of the code set to both the audiologist and the patient, as well as the use of the code set to guide further assessment and intervention strategies. The participants all agreed that using the code set would benefit their patients, as it would enable them as HCPs to provide a higher quality of care, to educate their individual patients about the fall risk factors applicable to them. By seeking to understand fall risk factors through a biopsychosocial lens, the ICF enables HCPs to use the interactions among the four ICF domains (body function domain; body structure domain; activities and participation domain; contextual domain [environmental and personal factors]) to explain to patients where their specific risk factors are the most prominent and indicate a higher risk for injurious falls (Covington et al., 2019).

Just over half of the participants indicated that the use of the developed ICF code set would help to establish them as a leader in the field of vestibular audiology. Audiologists are in the unique position to evaluate and diagnose vestibular disorders, including fall risk, and advance the profession of audiology through leadership, advocacy and education in vestibular disorders (ASHA, 2018; Bassett, 2018). By using the ICF code set as a screening measure for early identification of fall risk factors in older adults, audiologists could establish a baseline of risk factors for each patient they consult with and use this information to plan further assessment and management of those patients who do have a fall risk. Considering that the majority of the participants did not routinely screen for fall risk factors or conduct vestibular assessments in their practices, their perception of using the ICF code set to establish themselves as leaders in the field of vestibular audiology was to be expected. Although an audiologist who merely uses the ICF code set without conducting any further vestibular assessments would not in itself be considered a leader in the field, using the code set would be a rather innovative manner to expand their own skills and improve their patients' HRQoL. The results of this study however suggest that audiologists were fully aware of the fact that it would take more than basic knowledge and skills to be regarded as a leader in the field.

The participants agreed that the code set would assist them in determining fall risk factors that need further assessment or intervention measures. They were able to identify fall risk factors more easily with the code set, which was a positive result, especially considering that the majority of the participants did not have extensive experience in vestibular audiology. According to the estimate by the United Nations World Population Ageing Report (United Nations, 2017), the global population of older adults 70 years and older will triple between 2017 and 2050, with older adults projected to account for one in five people globally. Taking this projection into account, it is essential for audiologist to assist older adults not only to identify their specific fall risk factors, but also to know how to address and decrease these risks and manage this ageing population. The results obtained during this study confirm that the developed ICF code set has a high professional utility. It can be used by audiologists with or without experience in vestibular audiology to identify fall risk factors in older adults and then refer them appropriately as needed.

(vi) Overall clinical utility

Clinical utility is of central importance to personalised health care and is the minimum standard of care to ensure a positive outcome for patients. It adds value to the patient's overall HRQoL and ability to seek effective treatment or preventive strategies as needed (Lesko et al., 2010). By proving to have high clinical utility, this ICF code set could be used by audiologists to identify fall risk factors in older adults, guide their further assessment and referral strategies, and so potentially improve their HRQoL. Results indicate that audiologists were willing to use the code set even if it increased the time they spend with each patient. It provided them with a means to discuss the relevant fall risk factors with their patients and educate them on these risk factors. The developed ICF code set was deemed functionable and suitable to be used in everyday clinical practice, with minimal training required to effectively use the code set. By using the developed ICF code set, audiologists could actively do good and act to the benefit of their patients. Both audiologist and patient could benefit from the use of the code set, as early identification of fall risk factors and the implementation of appropriate intervention strategies could ultimately increase the patients' HRQoL.

5.6 Conclusion

Chapter 5 focused on administering the ICF code set to determine its clinical utility in terms of its appropriateness, accessibility, practicability, acceptability and professional utility for HCPs. This chapter reported on Phase 3, the final and quantitative phase of the study. The results indicate that the use of the developed ICF code set increases audiologists' ability to identify fall risk factors and make referrals to other HCPs. The ICF code set was shown to have high clinical utility specifically as related to appropriateness, acceptability and professional utility. Two key recommendations from this phase are to educate audiologists as part of CPD in the identification of fall risk factors in older adults, and to expand this study by involving a larger sample.

The next chapter concludes the thesis and integrates the results obtained across the three phases of the study. It also highlights the contribution of the study, provides a critical evaluation thereof and suggests future research possibilities.

CHAPTER 6: INTEGRATION OF RESULTS AND CRITICAL REFLECTION ON THE THESIS

In this final chapter of the thesis, the overall purpose of the research study is reviewed and the clinical implications of the results obtained during the study are discussed. Thereafter, critical reflection is used to explore the strengths and weaknesses of the research process, followed by a discussion of the value and contribution of the thesis to the field of fall risk. The chapter concludes with recommendations for future research emanating from the results of this study.

6.1 Purpose of the Research Study

The overall purpose of this study was to develop an ICF code set for fall risk factors in older adults as part of preventive health care to reduce falls and fall risk in this population. Such a code set directs HCPs in the identification of fall risk factors as the first step towards their assessment and management in a multidisciplinary health context. Various HCPs – medical practitioners (general practitioners and ENT specialists), nurses, podiatrists, physiotherapists, occupational therapists and audiologists – are involved in fall risk factor identification and in the assessment and management of fall risk in older adults. The developed ICF code set includes fall risk factors gathered from different sources (i.e., the perceptions of HCPs, the perceptions of the older adults themselves, as well as the literature surrounding fall risk assessment) via a narrative literature review (Chapter 2) and a scoping review of existing FRATs (Chapter 3). By consulting experts in the field, this code set was condensed to a manageable list of codes critical to the identification of fall risk factors in older adults. The final ICF code set was administered to a single group of HCPs, namely audiologists, to determine its clinical utility in clinical practice.

An ICF code set can serve as a benchmark for HCPs for the early identification of fall risk factors in older adults. When this is done from the comprehensive perspective of the ICF, not only the body's impairments are taken into account, but also some psychological factors and environmental factors, in conjunction with difficulties in participation and in performing activities (Kus et al., 2012). The aim of the developed ICF code set is to guide HCPs in three respects: to identify fall risk factors in older adults; to determine the areas in which diagnostic assessment and/or intervention is needed; and to determine the areas that require referral to other HCPs. By using the ICF to describe and classify fall risk factors in older adults, the strengths of the ICF as listed below were incorporated into the code set:

- The ICF is a universal language that transcends professional boundaries.
- It includes all aspects related to the individual, resulting in a holistic view of the individual's functioning (Maxwell et al., 2018; Selb et al., 2015; World Health Organization, 2002).
- It provides an efficient and easy way for HCPs to document fall risk factors applicable to all older adults they consult with in clinical practice.

Given the negative impact of a fall on older adults, HCPs must be equipped with a measure that is practical for everyday use (Swanenburg et al., 2015). The developed ICF code set fulfils this purpose.

6.2 Summary of Results and Relevance to the Process of ICF Code Set Development

6.2.1 Phase 1

The overall aim of Phase 1 was to obtain a list of ICF codes in the form of a preliminary code set for identifying fall risk factors in older adults. This was done by searching the literature and by conducting focus groups with older adults and HCPs respectively.

The data for Phase 1 was gathered through a systematic review of 43 current FRATs that provided a literature perspective, as well as two sets of focus groups with different stakeholder groups. The first set of sessions was conducted with a total of 36 older adults (spread across three focus groups) to obtain a target population perspective. Thereafter, two focus groups with a total of 18 HCPs were conducted to obtain a clinical perspective. The factors that emerged from these three data sources were mapped to the ICF, and then merged and consolidated to develop a preliminary code set.

When considering the different domains of the ICF, more than 90% of the 43 FRATs included in the systematic review focused on body function and structure, while only one FRAT focused mainly on the activities and participation domain. The almost 500 fall risk factors included in these FRATs were linked to the ICF, resulting in almost double the number of ICF codes (952

ICF codes). When the body function and structure domains were combined, these two domains together accounted for almost two thirds of the codes (40% and 25% respectively), with the remaining third being made up by the activities and participation domain (28%), and the environmental and personal factors domain (7%). All but four FRATs focused mainly on the body function and structure domain, suggesting that the body's physical structures and abilities constitute the main point of failure that increases fall risk. In contrast, current literature indicates that other factors outside the body – such as environmental factors – could have a significant impact on an older adult's fall risk (Klenk et al., 2017). By focusing on the body's structures through the narrow lens of the medical model, one could inevitably neglect some factors. When a wider lens such as the biopsychosocial model of assessment (e.g., the ICF) is used, there is no limitation on the conceptual thinking about identifying fall risk factors in older adults. To elaborate on the fall risk factors identified in the literature perspectives, additional perspectives were explored, such as those of the target population and of the HCPs who consult with this population. By shifting the focus away from the cause towards impact, the fall risk factors that affect older adults could be identified in a holistic way. The perspectives from several sources were needed to ensure a more complete picture of this health condition (de Clercq et al., 2020a).

During the three focus groups with the target population – older adults themselves – their perspective on fall risk factors was in stark contrast to the literature perspective. Although they still considered physical impairments and an ageing body as a point of failure, their focus was on their ability to participate in activities and the role the environment plays in their ability to reduce their own fall risk. The older adults were more concerned about the impact falls could have on their ability to participate in their daily activities than about their own physical limitation that could potentially cause a fall. This conclusion coincides with findings in recent studies about the attitudes and beliefs of older adults regarding falls (Gustavsson et al., 2018; Stevens et al., 2018). The older adults themselves were aware of their own fall risk and were able to identify several strategies that they use to reduce their own risk. Examples of such strategies are holding on to railings when climbing stairs, using walking aids when going to unfamiliar or crowded places, and watching out for smalls steps or uneven surfaces. The older adults also indicated the importance of regular health screenings and check-ups to ensure early identification of possible health problems, and they suggested that fall risk screening should be included in such check-ups when they visit their physician. They were excited about the idea of a fall risk factor programme or handout for them to learn more about potential fall risks and how to reduce their own risk.

Literature has shown that fall prevention interventions, for example home-based exercise programmes, can effectively reduce the number and rate of falls by reducing the manageable fall risk factors (Mittaz Hager et al., 2019). However, the proven fact that older adults' exercise adherence declines over time should also be considered in fall prevention programmes. Involving the older adults themselves would allow for more targeted assessment and intervention methods, as older adults are more likely to conduct home modification and reduce their personal fall risk when the focus is on their unique needs and factors they can control (Dellinger, 2017). The focus groups with the target population gave older adults as participants the opportunity to tell their stories in a relaxed group situation and to share their personal opinions and perceptions. Although most of the participants perceived falls to be generally age related, all of them agreed that they needed information on how to reduce their own risk of falling. They were well aware of how lower risk would increase their own HRQoL and allow them to continue participating in activities of daily living for as long as possible. Taking note of older adults' perspectives on fall risk factors could lead to greater involvement and buy-in from them during the assessment and intervention process, as older adults who believe that HCPs are listening to their concerns are more likely to participate in the intervention process (McMahon et al., 2011). HCPs thus have an important role to play in the early identification of fall risk factors in older adults, and their perspectives are needed to develop a measure that they can use in preventive health care.

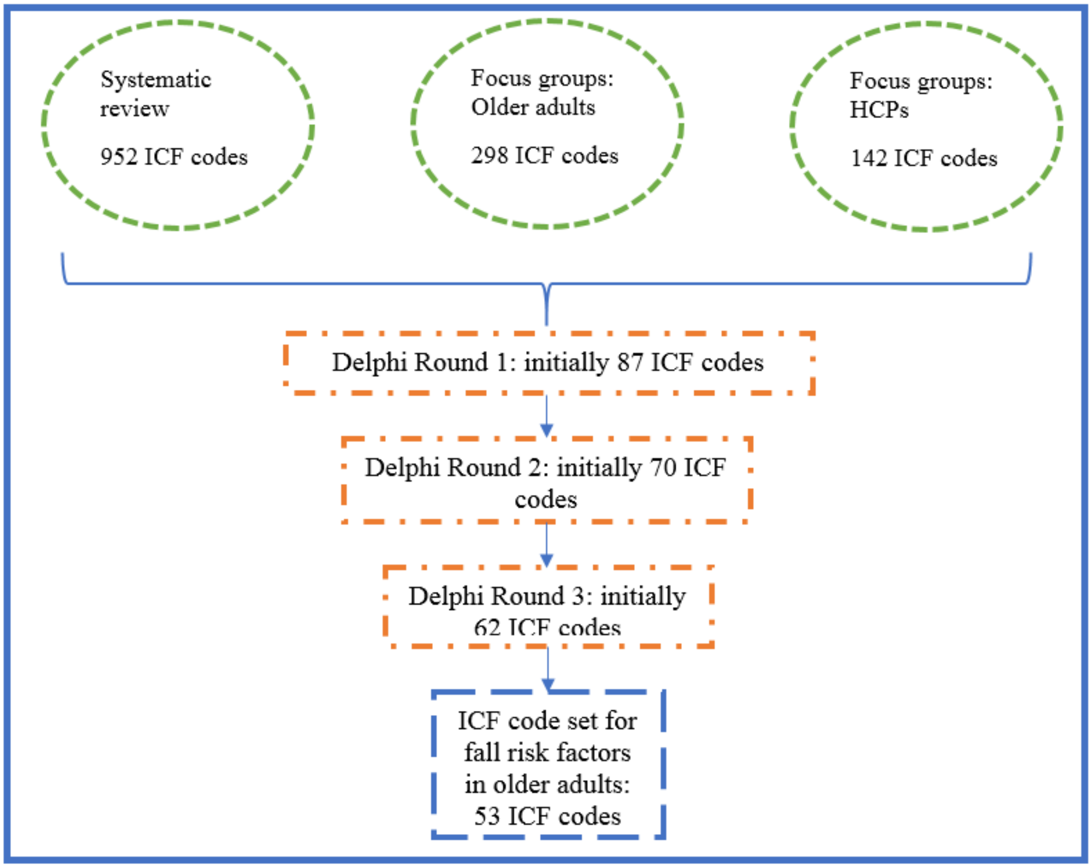
To explore the clinical perspective, two focus groups were held with various HCPs, including ENT specialists, GPs, nurses, podiatrists, physiotherapists, occupational therapists and audiologists. As expected from a medically oriented group, the results indicated a strong focus on the ICF domain of body function and structure as the point of failure, resulting in increased risk. By comparing the literature perspective to the clinical perspective, results suggested that the HCPs' knowledge of fall risk factors was in line with contemporary knowledge in this field as the fall risk factors obtained from the FRATs were similar to those obtained from the HCPs. Not only were the HCPs' knowledge up to date on fall risk factors, they also mentioned two additional, relevant ICF codes that were not captured during the literature perspective, namely "muscle power functions" and "mobility of joint functions". The importance of including their perspective was highlighted by their being aware of some practical methods of identifying fall risk factors, which led to the identification of these two additional ICF codes. The two codes were included in the ICF code sets and presented to the Delphi panel for evaluation. If the focus groups had not involved HCPs, these codes would not have been included in the code set. According to Howcroft et al. (2013) and Phelan et al. (2015), early identification of fall risk factors, combined with appropriate referrals by HCPs, could reduce older adults' fall rate by up to 24%.

The HCP focus groups revealed important information to add the clinical perspective to the compilation of this fall risk factor identification ICF code set. By including three sets of perspectives – those described in literature, those of the older adults themselves, as well as those of the HCPs – the study makes a unique contribution to the field of gerontology and to older adults as a vulnerable population. It explores fall risk from different perspectives and links these perspectives to the ICF to obtain ICF codes (de Clercq et al., 2020a, 2020b, 2020c). Once the initial code set had been developed (based on the fall risk factors identified in Phase 1), the next step was to develop a manageable list of codes that HCPs could use in their clinical practice.

6.2.2 Phase 2

The main aim of Phase 2 of the research study was to reduce and refine the list of ICF codes developed during Phase 1. This was done through a formal consensus process (a Delphi process) to determine which codes experts consider critical in the identification of fall risk factors in older adults. A three-round modified Delphi process was conducted involving several experts in fall risk. The Delphi process started with 87 ICF items in Round 1 and, by following a systematic reduction process, 53 ICF items remained at the end of Round 3 (Figure 5.1).

Figure 6.1: Outcome of the modified Delphi process



The modified Delphi process involved both ICF and fall risk experts to establish a distilled list of ICF codes critical for the identification of fall risk factors in older adults. By developing a manageable ICF code set, the use of the ICF in clinical practice could be increased. The consensus process started with a large number of codes obtained from Phase 1 that were systematically reduced. The experts were allowed to consider all the ICF codes relevant to fall risk in older adults and then to distil the codes to only those that are critical. By including the ICF codes obtained from both the older adult and HCP focus groups, and not only those obtained from the literature, the list was condensed to an ICF code set that was also relevant to community-dwelling older adults. This was a necessary step to ensure that the developed ICF code set would be not only relevant, but also critical to the identification of fall risk factors in older adults and could be used by various HCPs in clinical practice. The clinical utility of the ICF code set was determined by administering it to a group of HCPs.

6.2.3 Phase 3

The 53 ICF items that remained at the end of Phase 2 were presented as an ICF code set for use in the third and final phase of the research study. The main aim of Phase 3 was to administer the final ICF code set in order to determine its clinical utility. Results showed that the audiologists' overall clinical experience scores increased when they used the ICF code set and that the ICF code set had high clinical utility in three of the measured areas (i.e., appropriateness, accessibility and professional utility). It was encouraging that neither the audiologists' years of experience nor their experience in routine vestibular testing had any influence on their ability to answer the clinical application questions while using the ICF code set. This implied that the ICF code set could also be useful to other health care disciplines besides audiology.

In Phase 3, the barriers to conducting vestibular testing and identifying fall risk (cost; availability of equipment; training; confidence in conducting the tests; scope of practice), which were highlighted by the participants' responses, were shown to have a significant impact on the services rendered to older adults in both the private and public health sector. Addressing these barriers could increase the knowledge and confidence of audiologists and potentially enable them to identify – much earlier – more older adults who have vestibular dysfunctions and associated fall risks.

The clinical utility components that provided information about the ethical considerations of using the code set (acceptability), the effectiveness and relevance of the code set (appropriateness), and the benefit and value of using the code set to both HCPs and their patients (professional utility) were deemed the most critical by the audiologists. The component with the lowest clinical utility score (compared to the other components) was related to financial considerations of the code set (accessibility). This score would well change if audiologists were to be reimbursed for using the ICF code set during consultations.

Albeit not statistically significant, the results did show that the use of the ICF code set increased the audiologists' ability to identify fall risk factors and make suitable referrals to other HCPs. The participants agreed that although using the ICF code set would increase the time spent with each patient, they would be able to implement the ICF code set in their daily practice and integrate it with their existing consultation and assessment processes. Even if not reimbursed for using the code set, the HCPs indicated that they would still use it to assist their patients and potentially improve their HRQoL. The use of an ICF code set should thus become part of audiologists' routine clinical screening for fall risk factors in the older adults they consult with, as it may well enhance preventive care. It could also increase the awareness of older adults about their own fall risk factors and alert the multidisciplinary team involved in managing this population. Using the code set would assist HCPs to identify fall risk as early as possible, and to refer at-risk older adults to other professionals for assessment for those factors that are not within their scope of practice. Such collaboration could aid in the seamless integration of health care services between professionals.

Finally, the results of Phase 3 indicate that the ICF code set could be used by audiologists with or without vestibular experience. It is an easy and cost-effective manner in which audiologists could increase their service offering and potentially improve their patients' HRQoL. An important recommendation emerged during this phase, namely the need to educate audiologists on their scope of practice and the important role they have to play in the preventive health care they are able to provide to this population. A recommendation to expand the study to a larger sample size was also made.

6.3 Clinical Implications and Contributions

Firstly, the study findings imply that this newly available measure for early identification of fall risk factors in older adults could increase audiologists' situational awareness regarding fall risk factors and appropriate referral strategies. There is a need for HCPs to be aware of and knowledgeable on how they can provide preventive and educational care for their patients, which could assist in improving the latter's HRQoL. Two of the main focus points of the discussions with the older adults were their HRQoL and the activities older adults are involved in during their everyday life (which they knew could increase their fall risk). By explaining the relevant risk factors related to presbystasis (age-related balance problems) in older adults and how this increases their fall risk, the older adults could be empowered to reduce their own risk while still actively participating in the activities that are important to them. This was confirmed during the focus groups with older adults, when the participants indicated that despite knowing that there were risks involved, they were not willing to reduce their participation and activities to reduce their own fall risk. Instead, they would rather learn to manage such risk and continue to participate in their daily routines.

The physiotherapists, audiologists and occupational therapists in the focus groups believed that an increase in activities would reduce their patients' fall risk. This seems somewhat of a conundrum, as strength-based activities would increase older adults' muscle strength and a recent systematic review indicated that physical exercise interventions have the potential to significantly reduce fall rate and risk in healthy older adults (Hamed et al., 2018). In contrast, an increase in daily activities – not specifically exercise-based activities – can increase older adults' fall risk as it provides more opportunities for them to fall, especially if they move in unfamiliar environments or already have a fear of falling (Morrison et al., 2016; Young & Williams, 2015). This is an important factor that HCPs should consider when advising older adults on their risk of falling and attempting to reduce such risk through preventive measures. HCPs should be alerted to their role in preventive health care for older adults at risk for falls, as well as in the referral of at-risk patients to other HCPs (when fall risk factors are not within their own scope of practice). This also implies the need for HCPs to be aware of their own scope of practice as, concerningly, not all the ENT specialists or the audiologists who participated in this study agreed that fall risk assessment or screening was within their scope of practice. Preventive health care and early identification of fall risk factors in older adults can only be successful as a multidisciplinary approach. By not being aware of one's own scope of practice, HCPs could inadvertently limit their own ability to provide preventive health care to their patients.

Secondly, the study provides a useful measure for HCPs to identify and document fall risk factors in older adults they consult with, in line with the ICF's approach towards health care in the different domains (i.e., body function and body structure; activities and participation; contextual factors). By equipping HCPs with a measure that can be utilised in clinical practice when consulting with and screening older adults, this study succeeds in bridging the gap between research and clinical application by strategically aligning the goals of the research study and the clinical applications that stem from the research (Fort et al., 2017). The outcome of the study (developing an ICF code set for fall risk factors in older adults) provides audiologists with the necessary information for early identification of fall risk factors in older adults and referral to other HCPS as needed. Hence they can be actively involved in reducing and even preventing future falls in this population. StatsSA (Statistics South Africa, 2020) estimated the mid-year population of 2020 at 59,62 million in South Africa, with 5,43 million people (9.1%) aged 60 and over. Although currently a relatively small percentage of the population, it is estimated that this figure will double by the year 2050. Globally, it is estimated that the proportion of older adults will have increased by 16% by 2050, resulting in one in six people in the world being 65 years old or older (United Nations, 2017). These projections clearly highlight the importance of early identification as a critical component of preventive care to the elderly. All HCPs who consult with this population should be involved in early identification, as older adults would more readily adopt a preventive measure suggested by their HCP if it is practical and they feel it can increase their HRQoL (Heart & Kalderon, 2013).

Thirdly, the developed ICF code set is a measure that could guide HCPs to determine the areas in need of assessment and intervention. Concerningly, this study found that the majority of the HCPs (especially those who did not conduct any of the assessments themselves), did not know to whom they should refer patients who present with vestibular symptoms, including fall risk. This indicates a need for education among HCPs, not only on how to identify patients with a fall risk, but also on how to refer them to relevant HCPs who could assist in their assessment and management. By using the ICF code set as the first step in this process, HCPs could identify the fall risk factors relevant to each patient they consult with. If they are able to assess the indicated intervention needs, they could refer them to the appropriate HCPs.

Fourthly, some of the audiologists who participated in Phase 3 of the study believed that special training in vestibular assessment was needed to enable them to conduct assessments for fall risk, vertigo or dizziness in older adults and to use formal assessment tools such as FRATs. The results of the study indicated that audiologists, regardless of their experience in vestibular assessment, would be able to use the developed ICF code set to identify fall risk factors in older adults. The code set would also enable them to appropriately refer the patients who need additional assessment in areas that fall outside their scope of practice. Not all HCPs who consult with older adults on a regular basis have training or experience in identifying fall risk factors in older adults, despite the fact that falls occur at least once annually in 29% of younger-old community-dwelling adults (65 to 75 years old) (Ganz & Latham, 2020). This was confirmed in the current study as the HCPs in the focus groups indicated that although most of them regularly consult with older adults who complain of dizziness, vertigo or even have a history of falling, they were not always sure how to assess vestibular symptoms, including fall risk. One ENT specialist who participated in the study mentioned that although he would prescribe medication, he did not conduct specific vestibular assessments. Using the ICF code set to identify fall risk factors in older adults (even if the HCP did not conduct a vestibular assessment), would be a first step in the early identification of fall risk factors in this population.

In conclusion, it has emerged from this thesis that most audiologists were not routinely searching for new measures, tools or research in their clinical field. They also did not request more information on the clinical use of the ICF or on fall risk assessment, which may imply a lack of initiative to expand their own knowledge and skills. HCPs in South Africa are obliged by the HPCSA to expand their own professional development by continuing they own education and keeping up to date with research in their field (French & Dowds, 2008). Furthermore, HCPs who continually add and implement additional tools or measures in their practice (based on current research and best practice guidelines) have the potential to increase their patients' HRQoL by including the latest health care measures in their treatment (Price & Reichert, 2017). One such measure would be the ICF code set that was developed during this study. It could be distributed to all HCPs via the HPCSA or through profession-specific organisations, such as SAAA, and the code set and training on its use could be presented to HCPs as a CPD activity. Thus, HCPs would not have to search for potential measures independently and they could benefit from the research in hand. The use of this ICF code set can serve to expand HCPs' skills and ability to assess patients in a more holistic manner, and it could empower them to conduct further research on the effective use of ICF code sets to benefit their patients.

6.4 Evaluation of the Study

In this section, the strengths and limitations of each of the three methodological phases of this study are examined to provide a comprehensive picture of the research conducted. Overall, an important strength of this study was its contribution to the methodological process related to the compilation, evaluation and administration of a new ICF code set, so as to potentially satisfy a specific clinical need, namely the early identification of fall risk factors in older adults. By using an exploratory, sequential, mixed method research design with three distinct phases, the researcher was allowed not only to develop an ICF code set by gathering items from the literature, but also to strengthen this approach by using three different data sources to develop the initial code set. Thereafter, the Delphi process was used to obtain consensus on the ICF codes to be included in the code set, as well as to condense the list of codes to a manageable number of codes that HCPs can use in clinical practice. In addition, this study incorporated the guidelines for ICF core set development as set out by the ICF Research Branch (Selb et al., 2015) (see the detailed description in Table 3.2).

Furthermore, the current study expanded the traditional approach towards core set development that typically involves only the exploration, compilation and evaluation of ICF code set items (Selb et al., 2015). This was done by adding an administration phase of the developed ICF code set, as well as attaching a clinical utility component to the code set. Despite the fact that adding a phase was time-consuming, it greatly enhanced the quality of the research, as did the expansion of the clinical utility component to include professional utility. Traditionally, clinical utility is comprised of four components (appropriateness, accessibility, practicability and acceptability), but adding the professional utility component enabled the researcher to gauge the perceived benefit and value of the ICF code set for audiologists (potentially for HCPs in general) as well as for their patients.

6.4.1 ICF code set sampling and item development

The strength of Phase 1 lay in the number and variety of data sources included. Data was gathered from the literature and from key stakeholders involved in fall risk in older adults, namely the older adults themselves and the HCPs involved in fall risk screening of older adults.

Firstly, the ICF code set that emerged gave a comprehensive, holistic account of the factors related to fall risk in older adults. It also provided the key themes relating to older adults' view on falls, which could be used by HCPs to provide specific preventive measures that address their views and concerns about falls. Two additional ICF codes that were identified from the fall risk factors mentioned by the HCPs had not been identified earlier and therefore expanded the current list of codes from the literature. The fact that older adults also mentioned unique personal factors that had not been identified in either the literature or by the HCPs confirmed the need to consider the perspectives of older adults as primary stakeholders. By obtaining data from all these different sources, the researcher did not merely gather known factors as depicted in the literature, but was able to expand current knowledge on the relevant factors that HCPs should consider when screening for fall risk in older adults.

Secondly, by following this design, all three data sources included in Phase 1 contributed equally to the sampling and development of the code set. Moreover, they all provided unique divergent perspectives and each source provided some fall risk factors that were not obtained from any of the other sources. The fact that several of the fall risk factors were obtained from all three sources indicates the importance of these factors according to the different perspectives. This contributed to the richness of the qualitative data obtained and provided a holistic picture of the relevant fall risk factors. The eventual ICF code set combined the factors obtained from a single source and those obtained from more than one source, resulting in a comprehensive code set (85 ICF codes and five personal factors) that had all three perspectives represented in each of the ICF domains.

The first limitation of Phase 1 involved the fact that not all the FRATs identified during the literature review were included, but only those that met the inclusion criteria. It could thus be argued that some factors were not included in the initial list of ICF codes either. However, the researcher is confident that this aspect did not impact negatively on the data, as data saturation was obtained from the included FRATs.

The second limitation involved the HCP focus groups. Most of the HCPs were very time conscious and some of those who had been invited to participate and who had confirmed their attendance, did not attend the focus groups, due to medical emergencies. Mobilising the relevant HCPs (from both the public and private sector) to attend the focus groups was time consuming and provided logistical difficulties. As HCPs' first priority is to attend to their patients, the focus groups were unfortunately less important when time constraints arose. Perhaps an alternative format, such as an asynchronous online focus group, would have yielded more participants. The discussion could possibly also have been moderated differently by adding more probing questions to allow for a more in-depth discussion of the fall risk factors mentioned. In contrast to the older adults, the HCPs were more inclined to simply list all the relevant factors than to discuss why they deemed them important, or how they used the mentioned factors to determine fall risk in their patients. A more robust discussion could have benefited the HCPs who attended the focus groups and could have served as a learning opportunity for those who had less experience in fall risk assessments.

The third limitation relates to the different stakeholder groups from whom data was gathered during Phase 1. Although the perspectives of the older adults themselves and the HCPs were solicited, the perspectives of the significant others and/or family members of older adults who have a risk of falling were not obtained. The significant others and/or close family members of older adults could have a different perspective on how fall risk affects their loved ones and on the specific fall risk factors that should be addressed to reduce their risk.

6.4.2 ICF code set evaluation and item reduction

The design strength of Phase 2 was the fact that two different participant groups were used, which enhanced the rigor of the process. First, a pilot study was conducted with participants specifically knowledgeable on and experienced in the use of the ICF, regardless of their experience in fall risk. The ICF experts evaluated each code's description and examples, and refined the initial code set to align the individual codes with the intention of the ICF and be specific enough for HCPs to easily understand each code's meaning. Next, for the main study, fall risk experts evaluated and condensed the developed ICF code set to identify the codes critical to the identification of fall risk in older adults. As each code contained the ICF description as well as the examples as evaluated by the pilot study, the HCPs were able to easily understand each code's meaning, regardless of their level of experience in using the ICF. By drawing on the knowledge of the ICF experts as well as the fall risk experts, the ICF code set was developed in line with the intention of the ICF and made relevant specially to fall risk in older adults.

The second strength of Phase 2 resulted from the implementation of the rigorous Delphi process, rather than a more informal consensus process. Traditionally, the first round of the Delphi process involves the compilation of a list by means of obtaining items from the experts, which is then further evaluated and reduced in the following rounds. By modifying this process in the current thesis, the first round of the Delphi process already provided the fall risk experts with a comprehensive list of codes as obtained from Phase 1 of the research study. This reduced the time they had to spend on the first round and had the added benefit that the list provided to the experts already contained the relevant codes (all the relevant items had been constructed by then). This adaptation required less time from experts to participate, and hence no attrition of participants was seen across the three rounds. This is in contrast to the more traditional approach which is often fraught with participant attrition (Khodyakov et al., 2020). The modified Delphi process provided the experts the opportunity to evaluate and distil the list of relevant codes to establish the critical codes in three rounds of consensus. This process ensured that consensus was reached on all the included codes. The initial list of ICF codes was distilled to a manageable list of factors that were specifically relevant and critical to fall risk in older adults.

The ICF code set items could perhaps have been evaluated by a different methodological approach, such as in online focus groups involving HCPs. This might have provided the researcher with richer qualitative data and allowed the participants to discuss the relevant factors more robustly; however, it would not have provided the individual, expert opinions on each ICF code as the Delphi process has done. Although an online focus group would have been more time efficient for the participants, the specific Delphi process to reach consensus between participants resulted in accurate, quantitative data that was more suited to the objective of Phase 2.

6.4.3 ICF code set administration

Although the sample size for Phase 3 was relatively small, the strength of the obtained data lay in the fact that all 30 participants completed the entire questionnaire without any missing data, allowing for accurate statistical analysis. Another strength of Phase 3 was the completion of the pilot study prior to the main data collection, as this enabled the researcher to make changes to the clinical application section of the questionnaire. This resulted in more accurate data relevant to the specific sub-aims that were measured.

By using one HCP group – audiologists – to determine the code set's clinical utility, the study was able to generate a starting point not only on how to develop an ICF code set, but also on how to administer such a code set to a group of HCPs, thereby allowing further research to be conducted on other groups of HCPs. The code set includes the fall risk factors relevant to older adults and suggests possible HCPs to whom the patient could be referred for comprehensive assessment and management. This means that the code set can be utilised by all HCPs, even if they do not have experience of managing these patients by referring to the HCPs who would be able to assist them.

Phase 3 was conducted during the global COVID-19 pandemic, and although the data collection process had to be altered to adhere to the relevant restrictions during this time, the researcher was able to expand on the initial methodology, include a case history, and collect data via electronic channels. The impact that environmental factors had on research provided the researcher with the opportunity to explore other avenues of data collection. If COVID-19 had also impacted the methodology employed in Phase 1, data could have been collected by means of asynchronous online discussions or through online meeting programmes, rather than via the in-person focus groups that were used, thereby allowing participants to interact in real time. The strength of using the chosen methodological design lay in the fact that the actual data collection procedures could be altered to accommodate environmental changes, while the desired data could still be obtained from the relevant sources.

Another means of collecting data from audiologists during this time may have been to have them use their own case files or clinical data as the background to complete the clinical utility questionnaire. However, this approach was not deemed optimal for research purposes, considering the variance in patient details and data that different audiologists record in case history. Furthermore, the unique symptom clusters needed for completing the clinical utility questionnaire in a relevant way might not have been represented by a particular audiologist's own clinical or observational data. By providing the participating audiologists with a written case history, the researcher could ensure that they all had access to the same data, specific clusters of symptoms and information to complete the clinical utility questionnaire. In addition, the prescriptions of the Protection of Personal Information Act (POPI, 2013) regarding the use of the audiologists' own patient data for this research study may have been problematic and would have required additional informed consent from the patients whose data would be used.

A limitation of Phase 3 is that only one health profession was used to determine the clinical utility of the ICF code set. By including different types of HCPs, the clinical utility of the code set might have been determined more comprehensively to represent all HCPs' perceptions. The number of participants who completed the questionnaire was also relatively small and might not necessarily be an accurate representation of all audiologists in South Africa. Furthermore, since the questionnaire did not differentiate between responses from audiologists in the private and public sectors, it is possible that their perceptions could differ, based on their own experiences in the health care sector they work in. In retrospect, Phase 3 may well have been expanded to include audiologists internationally, as the data was collected electronically and the location of the participants was not a selection criterion.

6.5 Recommendations for Future Research

Due to the limited number of participants who were involved in the administration of the ICF code set, it is recommended that further research involve administering the code set to a larger sample of audiologists (recruited nationally as well as internationally). As the current study comprised the minimum number of participants for quantitative data analysis (n=30), repeating the study on a larger sample and on different sub-groups of participants could yield more significant results. Such a study should compare the answers of the audiologists with more or less experience in vestibular testing and also the answers of audiologists in private practice compared to those in the public sector. This comparison could yield valuable results, especially for clinical utility related to the accessibility (financial considerations) of using the ICF code set.

In addition, the research should be expanded to other groups of HCPs involved in fall risk assessment in older adults to determine the clinical utility of the ICF code set for different groups of HCPs. The ICF framework enables HCPs across different disciplines to use the universal language of the ICF code set to document their patients' fall risk factors. By expanding the study to other health care disciplines, subtle changes to the use of the code set could be discovered and additional ways to utilise it may be discovered.

The current study demonstrated the clinical utility of the ICF code set for audiologists. An intervention study is therefore recommended where the ICF code set can be used to develop training material for HCPs on the identification of fall risk in older adults and programmes for older adults on preventive measures to reduce their own fall risk. Home-based programmes aimed at reducing fall risk should include patients in the process of deciding about the type of exercises and modifications they are comfortable with. Programmes should also be developed in collaboration with HCPs such as physiotherapists to increase the patient's health literacy, to enhance the pleasure of exercising and to empower patients by providing them with choices that increase autonomy (Mittaz Hager et al., 2019). By developing preventive fall risk programmes, patients who are considered to have a fall risk could be educated on their specific risks and be equipped with a preventive programme they can use at home to reduce their fall risk. This was echoed during the focus groups with the older adults where the need for educational material (such as fall risk factor handouts) was suggested to create awareness in older adults on the risk factors they should look out for and how to manage these risks. Environmental barriers should also be included in these education programmes and could be distributed to other stakeholders. Organisations and corporations with clients who are older adults – such as banks and shopping centres – should be alerted to the fall risk older adults have and how to change their environments to accommodate and reduce these risk (e.g., placing more seating for older adults who have to wait in line for extended periods of time).

Furthermore, it is recommended that the ICF code set be remoulded into a multifactorial screening tool that includes the weighting of different fall risk factors to determine which factors or combinations of factors are more likely to cause falls in older adults. By adding the weighting of the different fall risk factors, HCPs who are not well-versed in fall risk factor identification will more easily be able to identify the combination of factors that indicate a greater need for intervention. This could result in quicker referral and intervention for those older adults who need it the most and have the highest risk.

Another recommendation for future research relates to the education of HCPs involved with fall risk assessment in older adults. Such education should involve presenting the developed ICF code set as a CPD activity, providing HCPs with the code set and educating them on the optimal use of the ICF framework and ICF code set in clinical practice. Although the results of this study indicate that no additional training is needed to use the code set, more HCPs may be inclined to use the code set if it was presented as part of a CPD activity. Thus, HCPS would have the double benefit of obtaining the code set as well as additional CPD points as required by the HPCSA. Furthermore, the developed ICF code set should be distributed to HCPs through professional organisations such as SAAA, where it can be sent electronically to their members. The code set should also be included in undergraduate studies for HCPs involved in fall risk assessment in older adults as part of their curriculum training on the ICF and the use of code sets in clinical practice.

Awareness campaigns targeting the general public should be developed based on the information contained in this code set. By distributing informational brochures, the public can be educated on the factors most relevant to fall risk in older adults. Awareness campaigns can sensitise the public to recognise the main risk factors and help potential patients to address and manage these risks. The informational and support needs of the significant other and/or family members of older adults with a fall risk could also be met in this way. The significant others and/or family members plays a vital role in supporting older adults and could assist them in managing and reducing their fall risk. Education of the public and significant others and/or family member would provide an additional way of supporting older adults with a risk of falling and reducing this risk and could include referrals to HCPs who could determine their fall risk and provide appropriate intervention strategies. One way of distributing information to the public and family members of older adults could be via internet platforms such as Wikipedia – one of the most consulted health resources in the world (Weiner et al., 2019). This is an effective way to continuously enhance the quality of health information available to the public and to provide access to best-evidence medical facts and accurate, useful information.

The current study included some contextual factors (environmental and personal) in the developed ICF code set. At this stage, the ICF does not code personal factors and it is up to the HCPs to identify and include them in their assessment and intervention plans. Further exploratory research should be done to expand the current body of knowledge on the personal factors related to fall risk in the different sub-categories of older adults (younger-old, middle-old and older-old) and how these factors could be integrated into the current ICF code set. Some personal factors could even be linked to other domains, based on the context of these factors and the underlying bodily mechanisms that would potentially be the cause of the fall.

6.6 Conclusion

The main focus of this research study was to develop an ICF code set that would contain the critical codes to consider when identifying fall risk factors in community-dwelling older adults. The objective, which was to guide HCPs' early identification strategies, was achieved by developing, evaluating and subsequently administering the ICF code set for fall risk factors in older adults to a group of HCPs, namely audiologists, to determine its clinical utility. The results of my study indicate that the ICF code set has high clinical utility, and that audiologists should be able to use the code set as part of their daily consultations with older adults to identify fall risk factors in this population. Use of the ICF code set by HCPs in clinical practice can potentially benefit the older adults they consult with and so improve their HRQoL.

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APPENDICES

3A: Informed consent form – older adults

3B: Informed consent form – HCPs

3C: Factors included in older adult fall risk assessment tools (FRATs): A systematic review

3D: Permission from Ageing and Society

3E: Older adults' perspectives on fall risk: Linking results to the ICF

3F: Permission from the Journal of Applied Gerontology

3G: Biographical questionnaire - older adults

3H: The perspectives of health care practitioners on fall risk factors in older adults

3I: Permission from Health SA Gesondheid

3J: Biographic questionnaire – HCPs

3K: Focus group script – HCPs

3L: Ethical permission from the University of Pretoria

4A: Informed consent form - Delphi process pilot study

4B: Informed consent form - Delphi process main study

4C: Delphi participants invitation letter (pilot study)

4D: Biographic questionnaire - Delphi participants

4E: Initial ICF code set

4F: Pilot study feedback form - Delphi process

4G: Delphi participants invitation letter (main study)

4H: Delphi survey - Round 1

4I: Delphi survey - Round 2

4J: Delphi survey - Round 3

5A: Written case history (main study)

5B: ICF code set (main study)

5C: Informed consent form - audiologists (pilot study)

5D: Informed consent form - audiologists (main study)

Appendix 3A: Informed consent form - older adults

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities

31 October 2018

Request for participation in a research study: Focus Groups

Dear Sir / Madam

I am currently a PhD student at the Centre for Augmentative and Alternative Communication (CAAC) at the University of Pretoria. In order to comply with the requirements of the degree, I have to complete an extensive research project resulting in a thesis. This study has received permission from the Ethics Committee, Faculty of Humanities, at the University of Pretoria.

Research title: To develop a multidisciplinary, clinical evidence-based tool, in the form of an ICF code set, to determine fall risk in community-dwelling older adults for use in the therapeutic sciences.

Objectives of the study: The aim of the first stage of the research study is to determine fall risk factors and to link these factors to the ICF categories as part of the ICF code set. Therefore, I would like to request your participation in a focus group. Your participation in this research study will contribute to the development of an ICF code set for fall risk in older adults. Recommendations resulting from this research will encourage new research in other related fields.

Who will participate in the study: Adults who are 65 years and older. Previous history of falls is not a requirement.

What will be expected of you: Should you wish to participate in this study, you will be asked for your informed consent to participate. You will then be asked to complete a short 1-page questionnaire with background information. Thereafter, you will participate in a focus group discussion which will require you input to identify specific areas and consequences of falling in adults 65 years and older. This discussion is expected to last approximately 60 – 90 minutes.

Will you experience any risk or discomfort during the study: You will experience no harm or discomfort during the focus groups and you may at any time throughout the study decide to withdraw without any penalization or negative consequences.

Centre for Augmentative and Alternative Communication, Room 2-36,
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University of Pretoria, Private Bag X20
Hatfield 0028, South Africa
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Fax +27 (0) 86 5100841
Email saak@up.ac.za
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Fakulteit Geesteswetenskappe
Lefapha la Bomotho

Confidentiality: The focus group sessions will be recorded for record keeping and data analysis. Data collected during these sessions will be entirely impersonal and would therefore not be harmful in any way. Confidentially will be ensured by the researcher taking the following steps:

- No personal information will be documented or used that can link you with this study;
- Your name will only be recorded to prevent duplicate entries, thereafter a participant number will be assigned to you.

All information gathered during the study will be treated as confidential and data will be stored at Centre for Alternative and Augmentative Communication at the University of Pretoria and destroyed after the mandatory 15 years. Results from this study will be presented as a PhD thesis, scientific research papers and as conference presentations. Should you wish, the results of the study would be made available to you following the completion of the research study.

Date of the data collection: The focus group discussion will take place on Thursday 8 November 2018 from 10:00 to 12:00 at Enzo's Pizzeria Eldoraigne.

Should you have any further questions, please feel free to contact Prof. Juan Bornman at 012 420 2001 or the researcher, Mrs. Hendrika de Clercq, at 012 755 9711.

I trust that this letter has provided you with sufficient information to make an informed decision about the participation in this research study. Should you agree to participate, please complete the reply slip attached and return it to us as indicated as soon as possible.

Kind regards,

Mrs H de Clercq	Prof J Bornman
Researcher	Supervisor

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Faculty of Humanities

Reply slip: Participation in research study: Focus Groups

Researcher: Hendrika de Clercq

Supervisor: Prof J Bornman

By signing this form, I acknowledge that I have read the information on the proposed study and have been given adequate time to consider this request. I have not been pressured to participate in any way and I understand participation in this study is completely voluntary and that I may withdraw from it at any time without supplying reasons. I am aware the University of Pretoria has approved this study and that results of this study will be used for scientific purposed and will be published. I agree to participate in this study and hereby give consent for participation. I give permission for the researcher to record the focus group session for analysis.

Yes, I give permission to participate in this research study ☐

No, I do not give permission to participate in this research study ☐

Name & surname: ____________________

Contact number: ____________________

Email address: ____________________

Preferred method of contact: Phone / Email / Both

Signature of participant: ____________________

Date: ____________________

I would like to get feedback on the results of the study: Yes / No

If yes, results will be emailed to you on completion of the research study.

Centre for Augmentative and Alternative
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Fakulteit Geesteswetenskappe
Lefapha la Bomotho

Appendix 3B: Informed consent form - HCPs

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities

07 November 2019

<u>Request for participation in a research study: Focus Group</u>

Dear Sir / Madam

I am a PhD candidate at the Centre for Augmentative and Alternative Communication (AAC) at the University of Pretoria. In order to comply with the requirements of the degree, I have to complete an extensive research project resulting in a thesis. This study has received approval from the Ethics Committee, Faculty of Humanities, at the University of Pretoria.

Research title: To develop a multidisciplinary, clinical evidence-based tool, in the form of an ICF code set, to determine fall risk in community-dwelling older adults for use in the therapeutic sciences.

Objectives of the study: The aim of this stage of the research study is to determine fall risk factors in older adults (65 years and older) and to link these factors to the International Classification of Function, Disability and Health (ICF) categories as part of the ICF code set. Therefore, I would like to request your participation in a focus group. Your participation in this research study will contribute to a list of factors that increase for fall risk in older adults. Therefore, I will link the factors to the ICF and recommendations resulting from this research will help to identify these factors earlier.

Who will participate in the study: Clinical experts who assess fall risk in older adults. You have specifically been selected based on your knowledge and experience working with older adults.

What will be expected of you? Should you wish to participate in this study, you will be asked to complete the informed consent reply slip attached to this letter. You will then be asked to complete a short 1-page questionnaire with background information. Thereafter, you will participate in a focus group discussion which will require you input to identify specific areas and consequences of falling in adults 65 years and older. This discussion is expected to last approximately 60 – 90 minutes.

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Fakulteit Geesteswetenskappe
Lefapha la Bomotho

Will you experience any risk or discomfort during the study? You will experience no risk, harm or discomfort during the focus group and you may decide to withdraw from the group at any time without any penalization or negative consequences.

Confidentiality: The focus group will be recorded for record keeping and data analysis. Data collected during the group will contain only de-identified data and would therefore not be harmful in any way. Confidentially will be ensured by the researcher taking the following steps:

- No personal information will be documented or used that can link you with this study;
- Your name will only be recorded to prevent duplicate entries, thereafter a participant number will be assigned to you.

All information gathered during the study will be treated as confidential and data will be stored at Centre for Alternative and Augmentative Communication at the University of Pretoria and destroyed after the mandatory 15 years. Results from this study will be presented as a PhD thesis, scientific research papers and as academic conference presentations. Should you wish, the results of the study would be made available to you following the completion of the research study.

Date of the data collection: The focus group will take place on 07 November 2019 from 13:00 at the Speech Therapy and Audiology Department in the Steve Biko Academic Hospital.

Should you have any further questions, please feel free to contact Prof. Juan Bornman at 012 420 2001 or the researcher, Mrs. Hendrika de Clercq, at 012 755 9711.

I trust that this letter has provided you with sufficient information to make an informed decision about the participation in this research study. Should you agree to participate, please complete the reply slip attached and return it to us as indicated as soon as possible.

Kind regards,

Mrs H de Clercq	Prof J Bornman
Researcher	Supervisor

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Lefapha la Bomotho

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities

Reply slip: Participation in research study: Focus Group (Clinical experts)

Researcher: Hendrika de Clercq

Supervisor: Prof J Bornman

By signing this form, I acknowledge that I have read the information on the proposed study and have been given adequate time to consider this request. I have not been pressured to participate in any way and I understand participation in this study is completely voluntary and that I may withdraw from it at any time without supplying reasons. I am aware the University of Pretoria has approved this study and that results of this study will be used for scientific purposed and will be published. I agree to participate in this study and hereby give consent for participation. I give permission for the researcher to record the focus group session for analysis.

Yes, I give permission to participate in this research study ☐

No, I do not give permission to participate in this research study ☐

Name & surname: ______________________________

Contact number: ______________________________

Email address: ______________________________

Preferred method of contact: Phone / Email / Both

Signature of participant: ______________________________

Date: ______________________________

I would like to get feedback on the results of the study: Yes / No

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Appendix 3C: Factors included in older adult fall risk assessments (FRATs): A systematic review

Ageing & Society (2020), 1–25
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REVIEW ARTICLE

Factors included in adult fall risk assessment tools (FRATs): a systematic review

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(Accepted 24 March 2020)

Abstract

Falls often have severe financial and environmental consequences, not only for those who fall, but also for their families and society at large. Identifying fall risk in older adults can be of great use in preventing or reducing falls and fall risk, and preventative measures that are then introduced can help reduce the incidence and severity of falls in older adults. The overall aim of our systematic review was to provide an analysis of existing mechanisms and measures for evaluating fall risk in older adults. The 43 included FRATs produced a total of 493 FRAT items which, when linked to the ICF, resulted in a total of 952 ICF codes. The ICF domain with the most used codes was body function, with 381 of the 952 codes used (40%), followed by activities and participation with 273 codes (28%), body structure with 238 codes (25%) and, lastly, environmental and personal factors with only 60 codes (7%). This review highlights the fact that current FRATs focus on the body, neglecting environmental and personal factors and, to a lesser extent, activities and participation. This over-reliance on the body as the point of failure in fall risk assessment clearly highlights the need for gathering qualitative data, such as from focus group discussions with older adults, to capture the perspectives and views of the older adults themselves about the factors that increase their risk of falling and comparing these perspectives to the data gathered from published FRATs as described in this review.

Keywords: accidental falls; aging/ageing; balance; disability and health; fall risk factors; fall risk assessment tools (FRATs)

Introduction

The ageing cohort of the world population is expected to increase at an unprecedented rate from approximately 8.5 per cent (617 million people) in 2015 to a projected 17 per cent (1.6 billion people) in 2050 (Stewart Williams *et al.*, 2015). Accidental falls are the leading cause of injury-related deaths among older adults of 65 years and older (LeCuyer *et al.*, 2016) and therefore of grave concern to all health-care practitioners and policy makers. Unsurprisingly, falls are one of the five so-called 'geriatric giants', along with dementia, poor mobility, incontinence and polypharmacy (Cumming, 2013). Internationally, it is estimated that a third of community-dwelling older people may experience accidental falls every year and among these fallers, 35.5 per cent may experience recurrent falls (Hung *et al.*, 2017). According to the Centers for Disease Control and Prevention, more than 2.7 million older adults are injured annually from falls in the United States of America (Homer *et al.*, 2017).

Older adults show a higher incidence and prevalence of falling and they also experience more severe complications after falls (Flaherty and Josephson, 2013), including medical, psychological and personal consequences. Medical consequences can be severe and include osteoporotic fractures, head injuries, impaired mobility, traumatic brain or head injury, increased risk of future falls, abrasions, lacerations, contusions and functional decline (Calys *et al.*, 2013; Flarity *et al.*, 2013; Wildes *et al.*, 2015; Callisaya *et al.*, 2016; Deschamps *et al.*, 2016; Dueñas *et al.*, 2016; Gu and Dennis, 2016; Kenny *et al.*, 2016; Romli *et al.*, 2017). The personal and psychological consequences of falls can be just as debilitating as the medical and physical consequences, and they do not only affect the older adult who falls, but also the immediate family and/or care-givers. Some of these consequences, as described in the literature, include fear of falling, depression, loss of independence, reduced quality of life, reduced participation in physical and social activities, immobility, early admission to nursing homes, difficulty with activities of daily living, dependency on others, social isolation, anxiety, loneliness, loss of confidence, loss of self-efficacy and decreased self-esteem (Ma *et al.*, 2014; Callisaya *et al.*, 2016; Deschamps *et al.*, 2016; Dueñas *et al.*, 2016; Greenberg *et al.*, 2016; Kenny *et al.*, 2016; Narayanan *et al.*, 2016; Palumbo *et al.*, 2016; Phelan *et al.*, 2015; Romli *et al.*, 2017). Other consequences of falls in older adults include financial and environmental factors such as hospitalisation, early admission to nursing homes, adaptation of the home environment, socio-economic burden on both the health-care system and the patients' relatives and prolonged rehabilitation (Da Costa *et al.*, 2012; Phelan *et al.*, 2015; Callisaya *et al.*, 2016; Dueñas *et al.*, 2016). Although age is one risk factor for falls, many other risk factors exist that could increase the likelihood that a person will fall (Phelan *et al.*, 2015), such as gait or balance disorders, dizziness, postural hypotension or environmental-related factors (Rubenstein, 2006). Some falls may be prevented if an older adult's risk of falling is identified before their first fall, and this can be done using one of several fall risk assessment tools (FRATs).

An older adult's risk of falling could be identified more effectively if a universal, standard language for measuring fall risk in the ageing population was available. The International Classification of Functioning, Disability and Health (ICF), which was endorsed by the World Health Organization in 2001, views functioning and disability as outcomes of interactions between the health condition (in this case, falls) and the contextual factors (in this case, fall risk factors), which include both personal and environmental risk factors (World Health Organization, 2002). The ICF aims to code a person's functioning and disability based on four categories, namely (a) body function; (b) body structure; (c) activities and participation; and (d) environmental and personal factors (Figure 1).

The ICF presents a scientific basis for understanding fall risk factors in older adults and provides a holistic model and universal language for health-care practitioners around the world to describe and classify falls and fall risk in older adults

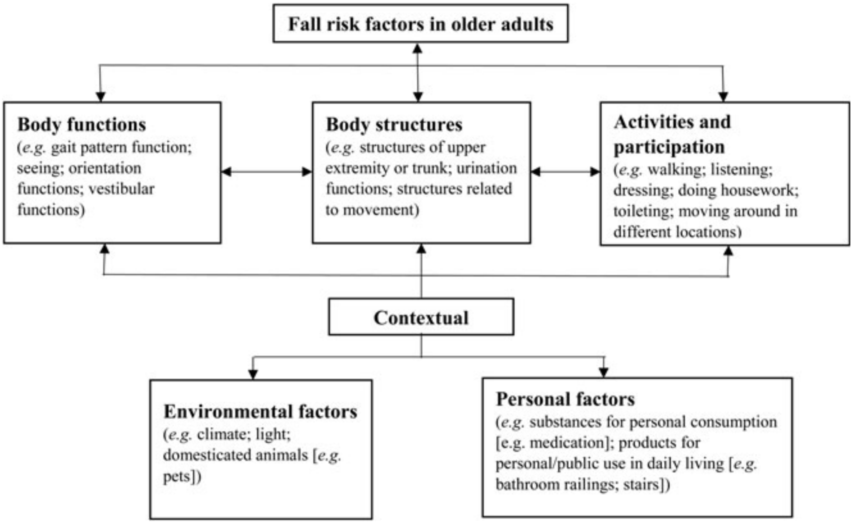

Figure 1. Fall risk factors in older adults in relation to the International Classification of Functioning, Disability and Health (ICF).
Source: Based on the ICF model (World Health Organization, 2002).

(World Health Organization, 2002). Since the ICF transcends professional boundaries across countries, it allows for clear interaction between professionals from different disciplinary backgrounds. It also enables them to discuss falls and fall risk factors without fear of miscommunication or bias due to selective, professional focus – thus increasing the possibility of early identification of fall risk in these individuals. The ICF is a systematic coding system for documenting health information, not simply about fall risk as a condition, but also for explaining how falls can affect the older adult in all aspects of life. It outlines the role of the environment and personal factors, and so allows health-care professionals to obtain a snapshot of the older adult's present health status (Granberg, 2015). Currently, most FRATs do not describe fall risk in terms of the ICF and there is a lack of information about fall risk assessment and the ICF, especially in community-dwelling older adults (Noohu *et al.*, 2017). Identifying fall risk factors in current FRATs may be one way to link fall risk assessment to the ICF and gain all the advantages of using the ICF as a model for discussing fall risk in older adults.

The overall aim of this systematic review was to provide an analysis of existing mechanisms and measures for evaluating fall risk in older adults. The specific objectives were (a) to identify factors that had been utilised to quantify fall risk in older adults by means of a FRAT; (b) to map the content of the identified measures (*i.e.* the fall risk factors) to ICF codes using the ICF linking rules; and (c) to compare the weighted focus of the FRATs items in relation to the body (body function and structure), the individual and society (activities and participation) and the impact of the environment on the individual (environmental and personal factors).

Method

A systematic review based on the five stages suggested by Arksey and O'Malley (2005) was conducted, and suggestions by Adair *et al.* (2018) were followed, who specifically aimed to identify measures and make recommendations for quality assessment. In Stage 1, the research question was identified and articulated as the aim of the review. In Stage 2, the search strategy that was followed involved identifying relevant studies and setting specific search parameters, such as the time and language of the articles. Stage 3 was the study selection which, for a systematic review, was articulated as the inclusion and exclusion criteria. During Stage 4, the data were charted using a customised data extraction sheet. Stage 5 involved collating, summarising and reporting the results as set out in the Results and Discussion section of this paper. The overall PRISMA methodology was included as this is an evidence-based minimum set of items for reporting in systematic reviews and meta-analysis (Moher *et al.*, 2009).

Search strategy and selection criteria

The structured database search included nine databases and platforms (WorldCat; Medline; PaperFirst; ScienceDirect; SA ePublications and Journal Collection; BioOne; JSTOR Health and General Sciences Collection; JSTOR Life Sciences Collection). The primary purpose was to compile a comprehensive list of published papers on fall risk assessment tools from the literature. The search terms used were ti:(fall*) AND ti:(risk) AND ti:(assess*) AND ti:(tool*). No restriction in respect of date was placed on the search and all articles mentioning the keyword in the title were included in the initial set of results. Articles that had been published in languages other than English were excluded, due to the cost and time involved in translating such material.

Article screening and data extraction

The first author (HdC) performed the initial database search and screened the titles for potentially relevant articles. After screening the titles, the articles were exported to Rayyan, a Web-based systematic review program that allows different reviewers to work on the same project simultaneously and determine the agreement percentage between reviewers (Ouzzani *et al.*, 2016). The first and second authors (HdC and AN) then independently screened all the identified potential articles at title and abstract level, using the inclusion and exclusion criteria (Table 1). Any discrepancies related to the inclusion of articles were resolved through discussion, and if consensus could not be reached, the third author (JB) was available to review the article. All three reviewers are dually qualified as speech-language therapists and audiologists, and each has at least ten years' clinical experience.

A customised data extraction sheet was compiled to enable consistent and independent data reporting for the search. Data extraction included the article date, author and the names of the FRATs discussed in the article. Data extraction was completed by HdC and AN, and no discrepancies were noted at this level.

Thereafter, two sets of criteria were used for including FRATs in the factor-mapping process. First, the FRAT had to be available at no cost, it had to be named and it had to have a supporting reference in the articles identified in this

Table 1. Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria	Theoretical justification
Older adults	Paediatrics and obstetrics	This study focused on older adults, as fall is one of the geriatric giants (Cumming, 2013)
Available at no cost	Tools that have to be purchased	Tools that had to be bought were excluded due to the cost and time involved in purchasing the material (Arksey and O'Malley, 2005)
Assessment tools	Intervention studies	This study focused on assessment tools as a fall prevention strategy (World Health Organization, 2018) and not on the monitoring or intervention of fall risk assessment
Fall risk	Papers with main focus on a specific medical condition with a known fall risk	Risk factors for these medical conditions are not sensitive and specific enough to identify fall risk in the general population (World Health Organization, 2018)

review to allow it to be located. Second, only those FRATs reported in at least one of the articles identified in the review were included. It is possible that previous researchers frequently chose only 'popular' FRATs for assessing fall risk when designing a study, but for this review, we aimed to include all mentioned FRATs, even if the FRAT was mentioned in only one of the articles identified in the search. Thus, our data were not limited to frequently used FRATs only. Two reviewers (HdC and AN) independently reviewed 102 studies for inclusion and excluded 35 studies. Of the 143 articles identified in the initial database search, 125 were subjected to title-level screening, 111 were evaluated on abstract level and 102 articles were evaluated for inclusion on full-text level. Of the latter 102 articles, 67 were eventually included in the data extraction process where a total of 49 tools were identified and 43 tools were included in the results (Figure 2).

Quality assessment

Our systematic review did not aim to summarise the effectiveness of assessment tools, the risk of bias of studies or the quality of the methodology used to design the FRATs (Adair *et al.*, 2018). Given our focus on the identification of FRATs, no formal assessments of methodological quality or risk of bias of the included articles were performed.

Data analysis

The 67 studies included in the review were independently evaluated by two reviewers (HdC and AN) and a 100 per cent agreement score was obtained by these two reviewers. A total of 49 FRATs were identified to be included in the review. Of the 49 tools identified, six were excluded as the researchers were unable to obtain them (Jester *et al.*, 2005; Vassallo *et al.*, 2005; Young *et al.*, 2005; Scott

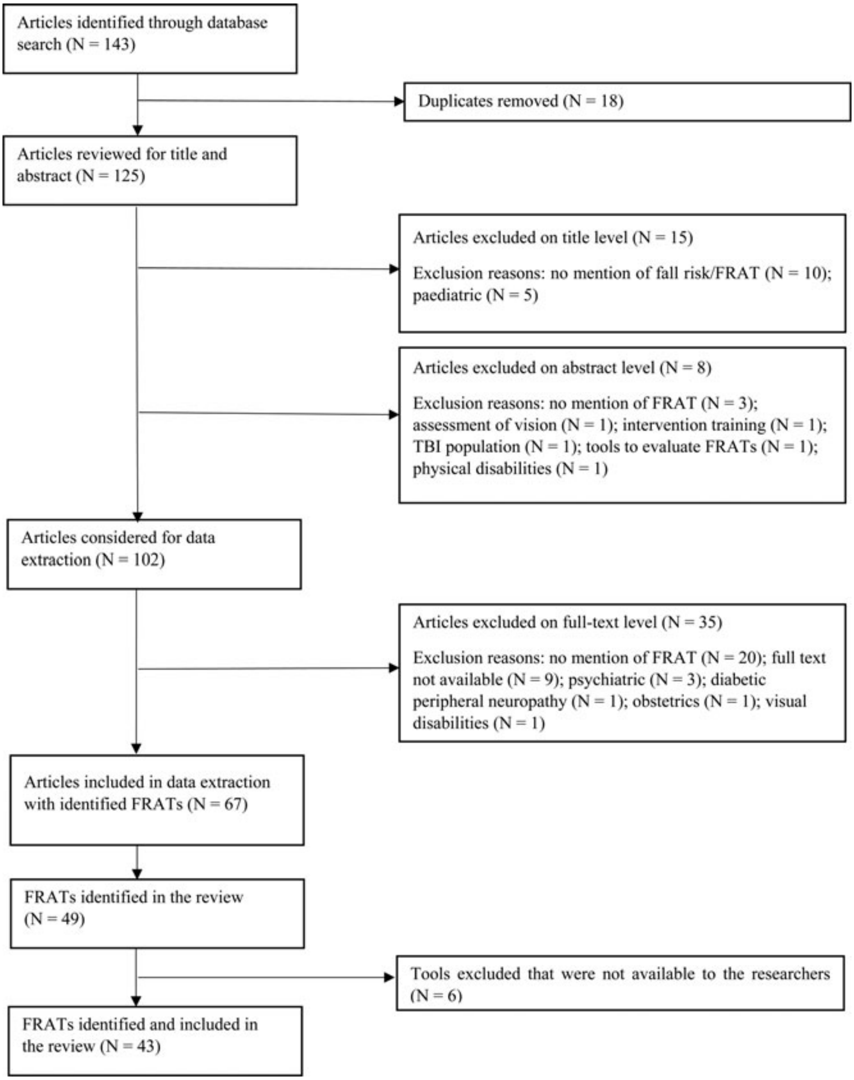

Figure 2. Graphic representation of the methodological process.
Notes: FRATs: fall risk assessment tools. TBI: traumatic brain injury.

et al., 2007; Hirase *et al.*, 2014; Miyakoshi *et al.*, 2014), despite contacting the corresponding authors of each article in which the tools were mentioned. The 43 FRATs included in the review were analysed by the first author (HdC) and the items in each tool were identified and extracted via Microsoft® Office Excel. All the tools were independently evaluated by all three reviewers (HdC, AN and JB) and an initial agreement of 92 per cent was established. After discussion of the discrepancies, the reviewers fully agreed on the ICF codes to which each item in the FRATs had been linked, using the ICF linking rules.

Items were linked to corresponding ICF categories by using the ten ICF rules for linking the relevant health information included in instruments and tools to the corresponding ICF categories (Selb *et al.*, 2015; Cieza *et al.*, 2016). The first seven linking rules were applied in this study: Rule 1 – acquiring good knowledge of the conceptual fundamentals of the ICF; Rule 2 – identifying the main concept of each item to be linked to the ICF; Rule 3 – identifying additional concepts for each item if needed; Rule 4 – considering the popular perspectives for each identified concept when collecting health-related information; Rule 5 – identifying and document the categorisation of the response options; Rule 6 – linking all meaningful concepts to the precise ICF category; and Rule 7 – using 'other specific' or 'unspecified' ICD categories as appropriate. Rules 8–10 are only used when a specific code is not available on the third or fourth ICF level. For the purposes of this review, a two-level ICF classification was sufficient (Rules 1– 7) and further classification was not required at the time. All three reviewers independently linked the identified FRAT factors to the corresponding ICF categories. The weighted focus of the FRAT items in relation to the ICF categories was calculated using the confidence intervals to determine the *p*-values.

Results

On completion of the data extraction, a summary was made of the 43 FRATs included in the review, based on the included 67 articles (*see* Table 2). These 43 FRATs were categorised according to where their focus lay with regards to the four ICF categories, namely the body (where body function and structure codes are grouped together), the level of the individual (activities and participation) and the impact of the environment on the individual (environmental and personal factors).

As depicted in Table 2, a total of 43 FRATs were identified. The five FRATs mentioned most often in the review were the Stratify (N = 17), Morse Fall Scale (N = 15), Timed Up and Go (N = 13), Hendrich II Fall Risk Assessment Tool (N = 13) and the Tinetti Balance Assessment Tool (N = 10). Nine tools were mentioned three to eight times, namely the Berg Balance Scale (N = 9), Downton Index (N = 8), Johns Hopkins Fall Risk Assessment Tool (N = 7), Conley Scale (N = 6), Mobility Interaction Fall Chart (N = 6), Functional Reach (N = 5), Dynamic Gait Index (N = 4), FROP-Com (N = 4) and the Melbourne Fall Risk Assessment Tool (N = 3). Eight other FRATs were only mentioned twice, while 21 FRATs (49%) were mentioned only once in the review. A total of 18 tools – developed between 1986 and 1999 – were mentioned in 70 per cent of the articles being reviewed, whereas the 25 tools developed between 2000 and 2018 were mentioned in only 30 per cent of the articles in this review.

Of all 43 FRATs, 39 (91%) focused mainly on the body (body function and structure), while only one tool (LASA Fall Risk Profile) focused mainly on activities and participation (56%). Another tool (Marianjoy FRAT) focused equally (46%) on body function and structure and on activities and participation; the MAHC-10 focused mainly on environmental and personal factors (47%); and the Thai FRAT focused equally (40%) on body function and structure as well as on environmental and personal factors.

Table 2. Summary of included fall risk assessment tools (FRATs) presented in alphabetical order

FRAT name	N	Original reference	Date when developed	ICF focus[1]
10 Meter Walk Test	2 (Renfro *et al.*, 2016; Lee and Kim, 2017)	Bohannon *et al.* (1996)	1996	**BF&S: 67%;** A&P: 33%; E&P: 0%
13-point FRAT	1 (Chang *et al.*, 2018)	Chang *et al.* (2018)	2000	**BF&S: 75%;** A&P: 0%; E&P: 25%
30-Second Chair Test	2 (Scott *et al.*, 2007; Chow *et al.*, 2018)	Jones *et al.* (1999)	1999	**BF&S: 67%;** A&P: 33%; E&P: 0%
Activities-specific Balance Confidence (ABC) scale	1 (Park, 2017)	Powell and Myers (1995)	1995	**BF&S: 75%;** A&P: 20%; E&P: 5%
Ballarat Health Service FRAT	1 (Wong Shee *et al.*, 2012)	Wong Shee *et al.* (2012)	2010	**BF&S: 69%;** A&P: 25%; E&P: 6%
Berg Balance Scale	9 (Stretanski *et al.* 2002; Scott *et al.*, 2007; Zhang and Lockhart, 2009; Hirase *et al.*, 2014; Palumbo *et al.* 2015; Renfro *et al.*, 2016; Kim and Xiong, 2017; Lee and Kim, 2017; Park, 2017)	Berg *et al.* (1989)	1989	**BF&S: 67%;** A&P: 33%; E&P: 0%
BESTest	2 (Renfro *et al.*, 2016; Kim and Xiong, 2017)	Horak *et al.* (2009)	2009	**BF&S: 67%;** A&P: 33%; E&P: 0%
Conley Scale	6 (Scott *et al.*, 2007; Lovallo *et al.*, 2010; Flarity *et al.*, 2013; Guzzo *et al.*, 2015; Majkusova and Jarosova, 2017; Park, 2017)	Conley *et al.* (1999)	1999	**BF&S: 70%;** A&P: 25%; E&P: 5%
Demura's Fall Risk Assessment	1 (Park, 2017)	Demura *et al.* (2010)	2010	**BF&S: 67%;** A&P: 27%; E&P: 6%

Downton Index	8 (Meyer *et al.*, 2005, 2009; Vassallo *et al.*, 2005, 2008; Scott *et al.*, 2007; Salb *et al.*, 2015; Majkusova and Jarosova, 2017; Nunan *et al.*, 2018)	Downton (1993)	1993	**BF&S: 67%**; A&P: 16.5%; E&P: 16.5%
Dynamic Gait Index (DGI)	4 (Scott *et al.*, 2007; Zhang and Lockhart, 2009; Renfro *et al.*, 2016; Park, 2017)	Whitney *et al.* (2005)	2005	**BF&S: 67%**; A&P: 33%; E&P: 0%
Falls Assessment Risk and Management (FARAM)	1 (Barker *et al.*, 2009)	Western Australia Department of Health (2015)	2004	**BF&S: 64%**; A&P: 18%; E&P: 18%
Falls Efficacy Scale (FES)	2 (Scott *et al.*, 2007; Kim and Xiong, 2017)	Yardley *et al.* (2005)	2005	**BF&S: 59%**; A&P: 35%; E&P: 6%
Falls Risk Assessment and Management Plan (FRAMP)	1 (Delfante *et al.*, 2018)	Western Australia Department of Health (2015)	2010	**BF&S: 54%**; A&P: 36%; E&P: 9%
Four Square Step Test	1 (Hirase *et al.*, 2014)	Dite and Temple (2002)	2002	**BF&S: 67%**; A&P: 33%; E&P: 0%
FRHOP Risk Assessment Tool	1 (Hill *et al.*, 2004)	Collins *et al.* (2004)	2004	**BF&S: 47%**; A&P: 35%; E&P: 18%
FROP-Com	4 (Russell *et al.*, 2006, 2008; Park, 2017; Teh *et al.*, 2017)	Moore K, Fearn M, Cyarto E, Renehan E et al. (2006)	2009	**BF&S: 58%**; A&P: 26%; E&P: 16%
Fullerton Advanced Balance (FAB) scale	1 (Park, 2017)	Rose *et al.* (2006)	2006	**BF&S: 67%**; A&P: 33%; E&P: 0%
Functional Independence Measure (FIM)	1 (Forrest *et al.*, 2013)	McDowell and Newell (1996)	1996	**BF&S: 58%**; A&P: 42%; E&P: 0%

(*Continued*)

Table 2. (*Continued.*)

FRAT name	N	Original reference	Date when developed	ICF focus[1]
Functional Reach (FR)	5 (Scott *et al.*, 2007; Russell *et al.*, 2008; Yamashita *et al.*, 2016; Kim and Xiong, 2017; Lee and Kim, 2017)	Duncan *et al.* (1990)	1990	**BF&S: 67%**; A&P: 33%; E&P: 0%
Hendrich II FRAT	13 (EA Kim *et al.*, 2007; Lovallo *et al.*, 2010; Chapman *et al.*, 2011; Flarity *et al.*, 2013; SR Kim *et al.*, 2013; Higaonna, 2015; Selb *et al.*, 2015; McNair and Simpson, 2016; Higaonna *et al.*, 2017; Kim and Xiong, 2017; Majkusova and Jarosova, 2017; Park, 2017; Baran and Gunes, 2018)	Hendrich *et al.* (1995)	1995	**BF&S: 64%**; A&P: 27%; E&P: 9%
Johns Hopkins FRAT	7 (Poe *et al.*, 2007; Flarity *et al.*, 2013; Hnizdo *et al.*, 2013; Hur *et al.*, 2016; Zhang *et al.*, 2016; Klinkenberg and Potter, 2017; Park, 2017)	Poe *et al.* (2005)	2003	**BF&S: 58%**; A&P: 32%; E&P: 10%
LASA Fall Risk Profile	1 (Park, 2017)	Pluijm *et al.* (2006)	2006	BF&S: 22%; **A&P: 56%**; E&P: 22%
Marianjoy FRAT	1 (Ruroede *et al.*, 2016)	Ruroede *et al.* (2016)	2000	**BF&S: 46%**; **A&P: 46%**; E&P: 8%
Melbourne FRAT	3 (Barker *et al.*, 2009; Narayanan *et al.*, 2016; Nunan *et al.*, 2018)	Royal Melbourne Hospital (1995)	1995	**BF&S: 56%**; A&P: 33%; E&P: 11%
Missouri Alliance for Home Care fall risk assessment tool (MAHC-10)	2 (Calys *et al.*, 2013; Gallagher *et al.*, 2013)	Calyset *al.*, (2013)	2010	BF&S: 35%; A&P: 18%; **E&P: 47%**
Mobility Interaction Fall (MIF) chart	6 (Lundin-Olsson *et al.*, 2003; Meyer *et al.*, 2005; Scott *et al.*, 2007; Kehinde, 2009; Park, 2017; Nunan *et al.*, 2018)	Lundin-Olsson *et al.* (2006)	2000	**BF&S: 56%**; A&P: 33%; E&P: 11%;

Modified Gait Abnormality Rating Scale	1 (Zhang and Lockhart, 2009)	Van Swearingen *et al.* (1996)	1996	**BF&S: 67%;** A&P: 33%; E&P: 0%
Morse Fall Scale	15 (EA Kim *et al.*, 2007; Poe *et al.*, 2007; Kehinde, 2009; Chapman *et al.*, 2011; Flarity *et al.*, 2013; Forrest *et al.*, 2013; SR Kim *et al.*, 2013; Higaonna, 2015; Salb *et al.*, 2015; Higaonna *et al.*, 2017; Kim and Xiong, 2017; Majkusova and Jarosova, 2017; Park, 2017)	Morse *et al.* (1989)	1989	**BF&S: 53%;** A&P: 20%; E&P: 27%
New York-Presbyterian Fall and Injury Risk Assessment Tool	2 (Chapman *et al.*, 2011; Salb *et al.*, 2015)	Currie *et al.* (2004)	2004	**BF&S: 75%;** A&P: 25%; E&P: 0%
Peninsula Health FRAT	2 (Barker *et al.*, 2009; Nunan *et al.*, 2018)	Stapleton et al (2009)	1999	**BF&S: 54%;** A&P: 35%; E&P: 11%
Queensland FRAT	2 (Park, 2017; Nunan *et al.*, 2018)	Peel et al (2008)	2007	**BF&S: 57%;** A&P: 29%; E&P: 14%
Quickscreen	1 (Tiedemann *et al.*, 2012)	Tiedemann (2006)	2004	**BF&S: 62%;** A&P: 30%; E&P: 8%
Schmid Fall Risk Assessment	1 (Park, 2017)	Schmid (1990)	1990	**BF&S: 50%;** A&P: 33%; E&P: 17%
Short Physical Performance Battery (SPPB)	1 (Park, 2017)	Guralnik *et al.* (1994)	1994	**BF&S: 67%;** A&P: 33%; E&P: 0%
Spartanburg FRAT (SFRAT)	1 (Robey-Williams *et al.*, 2007)	Robey-Williams *et al.* (2007)	2007	**BF&S: 57%;** A&P: 29%; E&P: 14%

(*Continued*)

Table 2. *(Continued.)*

FRAT name	N	Original reference	Date when developed	ICF focus[1]
Stratify	17 (Oliver *et al.*, 1997; Hill *et al.*, 2004; Papaioannou *et al.*, 2004; Jester *et al.*, 2005; Seneviratne, 2006; EA Kim *et al.*, 2007; Scott *et al.*, 2007; Vassallo *et al.*, 2008; Wong Shee *et al.*, 2012; SR Kim *et al.*, 2013; Skelton *et al.*, 2014; Guzzo *et al.*, 2015; Higaonna, 2015; Higaonna *et al.*, 2017; Kim and Xiong, 2017; Majkusova and Jarosova, 2017; Park, 2017)	Oliver *et al.* (1997)	1997	**BF&S: 57%**; A&P: 43%; E&P: 0%
Thai FRAT	1 (Park, 2017)	Thiamwong *et al.* (2009)	2009	**BF&S: 40%**; A&P: 20%; **E&P: 40%**
Timed Up and Go (TUG)	13 (Scott *et al.*, 2007; Zhang and Lockhart, 2009; Hirase *et al.*, 2014; Cattelani *et al.*, 2015; Renfro *et al.*, 2016; Kim and Xiong, 2017; Lee and Kim, 2017; Park, 2017)	Podsiadlo and Richardson (1991)	1991	**BF&S: 67%**; A&P: 33%; E&P: 0%
Tinetti Balance Assessment Tool (POMA)	10 (Meyer *et al.*, 2005; Vassallo *et al.*, 2005; Flarity *et al.*, 2013; Gallagher *et al.*, 2013; Hirase *et al.*, 2014; Renfro *et al.*, 2016; Kim and Xiong, 2017; Lee and Kim, 2017; Majkusova and Jarosova, 2017; Park, 2017)	Tinetti *et al.* (1986)	1986	**BF&S: 67%**; A&P: 33%; E&P: 0%
Traffic Light FRAT	1 (Chang *et al.*, 2018)	Chang *et al.* (2018)	2018	**BF&S: 75%**; A&P: 25%; E&P: 0%
Walking While Talking (WWT)	1 (Park, 2017)	Verghese *et al.* (2002)	2002	**BF&S: 72%**; A&P: 28%; E&P: 0%
Zur Balance Scale	1 (Park, 2017)	Zur *et al.* (2016)	2016	**BF&S: 67%**; A&P: 33%; E&P: 0%

Notes: N = 67 articles. ICF: International Classification of Functioning, Disability and Health. BF&S: body function and structure. A&P: activities and participation. E&P: environmental and personal factors. 1. The main focus is indicated in bold.

The items included in each of the 43 FRATs were extracted and linked to the ICF codes using the ICF linking rules (Cieza *et al.*, 2016). Each item was categorised based on body function, body structure, activities and participation, and environmental and personal factors. The 43 FRATs produced a total of 493 FRAT items, which were linked to a total of 952 ICF codes (summarised as shown in Table 3).

Table 3 depicts the ICF codes extracted from the included FRATs, arranged from most used codes to least used codes. The domain with the most used codes was body function with 381 of the 952 codes used (40%), followed by activities and participation with 273 codes (28%), body structure with 238 codes (25%) and, lastly, environmental and personal factors with only 60 codes (7%). As the body functions and structures are interlinked and both relate to the body, their codes were summed, which resulted in 619 codes and accounted for 65 per cent of the codes identified in the review. The differences between the statistical significance of these groups were calculated to determine the weighted focus of the FRAT items in each ICF category (Table 4).

Based on these values, a statistically significant *p*-value of $p < 0.0001$ and a 95 per cent confidence interval of the difference were reported among all three groups (Table 4), namely body function and structure (N = 619) compared to activities and participation (N = 273); activities and participation (N = 273) compared to environmental and personal factors (N = 60); and body function and structure (N = 619) compared to environmental and personal factors (N = 60) (Altman, 1991).

Discussion

In this review, the overall aim was to provide an analysis of existing mechanisms and measures for evaluating fall risk in older adults. We identified the factors in FRATs that are currently available in the literature and mapped these fall risk factors to the ICF. Results indicated that the majority of the linked factors focused on the domain of the body (body function and structure), followed by the activities and participation domain and lastly on the environmental factors. All but four FRATs focused mainly on the body, indicating that 'the body' is regarded as the point of failure and of risk in most currently available FRATs.

However, contemporary research is emerging to show that other factors – factors outside the body, such as environmental factors, present immediately prior to and during falls – could hold as much, if not more, significant risks (Klenk *et al.*, 2017). In-depth knowledge of falls in older adults therefore needs further development to consider environmental fall risk factors adequately. A recent study by Noohu *et al.* (2017) agreed with this notion and mentioned that the strongest predictor of a single fall is limitations in both the activities and participation and in the environmental domain, whereas multiple falls are best predicted with limitations in the activities and participation domain. This emphasises the fact that more emphasis needs to be placed on factors other than those related to the body, such as environmental factors and limitations surrounding an individual's ability to perform activities and participate in life situations.

Based on the results of this review and the strong focus on the body as the main contributor to falls in older adults, almost all freely available FRATs which focus on

Table 3. Summary of International Classification of Functioning, Disability and Health (ICF) codes linked to included fall risk assessment tools

Body function		Body structure		Activities and participation		Environmental and personal factors	
ICF code	N	ICF code	N	ICF code	N	ICF code	N
b760 – control of voluntary movement	106	s770 – additional musculoskeletal structures related to movement	92	d460 – moving around in different locations	53	e110 – products or substances for personal consumption	21
b770 – gait pattern function	59	s798 – structures related to movement	81	d415 – maintaining a body position	38	e120 – products and technology for personal indoor and outdoor mobility and transportation	11
b210 – seeing	35	s750 – structure of lower extremity	22	d110 – watching	34	e115 – products and technology for personal use in daily living	7
b126 – temperament and personality functions	19	s260 – structure of inner ear	19	d410 – changing basic body position	33	e298 – natural environment and human-made changes to environment; other	6
b235 – vestibular functions	19	s610 – structures of urinary system	16	d530 – toileting	32	e150 – design, construction and building products and technology of buildings for public use	4
b260 – proprioception functions	19	s760 – structures of the trunk	3	d420 – transferring oneself	14	e155 – design, construction and building products and technology of buildings for private use	4
b525 – defecation function	16	s730 – structure of upper extremity	2	d445 – hand and arm use	12	e255 – climate	2
b610 – urination functions	16	s799 – structures related to movement, unspecified	2	d450 – walking	11	e340 – personal care providers and personal assistants	2

b122 – global psycho-social functions	11	s430 – structures of respiratory system	1	d429 – changing and maintaining a body position, unspecified	8	e140 – products and technology for culture, recreation and sport	1
b749 – muscle functions	10			d455 – moving around	7	e240 – light	1
b755 – involuntary movement reaction functions	8			d115 – listening	6	e350 – domesticated animals	1
b114 – orientation functions	7			d540 – dressing	3		
b139 – global mental health functions	7			d640 – doing housework	3		
b152 – emotional functions	7			d230 – carrying out daily routine	2		
b230 – hearing	6			d310 – communicating with – receiving – spoken message	2		
b420 – sensations associated with hearing and vestibular functions	6			d330 – speaking	2		
b156 – perceptual functions	5			d510 – washing oneself	2		
b117 – intellectual functions	3			d570 – looking after one's health	2		
b279 – additional sensory functions	3			d571 – looking after one's safety	2		
b530 – weight management functions	3			d920 – recreation and leisure	2		
b740 – muscle endurance functions	3			d430 – lifting and carrying objects	1		
b798 – neuromusculoskeletal- and movement-related functions	3			d465 – moving around using equipment	1		

(*Continued*)

Table 3. (*Continued.*)

Body function		Body structure		Activities and participation		Environmental and personal factors	
ICF code	N	ICF code	N	ICF code	N	ICF code	N
b144 – memory functions	2			d620 – acquisition of goods and services	1		
b280 – sensations of pain	2			d630 – preparing meals	1		
b125 – activity level	1			d650 – caring for household objects	1		
b134 – sleep functions	1						
b147 – psychomotor functions	1						
b163 – basic cognitive functions	1						
b460 – sensations associated with cardiovascular and respiratory functions	1						
b715 – stability of joint functions	1						
Total	381		238		273		60

Table 4. Statistical differences between groups

Pairs	95% CI of the difference Lower	Upper	*p*
Pair 1: Body function and structure (N = 619) – Activities and participation (N = 273)	−381.0090	−380.9910	<0.001
Pair 2: Activities and participation (N = 273) – Environmental and personal factors (N = 60)	177.9910	178.0090	<0.001
Pair 3: Body function and structure (N = 619) – Environmental and personal factors (N = 60)	−559.0090	−558.9910	<0.001

Note: CI: confidence interval.

the medical factors and model of assessment neglect considering the contributions of the biopsychosocial model of assessment. Viewing dysfunction through the narrow focus of the medical model (which is strictly concerned with organic dysfunctions) can easily translate to health-care professionals being concerned only with the physical aspects of disease (Farre and Rapley, 2017), which is translated as 'the body' in the ICF. This can place a limitation on the conceptual thinking about assessing fall risk in older adults as it obscures the fact that fall risk assessment in older adults is a collaboration between health-care professionals and older adults, and not just a medical procedure (Légaré *et al*., 2018). Health-care professionals could address the older adults' needs more comprehensively by assessing all areas in their lives that could contribute to and increase their risk of falling. Otherwise, by focusing purely on the medical or body aspects when discussing fall risk in older adults, the assessment and intervention process can easily become restrictive as the medical model for intervention is inadequate (Jensen, 2006). Although a need for further research to address problems in implementing a biopsychosocial model to assessment and intervention remains, changes could be facilitated by bringing evidence-based research to health-care professionals on the needs of specific populations (Farre and Rapley, 2017), such as older adults with a risk of falling.

By shifting the focus away from cause towards impact – such as the impact of the limitations in older adults' ability to participate in life situations and engage in activities – all health conditions are placed on an equal footing and allowed to be compared using a common metric, the ruler of health and disability (World Health Organization, 2002). When fall risk in older adults is assessed through the lens of the impact of the condition on the individual, older adults are viewed holistically by also considering the activities in which they participate and the environment in which these activities take place. Hence, the ICF highlights the value of including not only activities and participation, but also the impact of environmental and personal factors on a person's abilities in the assessment of health, thereby reiterating that the focus of FRATs should also move towards including these factors. Our results indicated that of the 22 FRATs developed after 2001, all but three FRATs still focused mainly on the body. By neglecting to focus on the individual and environmental levels when assessing fall risk in older adults, important factors, such as quality of life, participation in activities, housing, family caring and even access to health-care services, could be omitted in the older adult's intervention plan.

We found that only a minimal number of codes representative of the environmental influence of fall risk were represented in the FRATs. Within this small number of environmental codes, the majority of these codes were linked to the use of medication. So even when the effects of personal and environmental factors on fall risk is mentioned, the impact of the medical model is still prevalent in the significant number of codes mentioning medication. This could also be because a vast amount of research has been done on the topic of fall risk and medication use. By moving away from the medical model, towards a biopsychosocial model, even our knowledge of the environmental and personal effect of falls on older adults could be enhanced. A major part of existing literature focuses on risk factors in isolation (Ek, 2019), ignoring possible interactions that other factors could have on older adults' fall risk. As risk factors seem to cluster within older adults, it is suggested that both the clinical and research focus of assessing fall risk in older adults should focus more on the whole risk profile of the individual as well as on the effect of cumulative risk, rather than on isolated, medical risk factors (Ek, 2019).

This begs the question of whether activities and participation, as well as environmental and personal influences, do not perhaps play a bigger role in increased risk of falling than is currently addressed by available FRATs. The medical focus of the most popular tools used could also discourage health-care professionals from adopting a more biopsychosocial model as they continue to use – on a regular basis – FRATs focused on the medical model. This could be because health-care professionals see the available and validated FRATs as reliable and do not feel the need to search beyond these factors. Health-care professionals should be able and ready to evaluate all factors contributing to a condition, not only the ones they are used to, and also not just the factors supporting a biological or organic cause of the condition (Farre and Rapley, 2017). By moving away from a medical model and towards a biopsychosocial model such as the ICF, it is during intervention possible to evaluate and consider the effects of fall risk on activities and participation in older adults, as well as the contributing environmental and personal factors.

One way of moving the discourse around environmental and personal factors on fall risk assessment forward could be to capture the perspectives and views of the older adults themselves about their perceptions on their own risk of falling in a qualitative research study on how fall risk assessment in older adults could be improved. As falls and fall risk is a multi-dimensional construct, particularly in older adults, a comprehensive ICF-based FRAT, that not only reflects a medical perspective (with a focus on the body), but that also captures older adults' perceptions and views about individual factors (related to activities and participation), as well as the influence of the environment, could lead to a more holistic assessment and intervention focus in future.

Limitations of this review

This review did not include all the FRATs identified in the search, as some tools (N = 6) were not available to the researchers. It also did not include only standardised tests, but all FRATs – regardless of normative data. Many of the included

FRATs (N = 29) were only mentioned in one or two of the included studies, which may have influenced the data extraction. No computer-based FRATs were included, which may have resulted in some FRATs, such as the Aachen fall prevention app (Pape *et al.*, 2015), not being included in our review. Only FRATs aimed at the adult population were included in the review and all FRATs based on a specific medical condition (*e.g.* traumatic brain injury, physical disabilities, visual disabilities, diabetic peripheral neuropathy) were excluded.

Recommendations and conclusion

This review highlighted the fact that current FRATs focus on the body, neglecting environmental and personal factors and, to a lesser extent, activities and participation. This over-reliance on the body as the point of failure in fall risk assessment clearly highlights the need for gathering qualitative data, such as from focus group discussions with older adults, to capture the perspectives and views of the older adults themselves about the factors that increase their risk of falling and comparing these perspectives to the data gathered from published FRATs as described in this review.

Furthermore, fall risk assessment should be a multi-disciplinary approach and, as such, data from different disciplinary backgrounds should be collected to determine the factors related to fall risk as identified by each discipline that is involved in fall risk assessment of older adults. The FRATs identified in this review were mostly aimed at the hospital setting, whereas future research should include data for fall risk assessment among community-dwelling older adults, as more and more older adults choose to live in these contexts for a longer period of their lives. Future qualitative research could enhance our knowledge of the experiences of older adults with regard to fall risk and how to address older adults' needs better. Insight into the perceptions of older adults relating to fall risk could expand the body of knowledge on falls, related injuries and preventive measures for both older adults and the professionals working with them (Gamage *et al.*, 2018).

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Appendix 3D: Permission from Ageing and Society

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Cc:
Bcc:
Subject: Re: Ageing & Society - Decision on Manuscript ID AGE-19-0225.R2
From: Miles Lambert Tuesday 01/06/2021 01:30 PM

History: This message has been replied to.

Dear Dr de Clercq

Thank you very much for your email. This will be fine. The copyright form you signed permits you to use the manuscript in this way.

Best regards
Miles

Miles Lambert Ageing and Society

Appendix 3E: Older adults' perspectives on fall risk: Linking results to the ICF

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Older Adults' Perspectives on Fall Risk: Linking Results to the ICF

Hendrika de Clercq[1], Alida Naudé[1], and Juan Bornman[1]

Abstract

The aim of this study is to establish the perceptions of older adults in the South African context regarding falls and to link these perceptions to the International Classification of Functioning, Disability and Health (ICF). Data were analyzed by a summative, conventional, and deductive approach. The analysis indicated that the Body Function and Structure codes were most frequently used during the discussions, but the contextual analysis of the most frequently used categories indicated that Activities and Participation were the participants' main focus. The main focus of fall assessment in older adults should therefore be on Activities and Participation, as this can assist them in decreasing their fall risk, irrespective of whether they had a previous fall. Contrary to the majority of current literature on falls, this study included both participants who had fallen and those who hadn't, resulting in richer data and themes gathered from the focus groups.

Keywords

disability and health, falls, fall risk, fall perception, focus groups, ICF, International Classification of Functioning, Disability and Health, older adults

> The people who are most afraid of falling are the ones who fall most.
>
> It's a fact that's been established through biomedical research.
>
> People who are afraid think: As long as I don't move, I can't fall down.
>
> Their physical condition and motors skills decline rapidly,
>
> and so they are bound to fall more often—on their way to the loo, for instance.
>
> That's the fall paradox for you in a nutshell
>
> —Groen (2016, p. 269).

Introduction

As Hendrik Groen, an 83¼-year-old Amsterdammer revealed, the fall paradox is a tricky "thing" that often starts with a fear of falling, leading to reduced function in those who fall, which in turn results in reduced health-related quality of life (HRQoL; Álvarez Barbosa et al., 2016). Falls can result in serious injuries, decreased mobility, reduced independence, imbalance, and deterioration of muscle strength. These consequences can increase fall risk in older adults by creating a downward spiral of decline in and loss of activity, causing the older adult to come closer to the critical threshold of functioning needed to perform everyday activities (Florence et al., 2018; Skelton & Beyer, 2003).

Older adults often find it challenging to establish a balance between taking risks and engaging in opportunities to be independent in daily life (Tinetti & Kumar, 2010). On one hand, older adults might be afraid of falling, which could result in reduced participation in activities inside or outside the house, in an attempt to avoid falling (Haines et al., 2015). This can lead to a reduction in the older adult's ability to exercise and interact with others, which in turn can result in physical deterioration that increases fall risk and curtails the older adult's independence (Reinoso, Mccaffrey & Taylor, 2018). On the other hand, even though falls are the leading cause of injury in older adults (Jin, 2018), they do not necessarily consider themselves as becoming part of these statistics (Gamage et al., 2018). They might underestimate their fall risk due to an inflated

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positive perception of their own state of health and levels of participation (Hughes et al., 2008). Participation entails two dimensions, namely attending (only being physically present) and involvement (which activities the older adult is participating in, while being physically present) (Adair et al., 2018; Imms et al., 2017). Although increased participation is an important part of independence in an older adult's life, it could potentially lead to more falls, injuries and reduced HRQoL (Haines et al., 2015) as both dimensions (attendance and involvement) are at play. Regardless of older adults' perceptions of their own fall risk, they generally consider falls to be an important and preventable issue and will even offer their peers advice on fall prevention (Stevens et al., 2018).

Over the past three decades, fall risk research mainly focused on risk factors as well as on prevention and intervention programs (Park, 2017). These fall risk factors mainly involved medical risk factors relating to the peripheral and central nervous systems which play a major role in mobility and falls (Ambrose et al., 2013), while the older adults' perceptions about falls and fall risk factors received less attention. However, research has shown that perceptions play an important role in limiting older adults' fall risk (Gamage et al., 2018). Clancy et al. (2015) state that both older adults and practitioners generally assume that appropriate physical and social environments can prevent falls, but that the "symbolic environment" associated with falls (such as spirituality and contributing to society with meaningful activities) might not be considered. Insight into the perceptions of older adults related to fall risk could increase the level of knowledge on falls, related injuries, and preventive measures for both older adults and the practitioners working with them (Gamage et al., 2018).

One of the challenges to building knowledge relates to the lack of a holistic, universal categorization to describe and understand the perceptions of older adults related to falls and fall risk. In this article, we propose the use of the International Classification of Functioning, Disability and Health (ICF) as a framework for this purpose. A framework such as the International Statistical Classification of Diseases and Related Health Problems (ICD), in contrast, focuses on classifying diseases and other health problems associated mainly with bodily disfunctions (World Health Organization [WHO], 2004). The ICF views functioning and disability as outcomes of interactions between the health condition (in this case, falls) and the contextual factors (in this case, fall risk factors), which include physical environmental risk factors such as natural or man-made products or environments (de Clercq et al., 2020). This framework has allowed us to code the older adult's perception of fall risk factors into three categories, namely, (a) Body Function and Structure, (b) Activities and Participation, and (c) Environmental Factors. Using the ICF provides a scientific basis for understanding older adults' perceptions of fall risk factors and yields a holistic model and universal language for health care practitioners (HCPs) to describe and classify these perceptions. This increases the possibility of early identification of fall risk factors in older adults (WHO, 2002).

As a qualitative approach, focus groups generate excellent data on the group's views, beliefs, and perceptions. Fall risk and fall risk assessment are multidimensional constructs and should include not only clinical and research perspectives, but also the perspective of the target population. Currently, HCPs approach fall risk assessment and the development of prevention strategies from their own perspective (Yen et al., 2014). To guide multidisciplinary assessments and daily clinical practice, ICF code sets are proposed as a framework, as they are purpose-orientated and clearly demarcate the areas of assessment (Yen et al., 2014). In clinical practice, ICF code sets allow for precise and detailed descriptions of a person's health status, allowing for comparison and agreement between HCPs (Tate & Perdices, 2008). Currently, no such code set exists for fall risk assessment in older adults. By including the older adults' perspectives in the development of a code set that could be used as an assessment tool, a comprehensive ICF code set could be developed. This will equip HCPs to assess this population in a holistic manner and not merely based on their own subjective perspectives. The study, therefore, provides insight into the perceptions of older adults in the South African context with regard to falls and links these perceptions to the ICF (Desai & Potter, 2006).

Method

Study Design

A focus group methodology was used. Focus groups have the potential to elicit and bring to the fore new information through the continuous exchange of experiences. This triggers new thoughts and associations that provide the researcher with an in-depth understanding of the relevant research constructs (Nyumba et al., 2018).

Participants

Participants were selected based on criteria related to age, literacy, corrected vision and hearing, intelligible speech, as well as the self-reported absence of any neurological diagnoses (Table 1).

Participants were recruited from multicultural "senior citizen" church community groups in the greater Tshwane area to allow for optimal heterogeneity of the selection criteria. These groups were representative of the local residents from all over the area. The focus group discussions were held in both urban and rural areas to include different contexts and be representative of different ethnicities. Thirty-six participants met the selection criteria, including no self-reported neurological diagnosis, other than dizziness or vertigo, and all consented to participate in this study. Each of the three

Table 1. Focus Group Participant Selection Criteria.

Criteria	Method	Theoretical justification
65 years or older	Biographic questionnaire	This study focused on older adults as they are at a higher risk of falling (World Health Organization, 2015).
Basic English literacy skills	Biographic questionnaire	The questionnaires were administered in English, as it is one of the most frequently spoken languages in Tshwane (South African Government, 2018).
Corrected vision and hearing within the normal limits	Participant selection screening questionnaire	Best corrected hearing within normal or near-normal limits was required to actively participate in the focus groups, while best corrected vision was required to complete the questionnaires (Trujillo Tanner et al., 2018).
Basic communication skills	Participant selection screening questionnaire	Basic communication skills ensured all participants had equal opportunities for verbal engagement during the focus group discussions (Carey & Asbury, 2012).
No self-reported neurological diagnosis, excluding dizziness or vertigo	Participant selection screening questionnaire	Falls could occur due to neurological diseases and for the purposes of this study any additional neurological contributing factors, other than vertigo or dizziness, were excluded (Homann et al., 2013).

Table 2. Materials and Equipment for Focus Groups.

Materials and equipment	Aim	Rationale	Method
Participant selection screening and biographic questionnaire	To ensure that participants meet the selection criteria and for descriptive purposes.	A quick and easy way to ensure participants meet the selection criteria and to increase the validity of the study (Sargeant, 2012).	Participants completed the screening questionnaire prior to commencement of the focus group discussions.
Focus group script (see Table 3 for more details)	To explore the areas deemed important by the participants regarding fall risk.	Method to structure the group and ensure that the discussion remains focused. Ensures procedural consistency across the three groups to heighten the data integrity (Hennink, 2014).	During the focus group discussions, the script was followed to ensure that all areas and questions were addressed in a similar manner across the three focus groups.
Voice recording	To document all verbal discussions with the participants during the focus group discussions.	Reviewing recorded data increased the validity of the data and the study (Gregory & Radovinsky, 2012) and assisted with transcriptions.	All focus group discussions were recorded for verbal interactions.
Field notes	To document all relevant nonverbal information obtained during the focus group discussions.	Reviewing notes on nonverbal interactions can increase the validity of the recorded data and provide context to the data (Gregory & Radovinsky, 2012).	Field notes were made of relevant nonverbal interaction in the focus groups.

focus group discussions, lasting 60 to 90 min, contained a mixed sex group (males and females) of 10 to 15 participants (Stewart & Shamdasani, 2014).

Materials and Equipment

Table 2 summarizes the materials and equipment used to conduct the focus groups and includes the aim, rationale, and method.

The custom-designed materials enabled the researcher to gain a rich and clear understanding of the perceptions of the older adults during the focus group discussions. The focus group script (Table 3) contained specific steps to conduct the focus groups to ensure that the discussion remains focused, ensures procedural consistency, and heightens data integrity.

The two specific questions asked to the groups were "Which factors do you think can increase your chance of falling?" and "Which factors do you think can decrease your chance of falling?" As the questions were broad enough to ensure a wide variety of answers, prompts were used only to gather specific information from the participants related to ICF categories. This ensured that the aim of the article was achieved by gathering the older adults' perceptions regarding fall risk.

Table 3. Focus Group Script Used During the Discussions.

Focus group script item	Procedure
Welcome and introduction	The researcher welcomes everyone to the discussion and introduces herself and her colleague. All the participants introduce themselves
Housekeeping rules	The following housekeeping rules are discussed: *Everyone is encouraged to participate *No one will be forced to participate *All answers/opinions are encouraged—there are no "dumb" questions or comments *Everyone's opinion is important *No one is to laugh at or dismiss another person's opinion/comment *Only one person should talk at a time and give everyone equal opportunity to participate *The researcher will ask a few questions, but you are welcome to go back to a previous question if we have already moved to the next question *All participants should have completed the informed consent form and the biographic questionnaire before we can continue the discussion
Ice breaker	The ice breaker question is discussed "If you had to give up one of your senses (hearing, seeing, feeling, smelling, tasting) which would it be and why?"
Short introduction of the research aim	The researcher explains the aim of the study to the participants: "This research study focuses of falls in older adults and aims to develop a list of factors that can influence an older adult's risk of falling."
How can participants help to achieve these aims	The researcher explains that the aim of the focus group is to identify the factors older adults (participants) consider to be facilitators (decrease your chances of falling) and barriers (increase your chances of falling) to the identification of fall risk in older adults. The participants can assist by giving their input on these factors.
Discussion questions	1. Which factors do you think can increase your chance of falling? (Prompts if needed: Prompt about specific factors related to (a) body functions and structure level, (b) activities and participation level, and (c) environmental factors.) 2. Which factors do you think can decrease your chance of falling? (Prompts if needed: Prompt about specific factors related to (a) body functions and structure level, (b) activities and participation level, and (c) environmental factors.)
Member checking	The participants' responses are summarized and read back to them. They are invited to make changes, add information, or clarify their contributions.
Closing	The researcher thanks everyone for their time and contribution and the session is closed.

Data Collection Procedure

Our research team consisted of audiologists and speech-language therapists who are well versed in fall risk, disability, and the ICF. The current study constitutes the initial part of a larger research project aimed at developing an ICF code set for assessing fall risk in older adults.

Ethics permission was obtained from the relevant university's Ethics Committee. Participants were recruited via local church groups in the greater Tshwane municipality. The contact persons of five church groups were contacted, and their groups were invited to participate in the study. Three responded. The first author visited two of these contact persons and had a telephonic conversation with the third group, explaining the purpose and selection criteria of the study. A time and date to conduct the focus group discussion was arranged at the venue where their weekly meetings take place. This made the participants feel comfortable in familiar surroundings and no additional logistical arrangements and costs (e.g., travel) had to be incurred.

In the first group, on average, 12 to 14 adults attended the meetings; in the second group, 12 adults usually attended; and in the last group, the average number of attendees was 20. On the day of the meeting of the first focus group, 14 potential participants attended and all of them met the selection criteria and agreed to participate. When the second group met, 10 adults complied with the selection criteria and agreed to participate. Due to the weather, only 12 adults attended the meeting of the third group, and all of them met the selection criteria and agreed to participate. The meetings of the first and second focus groups were conducted in Afrikaans and the third group in English. All the participants were conversant in the specific language used in the focus group and this language was also used for their weekly meetings.

The aim of the focus groups and research study was explained to the participants at the beginning of the gathering, as per the focus group script. All participants completed a biographical questionnaire. Questions that arose about the study were discussed and the participants were alerted to the fact that the discussion would be audio recorded for data analysis. The researchers and participants were introduced to one another and housekeeping rules were discussed. As the participants knew each other, rapport was quickly established. During the discussion, the researchers also made notes of the discussion to assist with member checking.

The focus group commenced with an ice breaker question. This served as an interactive and engaging start to the session to create a sense of familiarity among the participants and the researchers, strengthen group cohesion, and to lay a foundation for discussing fall risk and its consequences in older adults. Although participants were encouraged to participate and freely share their thoughts and ideas about falls and fall risk, they were not forced to interact. At the end of the focus group meeting, the participants were encouraged to add their final thoughts and ideas on the topic until no further information was given, signaling data saturation. Member checking was done by reading a summary of the main discussion points back to the participants, thereby providing them the opportunity to clarify their contributions or add additional information. In all three focus groups, minimal clarification or additions were made and all participants agreed that the final script was reflective of the discussions.

Rigor

Three groups were recruited from diverse backgrounds to ensure that multiple perspectives were obtained. A focus group script was used to ensure consistency between the groups and participant verification (member checking) was done. Member checking, or response validation, is one of the most crucial techniques for establishing credibility in qualitative studies (Birt et al., 2016). This also facilitated a shared understanding, which further improved the accuracy of the data collected (Harper & Cole, 2012).

Data Analysis Procedures

Verbatim transcripts of the three focus group discussions were collapsed into one data source for analysis. To determine the perceptions of older adults regarding their risk of falling and to link these perceptions to the ICF, data analysis consisted of three approaches to content analysis, namely a summative, conventional, and directed approach.

First, in the summative approach, a latent content analysis procedure was used by transcribing the three focus group discussions and then analyzing the data by using ATLAS.ti 8, a workbench for the qualitative analysis of large bodies of textual data (http://atlasti.com).

Thereafter, a conventional content analysis approach was used by following an inductive thematic data analysis procedure, as suggested by Clarke and Braun (2017), which entailed (a) familiarization of the raw data by exploring the transcribed data of all three focus groups; (b) creating a coding manual to code the data, making sure to capture both the semantic and conceptual meaning; (c) searching for themes by grouping codes with a similar meaning together; (d) reviewing themes independently and grouping related themes together in domains that reflected the most prominent ideas; (e) defining and naming the themes and reaching consensus between the researchers on the themes; (f) writing up the data to reflect the themes identified in the focus group data.

Next, a directed content analysis approach was followed and a deductive data analysis was made to link the identified themes to the ICF, using the ICF linking rules (Cieza et al., 2019). This allowed the researchers to categorize the older adults' perceptions.

All three researchers were familiar with linking qualitative data codes to ICF codes and therefore independently reviewed the themes and linked them to the ICF. A 96% agreement score between the authors was obtained and, after discussion, 100% consensus was reached on all themes and ICF codes. This resulted in a total of 298 ICF codes.

Finally, a summative content analysis was made in the form of a word frequency count. This determined the amount of times specific words were used during the focus group discussions, resulting in a word frequency list with a total of 2,250 unique words. Summative content analysis identifies and quantifies certain words in a text with the purpose of understanding the contextual use of the words or content and to explore usage.

Findings

Our three focus groups included a total of 36 participants, illustrated in Figures 1 and 2.

The older adults' perceptions relating to fall risk awareness in everyday life allowed for the identification of three main sets of data, namely, (a) thematic data analysis that resulted in 104 focus group themes; (b) deductive analysis that linked the focus group themes to the ICF, resulting in 298 ICF codes; and (c) word frequency count analysis that determined the most frequently used keyword categories (used 10 or more times) in the focus groups ($n = 31$).

The first category captured a spectrum of possible reasons that could increase fall risk. The predominant reasons for explaining an increased risk of falling were "floor surface" ($n = 18$), "know your own limitations" ($n = 9$), "fear of falling" ($n = 8$), "exercise" ($n = 7$), "vision" ($n = 7$), "animals" ($n = 6$), "hand railings on stairs" ($n = 6$), "blood pressure" ($n = 5$), and "shoes" ($n = 5$).

The second category resulted in a deductive analysis of the focus group codes, which was used to link the focus group themes to the ICF ($n = 92$). A total of 92 focus group themes were linked to the ICF and due to the nature of the linking rules; one focus group theme could appear in more than one ICF category (results indicated in Table 4). Three themes could not be linked to the ICF, as Personal Factors, namely "age" and "trust in God" and "medical conditions"—items that would typically be coded as ICD codes. The 92 themes resulted in a total of 298 ICF codes, as depicted in Table 4.

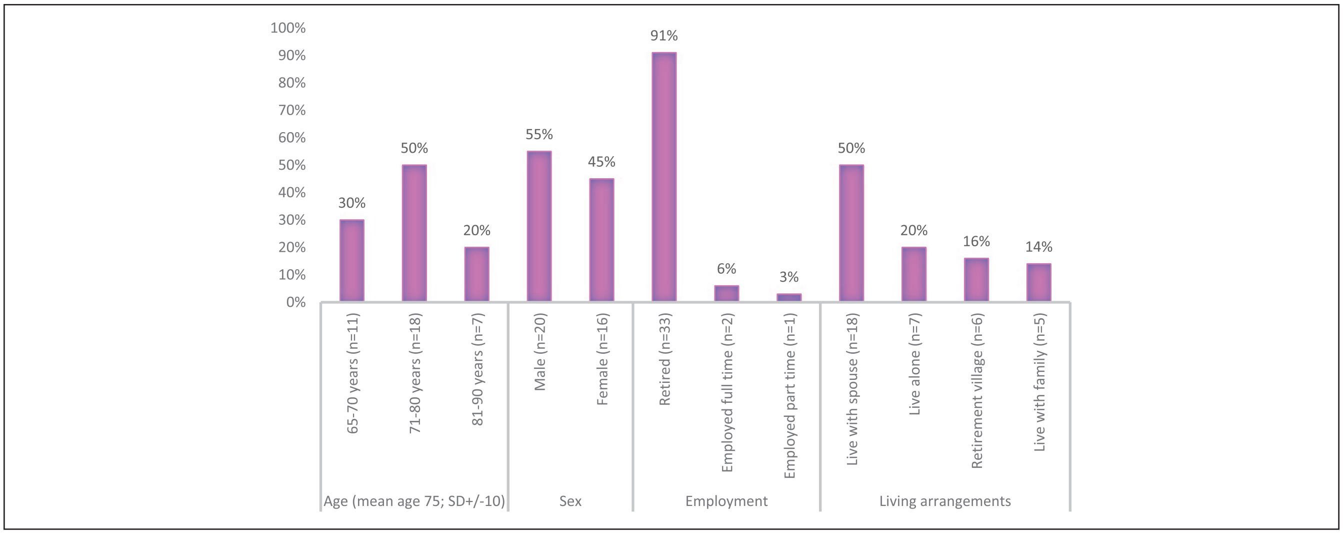

Figure 1. Participant biographic information ($n = 36$).

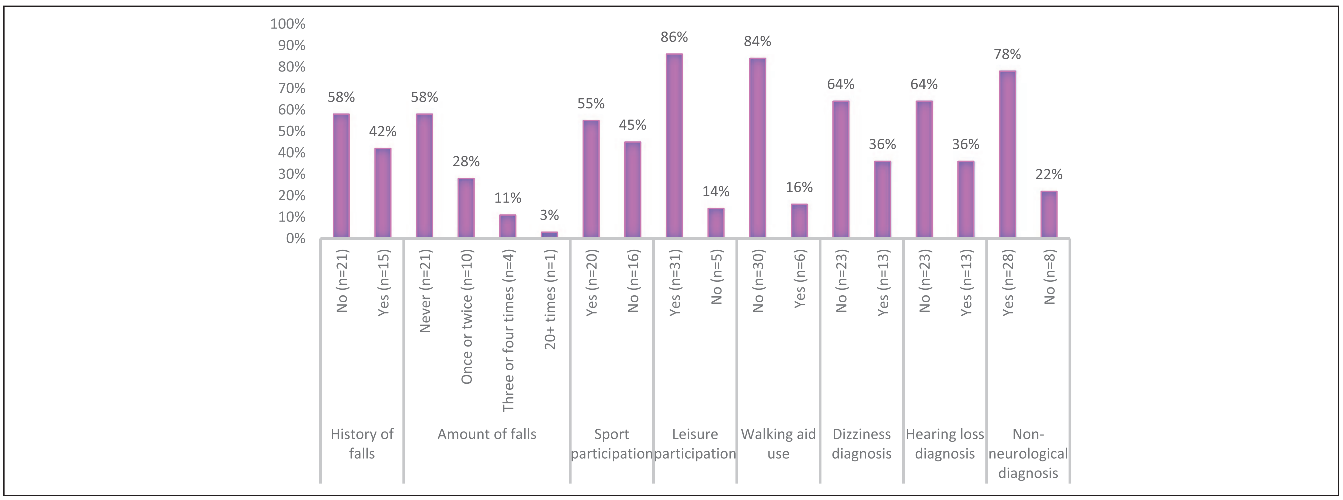

Figure 2. Participant case history relevant to falls ($n = 36$).

The items in each ICF category depicted in Table 4 are shown in decreasing order from the code mentioned most frequently to the code mentioned least in each section. The totals of the three ICF groups were analyzed using IBM's Statistical Package for the Social Sciences 24 (SPSS) (IBM 2016). Data were checked for normality using the Shapiro–Wilk test, which indicated that each group shows a significance of $<.05$, thereby not exhibiting normal distribution of the data. Next, the Friedman two-way analysis of variance (ANOVA) test was conducted to test for significant differences between the three groups of data (Body Function and Structure, Activities and Participation, and Environmental Factors). Results indicated a statistical difference between Body Function and Structure compared with Activities and Participation ($p < .0001$), as well as between Activities and Participation compared with Environmental Factors ($p < .0001$). There was no statistical difference between Body Function and Structure compared with Environmental Factors ($p = .2158$).

Due to the fact that the linking of keywords to the ICF takes into account textual meaning only and not contextual meaning also, a word frequency count was analyzed. All words contained in the core vocabulary of older adults as identified by the University of Nebraska–Lincoln, were disregarded from the 2,250 unique words, except for four words that were directly related to the topic ("hearing," "step," "walking," and "hands"). The remaining fringe words relevant to the context and topic discussion in the focus groups ($n = 267$) were then analyzed for frequency

Table 4. Results of Themes Linked to the ICF.

Body function and structure	Activities and participation	Environmental factors
b152—Emotional functions (*n* = 24)	d110—Watching (*n* = 13)	e150—Design, construction and building products, and technology of buildings for public use (*n* = 37)
b210—Seeing function (*n* = 13)	d460—Moving around in different locations (*n* = 10)	e155—Design, construction and building products, and technology of buildings for private use (*n* = 21)
b770—Gait pattern function (*n* = 10)	d429—Changing and maintaining body position, other specified and unspecified (*n* = 8)	e115—Products and technology for personal use in daily living (*n* = 11)
b755—Involuntary movement reaction functions (*n* = 8)	d920—Recreation and leisure (*n* = 8)	e350—Domesticated animals (*n* = 8)
b760—Control of voluntary movement (*n* = 8)	d410—Changing basic body position (*n* = 5)	e140—Products and technology for culture, recreation, and sport (*n* = 8)
b140—Attention functions (*n* = 6)	d449—Carrying, moving, and handling objects, other specified and unspecified (*n* = 2)	e110—Products or substances for personal consumption (*n* = 7)
b125—Activity level (*n* = 5)	d455—Hand and arm use (*n* = 2)	e580—Health services, system, and policies (*n* = 4)
b122—Global psychosocial functions (*n* = 4)	d430—Lifting and carrying objects (*n* = 1)	e120—Products and technology for personal indoor and outdoor mobility and transportation (*n* = 4)
b530—Weight management functions (*n* = 3)	d415—Maintaining a body position (*n* = 1)	e315—Extended family (*n* = 3)
b139—Global mental functions, other specified and unspecified (*n* = 2)	d420—Transferring oneself (*n* = 1)	e310—Immediate family (*n* = 3)
b420—Sensations associated with hearing and vestibular function (*n* = 2)	d450—Walking (*n* = 1)	e240—Light (*n* = 3)
b134—Sleep functions (*n* = 2)		e225—Climate (*n* = 2)
b126—Temperament and personality functions (*n* = 2)		e298—Natural environment and man-made changes to environment, other specified (*n* = 2)
b163—Basic cognitive functions (*n* = 1)		e230—Natural events (*n* = 2)
b144—Memory functions (*n* = 1)		
b749—Muscle functions, other specified and unspecified (*n* = 1)		
b730—Muscle power function (*n* = 1)		
b260—Proprioception function (*n* = 1)		
b715—Stability of joint function (*n* = 1)		
b235—Vestibular functions (*n* = 1)		
b545—Water, mineral, and electrolyte balance function (*n* = 1)		
s798—Structures related to movement, other specified (*n* = 18)		
s770—Additional musculoskeletal structures related to movement (*n* = 7)		
s750—Structure of lower extremity (*n* = 4)		
s730—Structure of upper extremity (*n* = 2)		
s799—Structures related to movement, unspecified (*n* = 2)		
s260—Structure of inner ear (*n* = 1)		
Total: *n* = 131 (44%)	Total: *n* = 52 (17%)	Total: *n* = 115 (39%)

Note. ICF = International Classification of Functioning, Disability and Health.

in context, and words with similar meanings were grouped together. When analyzing the most frequently used words, it is important to consider the context in which they were mentioned, as this reflects the intention of the participants during the discussion (Sutton & Austin, 2015). This analysis resulted in 31 categories of words that were mentioned 10 or more times in the focus groups. The most frequently used category was "fall" (*n* = 213), indicating the focus groups stayed on topic during the discussion. Other than "fall," only one category was used more than 100 times, namely "vision" (*n* = 110). Four categories were used 76 to 100 times, namely, "single steps" (*n* = 97), "walking" (*n* = 90), "floor surface" (*n* = 96), and "change in body position" (*n* = 95). The two words mentioned 51 to 75 times were "age" (*n* = 63) and "bones" (*n* = 59). Eight words were mentioned 26 to 50 times, namely, "hands" (*n* = 45), "ladders" (*n* = 35), "bathroom" (*n* = 34), "hearing" (*n* = 34), "environments" (*n* = 33), "walking aids" (*n* = 29), "feet" (*n* = 28), and "animals" (*n* = 26). The remaining 15 words were mentioned 10 to 25 times.

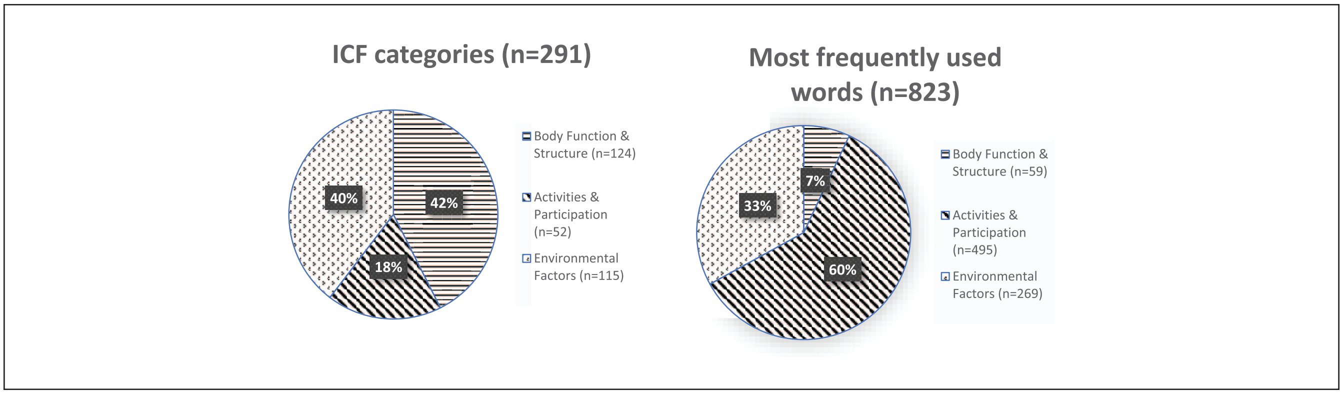

Figure 3. ICF categories of all codes ($n = 291$) compared with most frequently used word categories ($n = 823$).
Note. ICF = International Classification of Functioning, Disability and Health.

Of the most frequently used categories, the top 8 were also categorized under the ICF, namely, "fall," "vision," "steps," "floor surface," "change in body position," "walking," "age," and "bones." These words/phrases were mentioned a total of 823 times and compared with the total amount of ICF codes ($n = 298$) generated during the focus group discussions (Figure 3).

Figure 3 highlights the difference between linking all the textual words to the ICF and linking to them the most frequently used categories, within the context of the discussion.

Discussion

Participants were able to stay on topic, as is indicated by the fact that "fall" was the most used word during the discussion. Environmental Factors such as "floor surface," "fear of falling," "animals," and "shoes" were frequently mentioned. This correlates with a recent study by Hanger (2017) that suggests that changing standard floor surfaces to low-impact floor surfaces can significantly reduce fall-related injuries, although it does not alter the overall risk of falling. The idea of injury-reducing flooring was also embraced by older adults in a study by Gustavsson et al. (2018), indicating that this could be a significant method of reducing fall-related injuries in homes and hospitals. A study by Brundle et al. (2015) suggests that an unfamiliar or unsafe environment, inside or outside the house, is not in itself a risk factor for falls in older adults, but rather that the person's ability to cope with the environment and their interaction with the environment are significant.

As part of a person's interaction with the environment, one also has to consider the role of older adults' reaction time and the effect of reaction time on mobility and gait. Declines in physical and cognitive functioning are indeed risk factors for falls in older adults, as their postural control and attention demands and abilities decrease compared with younger adults (Jehu et al., 2017). Exercises and intervention programs could be beneficial for improving gait, reaction time, and dynamic postural control in older adults, which could lead to a decreased risk of falling (Morrison et al., 2014).

The results from the textual analysis indicated that Body Function and Structure codes were identified most frequently. This correlates with Pohl et al. (2015) who also found that participants often mentioned the aging body and physical impairments as reasons for increased fall risk. Physical impairment and several medical conditions, including central nervous system disorders that could increase older adults' fall risk, were regularly mentioned during the discussion. This corresponds with the findings of Ensrud et al. (2003) who indicated that the use of certain central nervous system drugs could lead to increased physical impairments and falls.

Textual analysis, as used when using the linking rules to link all the themes to the ICF, focuses just on the text itself, whereas contextual analysis, as used when linking the most frequently used categories to the ICF focuses on the surrounding conditions and environment in which the text was written—in this case, the focus groups (Drisko & Maschi, 2016). Comparing the textual and contextual analysis between all the themes and the most frequently used categories, the results are vastly different, indicating the importance of considering the context in which the words were used. This supports the notion of Gamage et al. (2018) that we should use patient narratives to increase our knowledge on falls and preventive measures for older adults.

The contextual analysis of the most frequently used categories indicated that Activities and Participation was the main focus of these discussions. Participants were more concerned about the impact that falls have on their ability to participate in daily activities than about their physical limitations such as age or medical conditions. As they age, the HRQoL of older adults might be influenced by declining physical health and functioning, due to the age-related changes in their bodies (Halaweh et al., 2018). This could lead to older adults being less active and less engaged in their daily life and recreational activities. The study by Gustavsson et al. (2018) came to the same conclusion, stating that participants were less interested in focusing on fall risks and more interested in discussing the impact falls have on social interactions and issues concerning daily activities. They further mention that older adults view falls as common and normal, and not as something out of the ordinary in the aging population. They also reiterated that most older adults find it difficult to establish a balance between taking risks and engaging in opportunities of being independent in their daily life (Tinetti & Kumar, 2010), which could lead to falls and a reduced HRQoL. Focusing on Activities and Participation also supports the notion by Johnson (2018) that increased knowledge of the activities that are linked to falls could be a valuable contribution to the prevention of falls in community-dwelling older adults.

Involvement in everyday activities, both social and mental, and maintaining such an involvement, is one of the factors that can increase a person's HRQoL (Nightingale et al., 2018). Participating in different life events is important for HRQoL; however, information about how falls restrict participation among older adults remains scant. A recent study by Liu (2017) indicates that about 70% of community-dwelling older adults experience participation restrictions. This supports the data gathered in this study and the notion that older adults' fall-related discussions indeed center around Activities and Participation, which is significantly related to fear of falling and could lead to a reduction in HRQoL (Pohl et al., 2015). Fear of falling could include fear of the actual fall, fear of the physical consequences, fear of pain, fear of loss of independent living, and/or fear of being embarrassed (McMahon et al., 2011). It is therefore important for HCPs to recognize and take into account how older adults view falls, including their fear of falling, and how these perceptions may influence their daily activities and subsequently their HRQoL (Trujillo et al., 2014). Fall prevention is an important contributor to good health and improved HRQoL, and for older adults, it is imperative to stay active despite being concerned about falling (Halaweh et al., 2018).

On conclusion of this study, we were able to provide insight into the perceptions of older adults in the South African context with regard to falls and to link these perceptions to the ICF. This enabled us to identify certain key themes from these discussions, namely, (a) older adults perceived environmental factors such as floor surfaces, animals, and footwear to be contributing factors that could increase their risk of falling; (b) they considered falls to have a significant impact on their ability to participate in daily activities and life events; (c) participation in activities was more important than the physical limitations that medical conditions or age placed on their lives; and (d) they considered falls to be common and normal in the aging population. The final theme highlighted the importance of taking notice of older adults' narratives, including their fear of falling, and to increase clinical knowledge on falls and provide preventive measures for this population. The identified themes are important for further research and the scientific discourse could be moved forward by comparing the perceptions of the older adults to the perceptions of HCPs and researchers (as documented in the literature dealing with falls in older adults), thereby compiling a holistic picture based on the aspects considered important by all three sources in assessing fall risk in older adults.

Limitations and Recommendations of the Study

In our focus groups, only two general questions were asked in relation to the participants' perceptions of fall risk in older adults. Further studies could consider asking specific questions regarding each ICF category to elicit more responses. The focus groups were conducted in urban and rural areas to include different contexts and be representative of the local community. Discussions were held only in Afrikaans or English, and thus were representative of the second and third most commonly spoken languages in Gauteng, South Africa (where the focus groups were conducted; South African Government, 2018). Other language groups should also be included in further studies, but although different words will be used in different languages to describe their experiences, it is expected that the essence of the construct will remain the same, regardless of the language used to describe it.

Implications and Conclusion

Based on this study, the main focus of fall assessment and fall intervention in older adults should be on Activities and Participation. Older adults might perceive falls as a common occurrence related to age, but by decreasing their fall risk, HCPs could assist them in improving their HRQoL. Older people's perspectives in respect of fall risk may influence the attendance and involvement dimensions of the activities they participate in, as well as fall prevention activities (Lim et al., 2018). Therefore, it is critically important during assessment and intervention to include their perceptions on the factors that they consider relevant. In this study, we included both participants who had and who had not fallen previously, which resulted in richer data and themes gathered during the focus group discussions.

Author Contributions

All authors contributed equally to this research paper.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical Approval

The study was approved by the Research Ethics Committee of the University of Pretoria, South Africa. Ethics Approval Reference Number: GW20170917HS.

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Appendix 3F: Permission from the Journal of Applied Gerontology

To: Hendrika de Clercq
Cc:
Bcc:
Subject: Re: Journal of Applied Gerontology - Decision on Manuscript ID JAG-20-0015
From:

History:

Dear Hendrika,

I have checked with the editor-in-chief, Dr. Julie Robison who has given you permission to use the article in your thesis, but wanted to make sure you cited it was in *JAG* and used the final form of the revised manuscript in your appendix (JAG-20-0015.R1) that was accepted on May 5, 2020.

Sincerely,
Christine Bailey & Kaleigh Ligus

Managing Editors, Journal of Applied Gerontology jag@uchc.edu

On behalf of:
Julie Robison, PhD
Editor-in-Chief, Journal of Applied Gerontology Professor, University of Connecticut jag@uchc.edu

Appendix 3G: Biographic questionnaire - older adults

Please complete all the questions. All information will be kept confidential and only be used for the intended research study by Hendrika de Clercq. If you are unsure about any questions, please do not hesitate to ask me. There are no right or wrong answers.

Date: ____

First name and surname: ____

1) What is your current age? ……………………………………………..……………………………

2) Are you: ❑ Male ❑ Female

3) What is your home language? ❑ Afrikaans ❑ English ❑ Other, namely: ....

4) Are you currently employed or retired?
   - ❑ Employed, full-time
   - ❑ Employed, part-time
   - ❑ Retired

5) Where do you currently live?
   - ❑ In a retirement village
   - ❑ In a frail care facility
   - ❑ In an apartment or house by yourself
   - ❑ In an apartment or house with a spouse / partner
   - ❑ With family or friends in the same house
   - ❑ In a 'Granny flat' on someone else's property
   - ❑ Other, namely: ……………………………………………………………………………

6) How long have you been living in your current place? ……………………………………………

7) Do you currently participate in any of the following sport activities? Please mark all the activities you participate in on your own or with others:
   - ❑ Bowling
   - ❑ Running / jogging / walking
   - ❑ Ten pin bowling
   - ❑ Chess
   - ❑ Golf
   - ❑ Cycling
   - ❑ None of the above
   - ❑ Other, namely: ……………………………………………..…………………………………

   …………………………………………………………………...………………………………

8) Do you currently participate in any of the following leisure activities? Please mark all the activities you participate in on your own or with others:
   - ❑ Sewing / knitting / embroidery
   - ❑ Reading
   - ❑ Crochet
   - ❑ Mosaic / decoupage
   - ❑ Cooking / Baking
   - ❑ None of the above
   - ❑ Other, namely: ……………………………………………..…………………………………

   …………………………………………...…………………………………………..……………

   …………………………………………...……………………………….………………………

9) Do you currently need assistance walking (e.g. with a walking cane)?
- ❑ No
- ❑ Yes

If yes, please describe current assistance you need while walking: …………...……………….
………………………………………………………………………………………..........................…
……………………………………………………………………………………………………......

10) Have you ever fallen in the past ten years?
- ❑ No
- ❑ Yes

If yes, approximately how many times have you fallen? …………………………………….
If you have fallen, did you sustain any injuries?
- ❑ No
- ❑ Yes

If you did sustain injuries from falling, were you admitted to hospital?
- ❑ No
- ❑ Yes

If you were admitted to hospital after falling, how many times were you admitted to hospital following a fall? …………………………………...……

11) Have you ever been diagnosed with dizziness or vertigo or any other dizziness-related condition?
- ❑ No
- ❑ Yes

If yes, please describe the condition you have been diagnosed with?
……………………………………………………………………...………………...…
……………………………………………………………………...…………………...
………………………………………………………………………………….....……

12) Do you have or think you have a hearing loss?
- ❑ No
- ❑ No, I don't think so, but my spouse / partner / other people complain about my hearing
- ❑ Yes, I have had my hearing tested before, but do not currently wear hearing aids
- ❑ Yes, and I wear one hearing aid in my ………. (left / right) ear
- ❑ Yes, and I wear two hearing aids

13) Do you currently take any chronic medication prescribed by a doctor or healthcare professions?
- ❑ No
- ❑ Yes

If yes, please describe or name the conditions for which you currently take any chronic medication: …………...…………………………………………………………………………
…………………………...........................………………………………………………………
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………………………………………...………………………………………………………….

Thank you for taking the time to complete this questionnaire, your input is appreciated!

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AOSIS

Page 1 of 9 Original Research

The perspectives of healthcare practitioners on fall risk factors in older adults

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Background: Accidental falls could have severe and far-reaching consequences for older adults, their families and society at large. Healthcare practitioners' (HCPs) perspectives on fall risk factors in older adults could assist in reducing and even preventing falls. Currently, no universal tool exists for this purpose. The World Health Organization's globally accepted International Classification of Functioning, Disability and Health (ICF) was used.

Aim: This study aimed to (1) describe the perspectives of HCPs on fall risk factors in older adults in South Africa and (2) link these factors to the ICF.

Setting: Eighteen HCPs participated in two focus groups.

Methods: Using a qualitative research design, an inductive thematic analysis allowed for the identification of important themes, which were linked to the ICF.

Results: The factors mentioned by participants were categorised into 38 themes, which were linked to 142 ICF codes, of which 43% ($n = 61$) were linked to the Body Function category, 23% ($n = 32$) to the Environmental Factors category, 18% ($n = 26$) to the Body Structure category and 16% ($n = 23$) to the Activities and Participation category. HCPs revealed two relevant factors that were not captured in existing fall risk assessment tools (FRATs), namely 'muscle-power functions' and 'mobility-of-joint functions', which directly relate to the ability to execute mobility activities. Combining HCPs' perspectives with other stakeholders and with literature provides a holistic picture of fall risk factors in older adults.

Keywords: disability and health; falls; fall risk; focus groups; ICF; International Classification of Functioning; healthcare practitioners.

Introduction

Accidental falls are the leading cause of injury-related deaths amongst older adults (National Center for Injury Prevention and Control 2019; i.e. individuals older than 65 years of age). Falls are therefore considered one of the five so-called 'geriatric giants', along with dementia, poor mobility, incontinence and polypharmacy (Cumming 2013). Internationally, it is estimated that a third of community-dwelling older adults may experience accidental falls every year, with a potential 35.5% experiencing recurrent falls (Hung et al. 2017). Although research on falls in South Africa is scarce (Kalula et al. 2016), a recent study revealed that falls are the most common injury in older adults for which medical intervention is required (Da Costa 2020). On the African continent, South Africa has one of the highest proportions of older adults, compared with other African countries, such as Angola, Burkina Faso, Gambia and Uganda. This population is expected to grow from 4 million in 2011 to over 10 million in 2030 (Kelly, Mrengqwa & Geffen 2019). Falls in older adults could have severe and far-reaching consequences, not only for the person who falls but also for their family members – as a third-party disability (Hickson & Scarinci 2007) – and for society at large. The International Classification of Functioning, Disability and Health (ICF) describes third-party disability as the disability experienced by significant others as a consequence of their family members' health condition (in this case falls), and the impact this has on the family members' life functioning. As such, falls have several financial and environmental consequences, for instance hospitalisation and early nursing home admission, which may result in a socio-economic burden on the person who falls, family members and the healthcare system (Bird et al. 2013; Howcroft, Kofman & Lemaire 2013; Liu et al. 2017).

The majority of the South African population relies on the public healthcare system – public hospitals, clinics and medical facilities – for medical intervention. The public health system in South Africa is an institution under severe restraint, with a shortage of healthcare practitioners (HCPs), poor leadership and often improper allocation and use of the limited resources (Kelly et al. 2019). Healthcare access, in both the public and the private sectors, is shaped by several factors, including the characteristics, financial position, social capital and level of education of the population and the limited availability of equipment, medicine, skilled HCPs and facilities (Kelly et al. 2019). Although the private healthcare system in South Africa is currently better equipped than the public system with both resources and HCPs, older adults nonetheless experience difficulties in navigating their medical aid funds to cover HCP fees. They also struggle to afford medical co-payments and cope with having to wait several weeks to months for specialist appointments. Because community-dwelling older adults face challenges in accessing appropriate care and support from medical facilities, they often under-utilise the healthcare system or receive insufficient care (Kelly et al. 2019). Because early identification of fall risk factors may potentially decrease the rate of falls in older adults, HCPs could assist in reducing older adults' chances of landing in the healthcare system for falls and fall-related injuries. Healthcare practitioners' play an important role in relieving not only the burden on the healthcare system but also, more importantly, the burden on older adults who have to live with the negative consequences of fall-related injuries. The latter could lead to reduced functioning and decrease these older persons' health-related quality of life (HRQoL; Fahlström et al. 2018). By lowering their fear of falling and improving their physical functioning, HCPs could help to reduce fall risks even more, thus creating a positive and upward spiral of health in older adults (Bjerk et al. 2018).

Despite the relatively small percentage of older adults in South Africa (8.6%) – considering a population size of almost 60 million in 2020 – this translates into an actual figure of more than 5.2 million older adults (South African Government 2018). With the expected growth of this population, as well as the burden that falls in older adults could have on the healthcare system and society at large, it is important to determine the perceptions of HCPs on fall-related risk factors. It is also imperative to use this knowledge to potentially increase early identification of fall risk factors in older adults and so reduce falls and fall-related injuries in this population. Literature is abundant with different factors that could potentially increase this population's risk of falling, although most studies are aimed at hospital settings or at specific medical conditions, e.g. Parkinson's disease or cancer (Myers 2013; Park 2017; Voss et al. 2012). A recent study (Howland et al. 2018) indicated that although almost all HCPs in their sample (n = 97) believed that older adults should regularly be screened (as this could guide HCPs to implement prevention strategies to reduce fall risk in older adults), only half of them felt confident to perform fall risk screenings in this population. Furthermore, these HCPs did not believe that conducting fall risk screenings currently constitutes the prevailing standard of practice in their profession. Some of the reasons for not screening for fall risk as routine practice could relate to limited time to complete such screenings during routine consultations (Hunderfund et al. 2011), not necessarily being compensated for these screening procedures by the healthcare system or medical aids (Howland et al. 2018) and the sheer amount of available screening fall risk assessment tools (FRATs). Another reason may be the fact that FRATs are currently not well-integrated as routine clinical practice in the majority of HCP practices (Howland et al. 2018). Identifying from a clinical point of view, the factors that are most relevant to fall risk in older adults could help to further develop early identification and screening methods to reduce falls in this population.

Reducing and even preventing fall risk in older adults firstly hinges on effective documentation of risk factors, which could then be used to guide further intervention and mitigate fall risk (Reinoso, Mccaffrey & Taylor 2018). One of the key strategies for compiling a list of relevant ICF codes involves determining the perspectives of HCPs on fall risk factors in older adults. Practitioners have an important role to play in identifying fall risk (Liddle et al. 2018), yet their perspectives are not routinely included in research on the topic (Burgon et al. 2019). Currently, no universal tool exists for HCPs to comprehensively document fall risk factors in older adults, and this possibly contributes to the ineffective management of the problem (De Clercq, Naude & Bornman 2020). One strategy towards creating an early identification documentation system is to develop a holistic, universal classification of fall risk in older adults. This can be done by incorporating the ICF as a framework for determining functioning in older adults who have a risk of falling and using this framework to guide the early identification of fall risk by HCPs of these patients. The World Health Organization's ICF uses a universal language to ensure that the functioning of a person of any age, participating in any activity, can be documented in any healthcare setting by HCPs from different professional disciplines. Built on such a multidimensional view of functioning, the ICF is especially suitable to obtain health information because it recognises the individual (consisting of a body participating in specific activities) as being influenced by different contextual factors. As such, the ICF consists of three domains, namely Body Functions and Structures, Activities and Participation and Contextual Factors (which are divided into Environmental and Personal Factors). Several codes describe each domain, save for Personal Factors, which are not coded in the ICF. The complete ICF consists of more than 1400 codes, presenting a challenge in using it in clinical practice (Aiachini et al. 2010). Therefore, researchers and clinicians alike have recommended that the most relevant and typical codes should be determined for a specific condition – termed a 'code set' – as that would enable HCPs to utilise the ICF more effectively in clinical practice. Currently, a code set does not exist to describe and document fall risk in older adults.

Based on their clinical experience, HCPs could offer new insights into the current knowledge on fall risk factors in older adults, thereby identifying potential risk factors not previously documented. Healthcare practitioners are also able to influence patients' opinions on falls and to reduce fall risk (Burgon et al. 2019). Obtaining qualitative data on their perspectives on fall risk factors in older adults and linking these factors to the ICF as a universal framework could give insight into the clinical manifestation of fall risk in this population. The data could also be used to move towards incorporating the perspectives of HCPs into future fall risk guidelines for clinical practice. This could also help to identify areas to be considered in the compilation of a list of ICF codes, as well as to develop improved strategies to manage (Loganathan et al. 2015) and ultimately have a positive impact on older adults' HRQoL. Healthcare practitioners are key stakeholders in the process of translating findings from literature and research into clinical practice and policies (Van Rhyn & Barwick 2019). By gathering their insights, researchers could develop more user-friendly and appropriate clinical tools for HCPs for use in their routine screening of these patients.

This study aims to fulfil two distinct objectives: firstly, to provide insight into the perspectives of HCPs in the South African context regarding risk factors associated with falls in older adults, and secondly, to link these factors to the ICF as a universal framework for describing functioning. The researchers hoped to move towards incorporating the perspectives of HCPs as key stakeholders into future fall risk guidelines for clinical practice.

Method

Following a qualitative design, two focus group discussions were conducted, as these allowed the gathering of in-depth, detailed information on a novel topic – the perspectives of HCPs in South Africa on fall risk factors in older adults. This method ensured that all voices in the discussion were heard, thereby enhancing contemporary knowledge (Carey & Asbury 2012).

Participants

Recruitment

As the *Protection of Personal Information (POPI) Act* prohibits the Health Professions Council of South Africa (HPCSA) to provide the contact details of currently practising HCPs to researchers, an internet search was conducted to identify potential facilities with multidisciplinary teams from both the public and the private sector, by using a convenience sampling method. Search terms included 'frail care facilities Gauteng', 'multidisciplinary facilities Gauteng', 'holistic healthcare facility Pretoria' and 'public hospitals Gauteng'. Ten facilities – six private and four public facilities – were identified in the same geographical area and subsequently contacted telephonically. The research study was explained to the relevant authority figures, and they were invited to have the HCPs in their facility to participate. Of the 10 facilities, 5 agreed to consider the proposal, and eventually 2 of the relevant authority figures consented to their facility's participation. Twenty-five potential participants were identified and a total of 18 participants consented; 8 of these participants were practising in the public sector and 10 in the private sector. The two venues that were chosen were easily accessible to the majority of participants in each sector. Two focus group discussions were held, one at a local public hospital, in the boardroom where weekly meetings are held, and one at a private institution, where approximately half of the participants worked. The ideal size of focus groups is described as being between 5 and 10 participants per group (Jacobsen 2021), and in this study, the first focus group had 10 participants and the second group had 8 participants.

Participant selection

Participants were selected based on their registration with either the HPCSA or the South African Nursing Council (SANC). They had to have at least 3 years of experience in their profession and at least 2 years of experience working with older adults. Experienced HCPs were more likely to be confident in their own knowledge and abilities, and hence they could be expected to contribute meaningfully to the discussions (Femdal & Solbjør 2018).

Because no consensus existed regarding the disciplines that would typically constitute a fall risk management team, an internet search for international fall clinics/centres was conducted to determine the most prominent disciplines involved. Based on the clinics' websites and publicly available information, the following six disciplines were included in this study:

1. Medical practitioners (they educate patients regarding health and personal factors that cause falls) (Phelan et al. 2015).
2. Nurses (they typically screen and then refer patients for a more in-depth assessment) (Unsworth 2003)
3. Podiatrists (they focus on foot health care, patient education, health promotion, rehabilitation and mobility) (Frankowski 2010).
4. Physiotherapists (they can assess environmental and behavioural factors that cause falls or increase fall risk) (Sherrington & Tiedemann 2015).
5. Occupational therapists (they review patients' home and work environments for hazards and evaluate their personal and environmental limitations that contribute to falls) (American Occupational Therapy Association 2020).
6. Audiologists (they identify, diagnose and provide treatment options for patients with vestibular disorders that lead to dizziness and imbalance, including fall risk) (Republic of South Africa 2009).

Participant description

All 18 participating HCPs were part of established multidisciplinary teams. They included two ear, nose and throat (ENT) specialists, two general practitioners (GPs), three nurses, three podiatrists, three physiotherapists, three occupational therapists and two audiologists. On average, the participants had 16 years' experience in their current profession (ranging from 3 to 40 years), with an average of 14 years' experience working with older adults (ranging from 2 to 39 years). The majority were female (n = 14).

Figure 1 shows that 88% (*n* = 16) of the participants consulted at least 20 patients per month in their practice, 82% (*n* = 15) consulted at least 10 older adults per month in their practice and 55% (*n* = 10) of the participants consulted up to 10 older adults with a fall history per month. Just over half of the participants (55%; *n* = 10) indicated that they assess fall risk in the patients with whom they consult in their practices. However, during the discussions, all of the participants agreed that they assess fall risk in an informal manner only, or by asking the patient to perform certain tasks (e.g. standing in tandem or walking down the corridor). The occupational therapists and the nurses in the public hospital indicated that they use some of the elements of two popular FRATs (Berg Balance Scale and Morse Fall Scale) as part of an informal assessment of patients with a potential fall risk.

Materials and equipment

Biographical questionnaires were compiled based on the inclusion criteria and were completed prior to the focus group meetings to ensure that all potential participants met the selection criteria as well as to obtain descriptive information (Sargeant 2012). A focus group script was followed to structure the group and ensure that the discussion would remain focussed and consistent across the two groups, thereby heightening procedural consistency and data integrity (Hennink 2014). The script contained specific steps for conducting the focus groups, as well as a specific question, namely 'Which factors do you think can increase or decrease an older adult's chance of falling?' The open-ended question was broad enough to ensure a wide variety of answers. After discussing the main question, the participants were asked to consider fall risk factors that they thought HCPs could assess in clinical practice. Healthcare practitioners normally use critical thinking skills when they reflect on knowledge derived from interdisciplinary subject areas (Zayapragassarazan et al. 2016). Thus, they are able to relate the topic at hand to their own knowledge and experience in the assessment and intervention of patients they see on a regular basis (The Health Foundation 2012). By asking the participants to relate fall risk factors to their own experience in the assessment of their patients, the researcher was able to prompt more critical consideration of the relevant factors and enrich the data gathered during the focus group discussions. The materials and equipment enabled the researcher to gain insight into the perspectives of HCPs regarding fall risk factors in older adults.

Data collection procedures

Prior to data collection, the relevant ethics permission was obtained from the University of Pretoria. All participants completed the informed consent forms and biographical questionnaires before commencement of the focus group. The aim of the research was explained in the focus group script, all questions that arose were discussed, and participants were alerted to the fact that the discussion would be audio-recorded and notes be made during the discussion. Everyone introduced themselves, and as most of the participants knew each other, rapport was quickly established.

Member checking was performed at the end of the focus groups by reading a summary of the main discussion points back to the participants and providing them the opportunity to clarify, alter or add to their contributions. Minimal clarifications were needed in both focus groups. On completion of the second focus group meeting, data saturation was reached. No new data were gathered compared with the first discussion, and there was no notable difference between the two groups that could have influenced the data (Fusch & Ness 2019). Data obtained from the two groups were thus collapsed into a single data set.

Rigour

Participants were recruited from the same disciplines, but from different employment contexts, to ensure that multiple perspectives were obtained. Participant verification in the form of member checking was carried

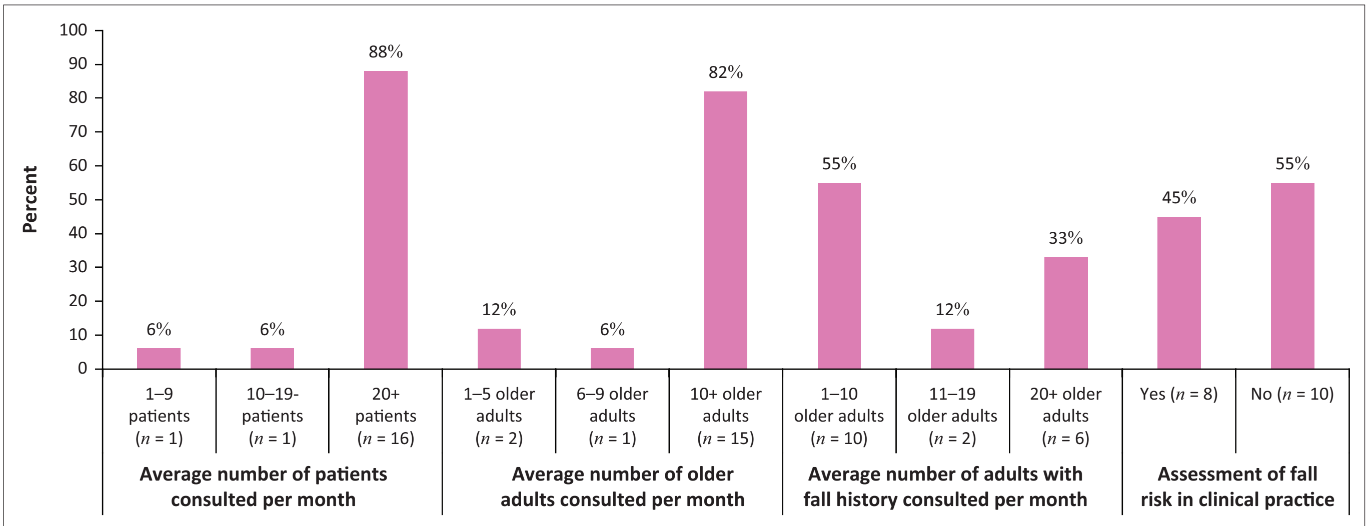

FIGURE 1: Service delivery by participants (average per month).

out, which is considered a crucial technique for establishing credibility in qualitative studies (Birt et al. 2016). It also facilitates a shared understanding and improves the accuracy of the data collected (Harper & Cole 2012). Data were analysed by using ATLAS.ti software, which enabled the complex organisation and retrieval of data and improved the rigour of analysis (Pope, Ziebland & Mays 2000). All three authors independently reviewed the themes as well as the codes linked to the ICF. After discussion, they fully agreed on the themes and the ICF codes to which each theme had been linked, thus resulting in a 100% inter-coder agreement score.

Data analysis procedures

Two consecutive data analysis procedures were employed during this study. Firstly, an inductive thematic analysis was conducted to address the first objective as suggested by Clarke and Braun (2017). The five steps of data categorisation included (1) familiarisation with the data by reading and rereading the verbatim transcriptions; (2) assigning preliminary codes; (3) searching for themes by the researcher (HdC); (4) reviewing themes by all three authors; and (5) defining and grouping similar themes together. The three authors eventually agreed on the final list of themes.

Secondly, to address the second objective, the identified themes were linked to the ICF by means of a deductive data analysis in the form of a directed content analysis, by using the ICF linking rules (Cieza 2019). For the purposes of this study, a two-level ICF classification was sufficient and its first seven linking rules were utilised:

1. Acquiring good knowledge of the conceptual fundamentals of the ICF – that is by studying the ICF manuals and coding system prior to data analysis.
2. Identifying the main concept of each of the themes that would be linked to the ICF – that is in 'walking outside on the sidewalks', the main concept would be 'walking'.
3. Identifying any additional concepts for each theme that could also be important and should be considered when linking the theme to the ICF – that is additional concepts to the previous example would be 'outside' and 'sidewalks'.
4. Considering the popular perspectives for each identified concept and whether the perspectives on the theme influenced the intended meaning of the theme – that is by reading current literature on the topic at hand.
5. Identifying and documenting all the identified, meaningful concepts that would be linked to the ICF – i.e. all main and additional concepts were listed with the number of times each concept was mentioned.
6. Linking all the meaningful concepts to the precise ICF category – i.e. 'walking' would be linked to the ICF code 'moving around in different locations'.
7. Using 'other specific' or 'unspecified' ICF categories as appropriate.

All the meaningful concepts and linked codes of the identified themes were independently reviewed by the three authors, and an initial inter-coder agreement score of 98% was established. After discussion, full agreement on all the linked codes was established.

Ethical consideration

The study was approved by the Research Ethics Committee of the University of Pretoria, South Africa (Ethics Approval Reference Number: GW20170917HS). This study followed the ethical considerations as set out by Declaration of Helsinki (World Medical Association 2001), including the principles of informed consent, voluntary participation, deception and clinical use, confidentiality and respect, social use and objectivity and professional integrity.

Results

The focus group participants provided rich insights into their perspectives with regard to the fall risk factors that they considered relevant in older adults. Table 1 lists the points that emerged from these discussions as well as how frequently each of the themes was mentioned, as per the first objective of the study.

A total of 42 themes emerged from the data, and the most prominent themes were identified as 'medical history/conditions' ($n = 14$), followed by 'floor surfaces' ($n = 10$) and 'balance/instability' ($n = 8$). One theme, 'medication', was mentioned six times and 'dizziness and vertigo' five times, followed by 'vision' four times. Five fall risk factors were mentioned three times each, 10 factors were mentioned twice and the remaining factors ($n = 21$) were only mentioned once during the discussions. Of the identified themes, four themes could not be linked to the ICF as they were classified as Personal Factors, namely 'age', 'fall history', 'gender' and 'medical history/conditions'. The remaining 38 themes could be linked to the ICF, resulting in a total of 142 ICF codes, as depicted in Table 2, to satisfy the second objective of the study.

As depicted in Table 2, of the 142 ICF codes identified from the 38 themes mentioned in the discussions, 43% ($n = 61$) were in the Body Function category, 23% ($n = 32$) in the Environmental Factors category, 18% ($n = 26$) in the Body Structure category and 16% ($n = 23$) in the Activities and Participation category.

Differences were calculated between all four categories, and statistically significant differences were found for the comparison between Body Function ($n = 61$) vs Body Structure ($n = 26$) – $p < 0.0001$; Body Function ($n = 61$) vs Activities and Participation ($n = 23$) – $p < 0.0001$; and Body Function ($n = 61$) vs Environmental Factors ($n = 32$) – $p = 0.0003$. No statistically significant differences were reported for any of the other comparisons ($p > 0.05$).

TABLE 1: Focus group themes (*n* = 42).

Theme	*N*	Theme	*N*	Theme	*N*
Medical history/conditions	14	Hearing	2	Confusion	1
Floor surfaces	10	Inactivity	2	Crutches with worn rubbers	1
Balance/instability	8	Mental health status	2	Deformities	1
Medication	6	Muscle strength	2	Diet	1
Dizziness and vertigo	5	Orientation	2	Gender	1
Vision	4	Orthopaedic problems	2	General personality	1
Alcohol	3	Small dogs	2	Getting up quickly	1
Fear of falling	3	Accessibility of home	1	Post-operative	1
Footwear	3	Age	1	Range of motion of lower limbs	1
Gait	3	Blood pressure	1	Small children	1
Pain	3	Bone density	1	Standing without support	1
Environment	2	Calcification in the eardrum	1	Things lying on the floor	1
Fall history	2	Climbing on a ladder	1	Too much physical support	1
Foot conditions	2	Clothes	1	Walking	1

TABLE 2: Focus group themes linked to the International Classification of Functioning, Disability and Health.

Body function	ICF code	*N*	Body structure	ICF code	*N*	Activities and participation	Code	*N*	Environmental factors	ICF code	*N*
Seeing	b210	10	Additional musculoskeletal structures related to movement	s770	13	Watching	d110	10	Design, construction; building products and technology of buildings for private use	e155	13
Proprioception function	b260	8	Structure of inner ear	s260	6	Maintaining a body position	d415	5	Products or substances for personal consumption	e110	9
Sensations associated with hearing and vestibular function	b420	7	Structures related to movement, other specified	s798	3	Moving around in different locations	d460	4	Products and technology for personal use in daily living	e115	5
Vestibular functions	b235	6	Structure of the trunk	s760	2	Changing and maintaining body position; other specified and unspecified	d429	2	Domesticated animals	e350	2
Gait pattern	b770	4	Structure of lower extremity	s750	1	Changing basic body position	d410	1	Extended family	e315	1
Emotional functions	b152	4	Structure of external ear	S240	1	Hand and arm use	d445	1	Natural environment and human-made changes to environment; other specified	e298	1
Control of voluntary movement	b760	3	-	-	-	-	-	-	Natural events	e230	1
Sensations of pain	b280	3	-	-	-	-	-	-	-	-	-
Activity level	b125	2	-	-	-	-	-	-	-	-	-
Global psychosocial functions	b122	2	-	-	-	-	-	-	-	-	-
Involuntary movement reaction	b755	2	-	-	-	-	-	-	-	-	-
Muscle power	b730	2	-	-	-	-	-	-	-	-	-
Orientation functions	b114	2	-	-	-	-	-	-	-	-	-
Consciousness function	b110	1	-	-	-	-	-	-	-	-	-
Mobility of joints	b710	1	-	-	-	-	-	-	-	-	-
Perceptual functions	b156	1	-	-	-	-	-	-	-	-	-
Stability of joints	b715	1	-	-	-	-	-	-	-	-	-
Temperament and personality	b126	1	-	-	-	-	-	-	-	-	-
Weight management	b530	1	-	-	-	-	-	-	-	-	-
Total	-	**61**	-	-	**26**	-	-	**23**	-	-	**32**
Percentage	-	**43%**	-	-	**18%**	-	-	**16%**	-	-	**23%**

ICF, International Classification of Functioning, Disability and Health.

Discussion

As expected, the results of this study revealed that the main focus of HCPs was on Body Function. The way in which the body functions is important to HCPs, as there is no better indication of successful assessment and intervention outcomes than improved functioning. Difficulties in functioning urge patients to seek advice from HCPs so as to improve their health and increase their own functioning (Bickenbach et al. 2012). When considering the ICF, a person's functioning (on the level of the body) is important for HCPs, as it describes the outcome of four main health strategies, namely prevention, cure, rehabilitation and support. The ICF also offers a common terminology for the improvement of clinical and patient-orientated assessment instruments (Bickenbach et al. 2012; World Health Organization 2012). A comparison between the perspectives of HCPs and a recent systematic review of FRATs (De Clercq et al. 2020) indicated that the majority of perspectives of both the FRATS and the HCPs focussed on Body Function. It also showed that the knowledge of HCPs was in line with contemporary knowledge in the field.

Functioning is furthermore related to the environment, as it essentially captures the functioning of the body in 'real-life contexts' and reflects how the body and the environment interact with one another to either increase or decrease older adults' ability to function. It was not at all surprising that approximately a quarter of the factors mentioned by the HCPs could be categorised under Environmental Factors. Almost all the activities of daily life are complex and require complex and dynamic interaction with the environment (Young & Williams 2015) (e.g. walking along an uneven pavement or stepping over obstacles on the floor). The physical environment poses the most significant environmental risk for older adults, and often home hazards are the most important to consider in understanding and preventing falls, especially for persons who fall repeatedly (Letts et al. 2010). A person's interaction with the environment is therefore important, as the type of interaction could increase fall risk.

When considering the number of codes in each ICF category, about a third of the second-level codes are in the Activities and Participation category. This category entails three concepts: one is the task being executed (Activities) (World Health Organization 2002) and the others are two Participation concepts, namely attending (physical presence) and involvement in activities (the type of activities the older adult is participating in, whilst being physically present) (Adair et al. 2018; Imms et al. 2017). In the current study, however, the HCPs had a minimal focus on this category and they only discussed Activity-related factors. They did not include any Participation factors, such as domestic life activities, relationship activities and community or social life activities, in this category. One possible reason for this could be that Activities, the execution of a task, is more closely related to Body Functions, and as such, more in line with the role of HCPs in the clinical identification of fall risk factors. Participation codes, on the other hand, are more in line with intervention strategies, which were not discussed by the focus groups.

A comparison between the clinical perspectives of HCPs on fall risk factors in older adults and the systematic review of FRATs (De Clercq et al. 2020) revealed that the HCPs mentioned two relevant factors that were not captured in existing FRATs, namely 'muscle-power functions' and 'mobility-of-joint functions'. Both of these ICF codes are important to consider for fall risk in older adults, as they relate directly to the ability to execute mobility activities. Almost 25% of older adults have mobility limitations, and both muscle-power functions and (to a degree) mobility functions are modifiable impairment limitations on the mobility of older adults (Bean et al. 2007). Studies have shown a link between lack of mobility and flexibility, and poor walking ability and balance in older adults (Martínez-López et al. 2014). Healthcare practitioners were clearly aware of the importance of these two aspects and included them in the discussions, thus revealing the importance of these clinical perspectives in the discussion of fall risk in older adults.

Healthcare practitioners have a crucial role to play in identifying fall risk factors in older adults and also in assisting older adults to understand the importance of reducing their own risk, not only in terms of their medical conditions but also with regard to their environment and how they engage and participate in activities. Early identification of fall risk factors, combined with appropriate referrals to other HCPs when needed, could reduce older adults' fall rate by up to 24% (Howcroft et al. 2013; Phelan et al. 2015). Our findings revealed that HCPs' knowledge is in line with current literature and they were well aware of the importance of including aspects not only related to Body Function, even though the latter was their main focus. By gathering the perspectives of HCPs on the topic at hand, we were able to add the necessary clinical evidence to support the development (in future research) of a holistic instrument to identify fall risk in older adults. Such an instrument could guide intervention strategies for this population, as well as be used by HCPs, in different settings, with ease and consistency. It could ultimately assist HCPs in guiding older adults on how to reduce their own risk of falling.

Limitations of the study

All data was collected from HCPs in urban Gauteng, although they represented both public and private facilities. The clinical knowledge, skills and experience of these HCPs may, however, differ from those of their peers in smaller towns or rural areas. Furthermore, this research only focussed on the perspectives of one stakeholder group, namely HCPs. Only one general question and a follow-up question were asked to elicit information about the participants' perspectives. Further studies could consider asking more specific questions regarding each ICF category to elicit more detailed ICF-focussed as well as intervention-related responses.

Implications and conclusion

Whilst this article provided insight into the perspectives of HCPs on factors contributing to fall risk in older adults, it also demonstrated that HCPs are not only aware of current literature on the topic but also have knowledge of factors not specifically related to the body (i.e. the environment and the older adults' ability to perform physical activities).

By comparing the perspectives of HCPs on fall risk in older adults to current literature as well as to the perspectives of the older adults themselves, future research could pursue a twofold aim: it could provide a holistic picture of fall risk factors in older adults, and it could use this information to further develop ICF tools to guide the comprehensive management of fall risk in this population. Future research could also identify factors that are focussed on intervention in fall risk management in older adults and determine if the perspectives of HCPs are translated into clinical practice.

Acknowledgements

Competing interests

The authors have declared that no competing interest exist.

Authors' contributions

All authors contributed equally to this work.

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Data availability statement

Data is stored at the University of Pretoria.

Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

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Appendix 3I: Permission from Health SA Gesondheid

To: Hendrika de Clercq
Cc:
Bcc:
Subject: Re: HSAG Online first publication 1495 - your article has been published
From:

Dear Prof. De Clercq
Thank you for your email.

You are welcome to include this article in your thesis.

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Kind regards / Vriendelike groete
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Appendix 3J: Biographic questionnaire - HCPs

Please complete all the questions. All information will be kept confidential and only be used for the intended research study by Hendrika de Clercq.

1) Gender: ❑ Male ❑ Female
2) Age: ______________________________
3) Current employer: ______________________________
4) Registered profession: ______________________________
5) Qualification/s: ______________________________
____
6) Job description: ______________________________
7) Professional bodies you are currently registered with:
____
8) Years of experience in current profession: ______________________________
9) Years of experience with older adults: ______________________________
10) Average number of patients you currently see, per month, for consultation.
    - ❑ 0 - 10
    - ❑ 11 - 20
    - ❑ 20+
11) Average number of older adults (65 years and older) you currently see, per month, for consultation.
    - ❑ 0 – 5
    - ❑ 6 – 10
    - ❑ 10+
12) Average number of older adults (65 years and older) that you have seen, in the last six months, who have a history of falls.
    - ❑ 0 – 10
    - ❑ 11 – 20
    - ❑ 20+
13) Do you currently work in a multi-disciplinary team?
    - ❑ No
    - ❑ Yes

      If yes, which professionals are part of your team?
      ____
      ____
14) Do you currently assess fall risk in your patients?
    - ❑ No

      If no, why do you not assess fall risk?
      ____
      ____
    - ❑ Yes

      If yes, how do you assess fall risk?
      ____
      ____

Thank you for taking the time to complete this questionnaire.

Appendix 3K: Focus group script - HCPs

- Welcome
- Introduction of researcher
- Introduction of participants (first names)
- Housekeeping rules:
    - Everyone is encouraged to participate
    - No one will be forced to participate
    - All answers / opinions are encouraged
    - Everyone's opinion is important
    - No one is to laugh at or dismiss another person's opinion / comment
    - Only one person should talk at a time and give everyone equal opportunity to participate
    - The researcher will ask a few questions, but you are welcome to go back to a previous question if we have already moved to the next question
    - All participants should complete the informed consent form and the biographic questionnaire before we can continue the discussion
- Short introduction of the aim of the research
    - This research study focuses of falls in older adults and aims to develop a list of factors that can influence an older adult's risk of falling
- Explain how participants can help to achieve these aims and why they are suitable for the task
    - The aim of the focus group is to identify the factors older adults (participants) consider to be facilitators (decrease your chances of falling) and barriers (increase your chances of falling) to the identification of fall risk in older adults
- Discussion questions:
    - Which factors do you think can increase an older adult's risk of falling?
    - If a person were to assess an older adult's risk of falling, which factors/areas do you think should be assessed?
- Closing of the session and thanking everyone for their time and participation

Appendix 3L: Ethical permission from the University of Pretoria

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities
Research Ethics Committee

2 October 2017

Dear Ms De Clerq

Project:	**Fall risk assessment in older adults: Developing a self-administered screening tool**
Researcher:	**De Clercq**
Supervisor:	**Prof J Bornman and Dr A Naudé**
Department:	**Speech-Language Pathology and Audiology**
Reference number:	**22099621.(GW20170917HS)**

Thank you for the application that was submitted for ethical consideration.

I am pleased to inform you that the above application was **approved** by the **Research Ethics Committee** at a meeting held on 28 September 2017. Data collection may therefore commence.

Please note that this approval is based on the assumption that the research will be carried out along the lines laid out in the proposal. Should the actual research depart significantly from the proposed research, it will be necessary to apply for a new research approval and ethical clearance.

We wish you success with the project.

Sincerely

Prof Maxi Schoeman
Deputy Dean: Postgraduate Studies and Ethics
Faculty of Humanities
UNIVERSITY OF PRETORIA
e-mail:tracey.andrew@up.ac.za

CC: Prof J Bornman (Supervisor)
Dr A Naudé (Co-Supervisor)

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Research Ethics Committee

6 May 2020

Dear Ms de Clercq

Project:	**Development of an ICF code set for fall risk in older adults: Implications for prevention and assessment**
Researcher:	**H de Clercq JL**
Supervisor:	**Prof J Bornman**
Department:	**Centre for Augmentative and Alternative Communication**
Reference number:	**22099621 (GW20170917HS) (Amendment to protocol)**

Thank you for the application to amend the existing protocol that was approved by the Committee on 28 September 2017.

I have pleasure in informing you that the amendment was **approved** the Research Ethics Committee at an *ad hoc* meeting held on ^ May 2020. Further data collection may therefore commence.

Please note that this approval is based on the assumption that the research will be carried out along the lines laid out in the proposal. Should your actual research depart significantly from the proposed research, it will be necessary to apply for a new research approval and ethical clearance.

We wish you success with the project.

Sincerely

Prof Innocent Pikirayi
Deputy Dean: Postgraduate Studies and Research Ethics
Faculty of Humanities
UNIVERSITY OF PRETORIA
e-mail: PGHumanities@up.ac.za

cc: Prof J Bornmam (Supervisor) Prof S Dada (HoD)

Faculty of Humanities
Fakulteit Geesteswetenskappe
Lefapha la Bomotho

Appendix 4A: Informed consent form - Delphi process (pilot study)

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities

10 February 2020

Request for participation in a pilot study for a Delphi consensus

Dear Sir / Madam

I am a PhD candidate at the Centre for Augmentative and Alternative Communication (CAAC) at the University of Pretoria in South Africa. In order to comply with the requirements of the degree, I have to complete an extensive research project resulting in a thesis. This study has received permission from the Ethics Committee, Faculty of Humanities, at the University of Pretoria.

Research title: Developing an ICF code set for fall risk in older adults: Implications for intervention and assessment.

Objectives of the study: The overall aim of the research study is to develop an International Classification of Functioning, Disability and Health (ICF) code set for assessing fall risk in older adults. The research study followed a mixed-method sequential design and the initial ICF code was developed during the first phase of the study by means of a systematic review and focus groups. For this last and final phase, the aim is to establish the relevance and importance of the developed code set items when to assessing fall risk in community-dwelling older adults, by means of a Delphi consensus.

Why should you participate? Your participation in this research study will contribute to the development of an ICF code set for fall risk in older adults and recommendations resulting from this research will encourage new research in related fields. Each participant will also receive a copy of the final ICF code set to be used in their practice or for further research.

Who will participate in the study? Professionals and researchers with knowledge in the ICF.

What will be expected of you? Should you wish to participate in this study, you will be asked for your informed consent to participate. You will then be asked to complete an online questionnaire which will include a section on your biographic information. On completion of the questionnaire, you will be asked to give feedback on the questionnaire in term of five questions regarding the time frame, relevance of the items and general considerations.

Centre for Augmentative and Alternative
Communication, Room 2-36,
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University of Pretoria, Private Bag X20
Hatfield 0028, South Africa
Tel +27 (0)12 420 2001
Fax +27 (0) 86 5100841
Email saak@up.ac.za
wwwcaac.up.ac.za

Will you experience any risk or discomfort during the study? You will experience no harm or discomfort during the discussions, and you may at any time throughout the study decide to withdraw without any penalization or negative consequences.

Confidentiality: The pilot study will not be anonymous, but all data collected during the session will be entirely depersonalized by using participation numbers and would therefore not be harmful in any way. Confidentially will be ensured by the researcher taking the following steps:

- No personal information will be documented or used that can link you to this study;
- Your name will only be recorded to prevent duplicate entries, thereafter a participant number will be assigned to you.

All information gathered during the study will be treated as confidential and data will be stored at the Centre for Alternative and Augmentative Communication at the University of Pretoria and destroyed after the mandatory 15 years. Results from this study will be presented as a PhD thesis, scientific research papers and as conference presentations. Should you wish, the results of the study would be made available to you following the completion of the research study.

Date of the data collection: The questionnaire and feedback questions will be sent to you on **10 February 2020 and feedback should be given by 12 February 2020.**

Should you have any further questions, please feel free to contact Prof. Juan Bornman at +2712 420 2001 or the researcher, Mrs. Hendrika de Clercq, at +2712 755 9711.

I trust that this letter has provided you with sufficient information to make an informed decision about the participation in this research study.

Kind regards,

Mrs H de Clercq — Prof J Bornman

Researcher — Supervisor

Appendix 4B: Informed consent form - Delphi process (main study)

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities

27 January 2020

Request for participation in a research study: Delphi consensus

Dear Sir / Madam

I am a PhD candidate at the Centre for Augmentative and Alternative Communication (CAAC) at the University of Pretoria in South Africa. In order to comply with the requirements of the degree, I have to complete an extensive research project resulting in a thesis. This study has received permission from the Ethics Committee, Faculty of Humanities, at the University of Pretoria.

Research title: Developing an ICF code set for fall risk in older adults: Implications for intervention and assessment.

Objectives of the study: The overall aim of the research study is to develop an International Classification of Functioning, Disability and Health (ICF) code set for assessing fall risk in older adults. The research study followed a mixed-method sequential design and the initial ICF code was developed during the first phase of the study by means of a systematic review and focus groups. For this last and final phase, the aim is to establish the relevance and importance of the developed code set items when to assessing fall risk in community-dwelling older adults, by means of a Delphi consensus.

Why should you participate? Your participation in this research study will contribute to the development of an ICF code set for fall risk in older adults and recommendations resulting from this research will encourage new research in related fields. Each participant will also receive a copy of the final ICF code set to be used in their practice or for further research.

Who will participate in the study? Professionals and researchers with extensive knowledge in the field of vestibular assessment, management and fall risk in older adults.

What will be expected of you? Should you wish to participate in this study, you will be asked for your informed consent to participate. You will then be asked to complete a short biographic questionnaire. Thereafter, you will participate in a two to three-round Delphi consensus, conducted via electronic mail, to reach consensus with other professionals on the relevance of a set of items to be included when assessing fall risk in older adults. Each round would consist of up to 140 items

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to be rated and should take no more than 30 minutes to complete. Internet connection will be needed to complete the survey, but no additional software or installation on your computer will be required.

Will you experience any risk or discomfort during the study? You will experience no harm or discomfort during the discussions, and you may at any time throughout the study decide to withdraw without any penalization or negative consequences.

Confidentiality: The Delphi consensus will not be anonymous, but all data collected during these sessions will be entirely depersonalized by using participation numbers and would therefore not be harmful in any way. Confidentially will be ensured by the researcher taking the following steps:

- No personal information will be documented or used that can link you to this study;
- Your name will only be recorded to prevent duplicate entries, thereafter a participant number will be assigned to you.

All information gathered during the study will be treated as confidential and data will be stored at the Centre for Alternative and Augmentative Communication at the University of Pretoria and destroyed after the mandatory 15 years. Results from this study will be presented as a PhD thesis, scientific research papers and as conference presentations. Should you wish, the results of the study would be made available to you following the completion of the research study.

Date of the data collection: The first round of the Delphi consensus will be held from **17 – 23 February 2020.**

Should you have any further questions, please feel free to contact Prof. Juan Bornman at +2712 420 2001 or the researcher, Mrs. Hendrika de Clercq, at +2712 755 9711.

I trust that this letter has provided you with sufficient information to make an informed decision about the participation in this research study.

Should you agree to participate, please complete the reply slip attached and return it to us on or before **10 February 2020.**

Kind regards,

Mrs H de Clercq	Prof J Bornman
Researcher	Supervisor

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities

Reply slip: Participation in research study: Delphi consensus

Researcher: Hendrika de Clercq

Supervisor: Prof J Bornman

By signing this form, I acknowledge that I have read the information on the proposed study and have been given adequate time to consider this request. I have not been pressured to participate in any way and I understand participation in this study is completely voluntary and that I may withdraw from it at any time without supplying reasons. I am aware the University of Pretoria has approved this study and that results of this study will be used for scientific purposed and will be published. I agree to participate in this study and hereby give consent for participation.

Yes, I give permission to participate in this research study ☐

No, I do not give permission to participate in this research study ☐

Name & surname: ______________________________

Contact number: ______________________________

Email address: ______________________________

Signature of participant: ______________________________

Date: ______________________________

I would like to receive a copy of the final ICF code set on completion of the study: Yes / No

If yes, the final ICF code set will be emailed to you on completion of the research study.

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Appendix 4C: Delphi participants invitation letter (pilot study)

Request for participation in a research study: Delphi consensus

Dear Sir/Madam

Due to your expertise in the field of ICF, I would like to invite you to participate in this study as an expert professional.

I am currently a PhD candidate at the Centre for Augmentative and Alternative Communication (CAAC) at the University of Pretoria, South Africa. In order to comply with the requirements of the degree, I have to complete an extensive research project resulting in a thesis. This study has received permission from the Ethics Committee, Faculty of Humanities, at the University of Pretoria.

Please see the attached letter outlining the scope of the study as well as an informed consent letter.

Should you wish to participate in this study, please complete the attached informed consent and send it back to me.

If you know of any of your colleagues who would be interested to participate in this study, please send me their contact details.

Feel free to contact me if you need any additional information.

Regards,

Hendrika de Clercq.

Appendix 4D: Biographic questionnaire - Delphi participants

Title: ______ First name & surname: ____

Email address: ____

Country where you practice / work : ____

Profession: ____

1. Are you registered with the local governing body (e.g. HPCSA / ASHA / Medical board etc.)?

Yes: _______ (2) No: _______ (0)

If yes, please name the governing body/bodies you are registered with: ____

2. Highest qualification: Bachelor's degree __ (1 point) Honour's degree __ (1 points)

Master's degree ____ (2 points) PhD __________ (3 points)

3. Amount of peer reviewed publications where you have been one of the authors:

0 – 3 publications ______ (1 point)

4 – 6 publications ______ (2 points)

7 – 9 publications ______ (3 points)

10 or more publications ____ (4 points)

4. Years of clinical experience in the field of vestibular and/or fall risk assessment:

1 – 2 years ______ (1 point)

3 – 5 years _______ (2 points)

6 – 10 years ______ (3 points)

10+ years _____ (4 points)

5. Conference presentations on vestibular and/or fall risk assessment

0 – 2 presentations _____ (1 point)

3 – 5 presentations ____ (2 points)

5+ presentations _____ (3 points)

6. On average, how many fall risk assessments do you conduct per month?

0 – 3 assessments (1 point)

4 – 6 assessments (2 points)

7 – 9 assessments (3 points)

10+ assessments (4 points)

7. On average, how many older adults (65 years and older) do you assess for fall risk or vestibular symptoms per month?

0 – 3 older adults (1 point)

4 – 6 older adults (2 points)

7 – 9 older adults (3 points)

10+ older adults (4 points)

8. Have you received any formal training in fall risk assessment in older adult?

Yes ______ (1 point) No _____ (0 points)

8. Do you use any formal fall risk assessment tools (FRATs) when assessing older adults for fall risk?

Yes ____ (1 point) No _____ (0 points)

If yes, please name the formal FRATs you use?

____

Appendix 4E: Initial ICF code set

Fall risk factors in older adults: ICF code set

Body Functions

Consciousness functions[*N]
Orientation functions[*N]
Perceptual functions[*N / P / OT]
Seeing function[*O]
Vestibular functions[*A / P / E]
Additional sensory functions[*P / OT]
Sensations of pain[*M]
Sensations associated with hearing and vestibular function[*E / A]
Sensations associated with cardiovascular and respiratory functions[*C]
Mobility of joint functions[*P / A]
Stability of joint function[*P / A]
Muscle power functions[*P]
Muscle endurance functions[*P]
Muscle functions[*P]
Involuntary movement reaction functions[*P / A]
Control of voluntary movement functions[*P]
Gait pattern function[*P / A / PO]
Neuromusculoskeletal- and movement-related functions[*P / PO]

Body Structures

Structure of lower extremity[*M / P]
Structure of the trunk[*M / P]
Additional musculoskeletal structures related to movement[*M / P]
Structures related to movement[*M / P]
Structures of the inner ear[*E / A]

Activities & Participation

Watching[*O / OT]
Focussing attention on the environment [*P / A / OT]
Carrying out daily routine[*P / A / PO]
Changing basic body position[*P / A]
Maintaining a body position[*P / A]
Transferring oneself[*P / A]
Changing and maintaining body position, other specified and unspecified[*P / A]
Lifting and carrying objects[*P / OT]
Hand and arm use[*P / OT]
Basic walking[*P / A]
Walking[*P / A]
Moving around[*P]
Moving around in different locations[*P]
Moving around using equipment[*P / A]
Washing oneself[*P / OT]
Toileting[*P / OT]
Dressing[*P / OT]
Looking after one's safety[*P / OT]
Acquisition of goods and services[*P / OT]
Doing housework[*P / OT]

Environmental Factors

Products or substances for personal consumption (e.g. medication)[*SR; OA; HCP]
Products and technology for personal use in daily living (e.g. walking aids, hearing aids)[*SR; OA; HCP]
Products and technology for personal indoor and outdoor mobility and transportation (e.g. driving a car)[*SR; OA]
Design, construction and building products and technology of buildings for public use (e.g. stairs/railings in public places)[*SR; OA]
Design, construction and building products and technology of buildings for private use (e.g. stairs/railings in own home)[*SR; OA; HCP]
Natural environment and human-made changes to environment, other specified (e.g. rain, wet surfaces)[*SR; OA; HCP]
Light[*SR; OA] Domesticated animals[*SR; OA; HCP] Health services, systems and policies[*OA]

Personal Factors

Age
Fall history
Medical conditions[*M]

*Possible referral sources: N = Neurologist; P = Physiotherapist who does vestibular testing/rehabilitation; A = Audiologist who does vestibular testing/rehabilitation; O = Ophthalmologist / Optometrist; OT = Occupational therapist; M = Medical practitioner; E = Ear, Nose and Throat (ENT) specialist; C = Cardiologist; PO = Podiatrist

[$] Items are relevant, but not critical to the assessment of fall risk to older adults

Appendix 4F: Pilot study feedback form - Delphi process

Please answer the following questions on completion of the online survey.

1. Technical aspects of the survey

1a. Did the link to the survey open the survey without any technical challenges? Please mention any technical challenges when opening the link.

Answer:

1b. Which web browser did you use to open and complete the survey?

Answer:

1c. Were you able to complete all the questions in the survey? Please mention any questions you were unable to complete due to technical challenges.

Answer:

1d. Did you complete the survey on a laptop, desktop computer or on a mobile device?

Answer:

2. Layout and visual representation of the survey

2a. Was the layout and flow of the survey intuitive? Please mention any aspect that could be changed or enhanced in the survey's layout.

Answer:

2b. In your opinion, was the horizontal layout of the response options easy to complete or would you have preferred the response options to be in a vertical direction?

Answer:

2c. In your opinion, was the positive responses on the left-hand side intuitive or would you have preferred the positive responses to be on the right-hand side?

Answer:

3. Survey items

3a. Please comment on the appropriateness of each example in relation to the corresponding ICF item. Please mention all the questions where the example was not appropriate for that question's ICF description.

Answer:

3b. Please comment on the clarity of each of the example to explain the ICF description for that question. Please mention all questions where the examples were unclear or ambiguous.

Answer:

3c. In your opinion, were there any repetition in the survey in terms of ICF descriptions or examples? Please mention any repetitive questions.

Answer:

3d. Were the headings (ICF categories) for each section appropriate to the ICF codes mentioned in the that sections? Please mention any questions that should have been in a different ICF category.

Answer:

3e. Were the instructions given to complete the survey clear? Please provide suggestions for clarification.

Answer:

4. General aspects

4a. How long did it take you to complete the survey?

Answer:

4b. In your opinion, is the suggested time of 20 – 30 minutes to complete the survey appropriate or should more or less time be suggested to complete the survey?

Answer:

4c. Please comment of the number of items in the survey. In your opinion, were the number of items appropriate for the topic at hand?

Answer:

5. Further suggestions or comments

5a. Do you have any additional comments or further suggestions to enhance the survey?

Answer:

Appendix 4G: Delphi participants invitation letter (main study)

Request for participation in a research study: Delphi consensus

Dear Sir/Madam

Due to your expertise in the field of vestibular assessment and treatment, I would like to invite you to participate in this study as an expert professional.

I am currently a PhD candidate at the Centre for Augmentative and Alternative Communication (CAAC) at the University of Pretoria, South Africa. In order to comply with the requirements of the degree, I have to complete an extensive research project resulting in a thesis. This study has received permission from the Ethics Committee, Faculty of Humanities, at the University of Pretoria.

Please see the attached letter outlining the scope of the study as well as an informed consent letter.

Should you wish to participate in this study, please complete the attached informed consent and send it back to me.

If you know of any of your colleagues who would be interested to participate in this study, please send me their contact details.

Feel free to contact me if you need any additional information.

Regards,

Hendrika de Clercq.

Delphi Survey Round 1

Informed consent for participation in a Delphi survey

Developing an ICF code set for fall risk in older adults: Implications for intervention and assessment

Dear Sir/Madam

Your are invited to participate in an expert Delphi survey.

The overall aim of this research study is to develop an International Classification of Functioning, Disability and Health (ICF) code set for assessing fall risk in older adults. The research study followed a mixed-method sequential design and the initial ICF code set was developed during the first phase of the study by means of a systematic review and focus groups. For this last and final phase, the aim is to establish the relevance and importance of the developed code set items when assessing fall risk in community-dwelling older adults.

An international group of professionals and researchers with extensive knowledge in the field of vestibular assessment, management and fall risk in older adults are eligible to participate in this survey. The developed code set will be used by healthcare professionals assessing fall risk in older adults.

Please note the following:

This study involves completing a survey and your participation is very important.

The Delphi survey will not be anonymous, but all data collected during these sessions will be entirely depersonalized by using participation numbers and would therefore not be harmful in any way.

Confidentially will be ensured by the researcher taking the following steps:
*No personal information will be documented or used that can link you to this study;
*Your name will only be recorded to prevent duplicate entries, thereafter a participant number will be assigned to you.

3/1/2020 Qualtrics Survey Software

You will experience no harm or discomfort during the discussions, and you may at any time throughout the study decide to withdraw without any penalization or negative consequences.

Completing the survey will take about 20 to 30 minutes.

I have read and understood the above consent form and desire of my own free will to participate in this study.

Yes, I understand and agree to participate
No, I do not wish to participate

To continue to the first question, please click the >> arrow below.

During the survey, you can navigate between pages using the << back or >> next arrows at the bottom of the screen.

You can exit the survey at any time and continue later, the last completed responses will automatically be recorded.

On completion of the survey, your answers will be automatically submitted.

Titel

Mr
Mrs
Ms
Dr
Prof

First name and surname

Email address

Country where you work / practice?

Profession

Medical doctor
Audiologist
Occupational therapist
Nurse
Podiatrist
Physical therapist
Other

If other, please specify

Are you registered with any local governing or medical body/bodies, such as a Health Professions Council?

Yes
No

If yes, please specify the local governing or medical body/bodies you are registered with?

Highest qualification

Bachelor's degree
Honour's degree
Master's degree
PhD

Number of peer reviewed publications where you have been one of the authors?

0 - 3 publications
4 - 6 publications
7 - 9 publications
10+ publications

Years of clinical experience in the field of fall risk assessment / vestibular assessments

1 - 2 years
3 - 5 years
6 - 9 years
10+ years

Number of conference presentations you have presented related to balance or fall risk

0 - 2 presentations
3 - 4 presentations
5+ presentations

On average, how many fall risk assessments do you conduct or assist with per month?

0 - 3 assessments
4 - 6 assessments
7 - 9 assessments
10+ assessments

On average, how many older adults (65 years and older) do you assess or assist with assessing for fall risk or vestibular symptoms per month?

0 - 3 older adults
4 - 6 older adults
7 - 9 older adults
10+ older adults

Have you received any formal training on fall risk assessment in older adults?

Yes
No

Do you use any formal fall risk assessment tools (FRATs) when assessing fall risk in older adults?

Yes
No

If yes, please name the FRATs you use?

ACTIVITIES AND PARTICIPATION CATEGORY

The following items are related to Activities and Participation.
Activities relates to the execution of a task or action. Activity limitations are difficulties an individual may have in executing activities.
Participation relates to an individual's involvement in a life situation. Participation restrictions are problems an individual may experience in involvement in life situations.

PLEASE RATE THE RELEVANCE OF EACH OF THE FOLLOWING ITEMS WHEN ASSESSING FALL RISK IN OLDER ADULTS

Writing (e.g. drafting a letter)

Extremely relevant | Very relevant | Moderately relevant | Neutral | Slightly irrelevant | Low relevance | Not at all relevant

Watching (e.g. looking at object or people in the environment, watching a sports event)

Extremely relevant | Very relevant | Moderately relevant | Neutral | Slightly irrelevant | Low relevance | Not at all relevant

Listening (e.g. listening to conversations, the radio/TV, warning signals)

Extremely relevant | Very relevant | Moderately relevant | Neutral | Slightly irrelevant | Low relevance | Not at all relevant

Focusing attention on the environment (e.g. changes in physical or social stimuli)

Extremely relevant | Very relevant | Moderately relevant | Neutral | Slightly irrelevant | Low relevance | Not at all relevant

Carrying out daily routine (e.g. completing activities of daily living, activity level, sedentary lifestyle)

Extremely relevant | Very relevant | Moderately relevant | Neutral | Slightly irrelevant | Low relevance | Not at all relevant

Communicating with - receiving - spoken message (e.g. responding and comprehending questions or instructions)

Extremely relevant | Very relevant | Moderately relevant | Neutral | Slightly irrelevant | Low relevance | Not at all relevant

Speaking (e.g. requesting help, telling a story, talking while walking)

Extremely relevant | Very relevant | Moderately relevant | Neutral | Slightly irrelevant | Low relevance | Not at all relevant

Changing basic body position (e.g. sitting down on a chair from a standing position, getting up from the dinner table into a standing position)

Extremely relevant | Very relevant | Moderately relevant | Neutral | Slightly irrelevant | Low relevance | Not at all relevant

Maintaining a body position (e.g. remaining standing in a queue at the bank, sitting on a bench)

Extremely relevant | Very relevant | Moderately relevant | Neutral | Slightly irrelevant | Low relevance | Not at all relevant

Transferring oneself (e.g. moving from bed to chair)

Extremely relevant | Very relevant | Moderately relevant | Neutral | Slightly irrelevant | Low relevance | Not at all relevant

Changing and maintaining body position, other specified and unspecified (e.g. turn around while walking without losing balance)

Extremely relevant | Very relevant | Moderately relevant | Neutral | Slightly irrelevant | Low relevance | Not at all relevant

Lifting and carrying objects (e.g. lifting an object from the floor or a table to transport it from one place to another)

Extremely relevant | Very relevant | Moderately relevant | Neutral | Slightly irrelevant | Low relevance | Not at all relevant

Hand and arm use (e.g. reaching for something, picking up an object, turning a door handle, opening or closing a door)

Extremely relevant | Very relevant | Moderately relevant | Neutral | Slightly irrelevant | Low relevance | Not at all relevant

Basic walking (e.g. short and long distances)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Walking (e.g. walking on different surfaces, stepping over objects, walking forwards, backwards or sideways)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Moving around (e.g. going up and down stairs, moving around obstacles)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Discussion (e.g. talking about current events in a group setting)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Moving around in different locations (e.g. walking inside or outside the home)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Moving around using equipment (e.g. use of walking aids, cane)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Washing oneself (e.g. taking a bath or shower)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Toileting (e.g. planning and carrying out a trip to the toilet and cleaning yourself afterwards)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Dressing (e.g. getting dressed, putting on shoes)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Looking after one's health (e.g. maintaining a balanced diet, managing medication, avoiding risks of alcohol or drugs)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Looking after one's safety (e.g. not taking unnecessary risk, avoiding harm to one's safely)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Acquisition of foods and services (e.g. going shopping)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Preparing meals (e.g. cooking food with heat, preparing cold drinks, serving food)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Doing housework (e.g. sweeping, cleaning the house)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Caring for household objects (e.g. watering plants)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Intimate relationships (e.g. having a healthy sex life)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Recreation and leisure (e.g. visiting with friends, going out to social events, the gym or the museum)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

BODY FUNCTION CATEGORY

The following items are related to Body functions.
Body functions items relate to the physiological functions of body structure, including psychological functions. Impairments are problems in body function as a significant deviation or loss.

PLEASE RATE THE RELEVANCE OF EACH OF THE FOLLOWING ITEMS WHEN ASSESSING FALL RISK IN OLDER ADULTS

Consciousness functions (e.g. state of one's awareness or alertness)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Articulation function (e.g. stuttering or stammering)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Orientation functions (e.g. knowing where you are, what time it is and what is your orientation to your environment)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Intellectual functions (e.g. intellectual or mental retardation, dementia)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Global psychosocial functions (e.g. personal and interpersonal skills used during social interactions)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Temperament and personality functions (e.g. confidence, non-compliance, impulsiveness, emotional stability)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Sleep functions (e.g. sleep disturbances, lack of sleep, quality of sleep, insomnia)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Global mental functions (e.g. global cognitive or mental status)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Memory functions (e.g. short or long terms memory loss, amnesia, ability to remember)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Psychomotor functions (e.g. agitation)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Emotional functions (e.g. functions of appropriateness and regulation of emotions, fear, happiness, sadness)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Perceptual functions (e.g. lack of insight, altered awareness, illusions)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Seeing function (e.g. clarity and quality of vision)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Hearing (e.g. localizing sound, discriminating speech or words)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Vestibular functions (e.g. sensory functions to keep your balance while moving)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Sensations associated with hearing and vestibular function (e.g. sensations of dizziness / vertigo)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Proprioception function (e.g. sense of joint position, functions to enable moving your hand or arm)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Additional sensory functions (e.g. loss or dysfunction in any of the senses)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Procreation function (e.g. sexual activity)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Sensations of pain (e.g. pain in legs, pain affecting level of functioning)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Sensations associated with cardiovascular and respiratory functions (e.g. shortness of breath, oxygen requirements)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Defecation function (e.g. frequency of defecation, constipation, incontinence)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Weight management function (e.g. lack of appetite, weight loss, weight gain)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Urination functions (e.g. stress, urge, dribbling, incontinence)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Mobility of joint functions (e.g. function to bend knees, elbows and other joints easily, range of motion)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Stability of joint function (e.g. function related to hip or shoulder stability)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Muscle power functions (e.g. contracting arm of leg muscle for movement)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Muscle endurance functions (e.g. function related to keep a single body position for a period of time)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Muscle functions (e.g. muscles needed to transfer oneself form the bed to a chair)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Involuntary movement reaction functions (e.g. functions related to postural reactions)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Control of voluntary movements (e.g. bending the legs or lifting the arms)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Gait pattern function (e.g. body functions used for walking or running)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Neuromusculoskeletal- and movement-related functions (e.g. impaired mobility)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Functions of hair (e.g. hair loss, slow hair growth)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

BODY STRUCTURE CATEGORY

The following items are related to Body structures.
Body structure items relate to anatomical part of the body such as organs, limbs and their components.
Impairments are problems in body structure as a significant deviation or loss.

PLEASE RATE THE RELEVANCE OF EACH OF THE FOLLOWING ITEMS WHEN ASSESSING FALL RISK IN OLDER ADULTS

Structure of the nose (e.g. nose cartilage)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Structure of the inner ear (e.g. vestibular apparatus and cochlea)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Structures of respiratory system (e.g trachea, lungs and muscles of respiration)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Structures of urinary system (e.g. kidney, bladder)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Structure of the intestines (e.g. small and large intestines)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Structure of upper extremity (e.g. upper arm, forearm, hand)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Structure of lower extremity (e.g. thigh, lower leg, ankle and foot)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Structure of trunk (e.g. vertebrae, muscles and ligaments of the trunk)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Structures related to movement (e.g. structure related to active movement such as leg muscles when walking)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Additional musculoskeletal structure related to movement (e.g. structure of the legs, hips, trunk and arms)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Structure of nails (e.g. nail, cuticles)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

ENVIRONMENTAL FACTORS CATEGORY

The following items are related to Environmental factors.
Environmental factors make up the physical, social and attitudinal environment in which people live and conduct their lives.

PLEASE RATE THE RELEVANCE OF EACH OF THE FOLLOWING ITEMS WHEN ASSESSING FALL RISK IN OLDER ADULTS

Products or substances for personal consumption(e.g. medication, alcohol)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Flora and Fauna (e.g. birds in cages at the zoo)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Products and technology for personal use in daily living (e.g. footwear, clothing, mats and furniture, kitchen and cleaning equipment, support handles)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Products and technology for personal indoor and outdoor mobility and transportation (e.g. walking aids, crutches, canes)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Products and technology for culture, recreation and sport (e.g. equipment used during sport or leisure activities)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Design, construction and building products and technology of building for public use (e.g. public spaces, stairs, floor surfaces, public bathrooms and guardrails)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Design, construction and building products and technology of building for private use (e.g. bathrooms, railings, stairs in one's own home)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Sound (e.g. loud thunderstorms outside when you're sitting inside the house)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Climate (e.g. excessive heat or cold, rain)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Light (e.g. darkness, poor lighting)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Natural environment and human-made changes to environment, other specified (e.g. uneven surface, environmental hazard, crowding, land forms, bodies of water)

Extremely	Very relevant	Moderately	Neutral	Slightly	Low relevance	Not at all

relevant	relevant	irrelevant	relevant

Immediate family (e.g. emotional of physical support form immediate family members)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Extended family (e.g. emotional or physical support form relative outside the immediate family)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Personal care providers and personal assistants (e.g. emotional or physical support from non-family members)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Domesticated animals (e.g. pets)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Support and relationships, other specified (e.g. physical support form non-family members)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Health services, system and policies (e.g. having access to rehabilitation and other health services)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Legal services, system and policies, (e.g. influence of customary marriages, right to assistance, technical aids)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

PERSONAL FACTORS CATEGORY

The following items are related to Personal factors.

Personal factors make up personal conditions or factors that might have an influence on an individual's risk of falling. Personal factors are not coded to the ICF.

PLEASE RATE THE RELEVANCE OF EACH OF THE FOLLOWING ITEMS WHEN ASSESSING FALL RISK IN OLDER ADULTS

Acute / chronic medial conditions (e.g. acute ischemic incident, chronic high blood pressure)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Political views (e.g. voting for a specific political party of your choice during a general election)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Age (e.g. being over 65 years old)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Drinking lots of water (e.g. drinking at least 2 liters of water per day)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Faith (e.g. trusting higher powers to provide in your needs and prevent you from falling)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Fall history (e.g. previous fall sin the last 12 months)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

History of causing car accidents (e.g. causing several car accident in the last 12 months)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Fever (e.g. fever due to high body temperature or due to illness)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Gender (e.g. begin male or female)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Physical disabilities (e.g. having one leg amputated)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Post-operative (e.g. the first 48 hours after an operation or anesthesia)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Reduction in body mass (e.g. begin thin and frail)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Symptoms of falling (e.g. loss of balance, unsteadiness, lightheartedness)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Trauma fractures (e.g. fractures in the upper or lower extremities)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Nail biting (e.g. being a nail biter)

Extremely relevant	Very relevant	Moderately relevant	Neutral	Slightly irrelevant	Low relevance	Not at all relevant

Please add any factors you think is relevant when assessing fall risk factors in older adults that was not mentioned int this survey.

Please add any further reflections of importance for the assessment and intervention to this group of patient not mentioned in this survey.

Thank you for participating in this survey. Your time and effort is appreciated.

Should you have any question, feel free to contact me on hendrika@hdcinc.co.za

This is the end of the survey, please submit your answers by clicking on the >> next arrow.

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Delphi Survey Round 2

Dear Sir / Madam

Thank you for participating in this research study, your time, expertise and input is very valuable and contribute positively towards the outcome of the project.

This survey only contain the fall risk items that 80% of the participants in the first round indicated are relevant when assessing fall risk in older adults.

For that reason, some items you indicated as relevant, might not appear in this survey.

During the survey, you can navigate between pages using the << back or >> next arrows at the bottom of the screen.

You can exit the survey at any time and continue later, the last completed responses will automatically be recorded.

On completion of the survey, your answers will be automatically submitted.

For this round, emphasis is placed on the **IMPORTANCE** of each survey item when assessing fall risk in older adults.

Even though some items might still be <u>highly relevant</u>, it does not necessarily mean it is <u>highly important</u>.

Please consider each item in light of how IMPORTANT that specific item is when you assess an older adult for fall risk. For example, should you have limited time available and you need to assess an older adult, consider how important would each item be to make sure you include or assess it, within your time limit.

Completing this survey will take about 15-20 minutes.

Please submit your responses as soon as possible, but no later than **Saturday 14 March 2020.**

If you have any questions about the survey or technical difficulties completing this survey, please contact Hendrika de Clercq on hendrika@hdcinc.co.za

First name and surname

ACTIVITIES AND PARTICIPATION

The following items are related to Activities and Participation.
Activities relates to the execution of a task or action. Activity limitations are difficulties an individual may have in executing activities.
Participation relates to an individual's involvement in a life situation.
Participation restrictions are problems an individual may experience in involvement in life situations.

PLEASE RATE THE IMPORTANCE OF EACH OF THE FOLLOWING ITEMS WHEN ASSESSING FALL RISK IN OLDER ADULTS.

Rehearsing (e.g. repeating a sequence of events or symbols as a basic component of learning, such as counting by tens or practicing the recitation of a poem)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
			○			

Watching (e.g. looking at objects or people in the environment)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Focusing attention on the environment (e.g. changes in physical or social stimuli, paying attention to the type of surfaces you walk on)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Carrying out a daily routine (e.g. completing activities of daily living, managing one's activity level, sedentary lifestyle)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Communicating with - receiving - spoken messages (e.g. responding and comprehending questions or instructions)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Speaking (e.g. requesting help, telling a story, talking while walking)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Changing basic body position (e.g. sitting down on a chair from a standing position, getting up from the dinner table into a standing position)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Maintaining a basic body position (e.g. remaining standing in a queue at the bank, sitting on a bench)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Transferring oneself (e.g. moving from bed to chair)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Changing and maintaining a body position (e.g. turn around while walking without losing balance)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Lifting and carrying objects (e.g. lifting an object from the floor or a table to transport it from one place to another)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Hand and arm use (e.g. reaching for something, picking up an object, turning a door handle, opening or closing a door)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Basic walking (e.g. short and long distances)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Walking (e.g. stepping over objects, walking forwards, backwards or sideways)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Moving around (e.g. going up and down stairs, moving around obstacles)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Making decisions (e.g. making a choice among options, implementing the choice, and evaluating the effects of the choice)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Moving around in different locations (e.g. walking inside or outside the home on different terrains or surfaces)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Moving around using equipment (e.g. use of walking aids, canes)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Washing oneself (e.g. taking a bath or a shower)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Toileting (e.g. planning and carrying out a trip to the toilet and cleaning yourself afterwards)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Dressing (e.g. getting dressed, putting on shoes)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Looking after one's safety (e.g. not taking unnecessary risks, avoiding harm to one's safety)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Acquisition of goods and services (e.g. selecting and gathering food, fuel, household items or cooking necessities for daily living, going shopping)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Preparing meals (e.g. cooking food with heat or on an open fire, preparing cold drinks, serving food)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Doing housework (e.g. sweeping, cleaning the house, collecting and washing clothes inside or outside the house)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Caring for household objects (e.g. watering plants)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Producing non-verbal messages (e.g. using gestures, symbols and drawings to convey messages)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Recreation and leisure (e.g. visiting with friends, going out to social events, the gym or museums)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

BODY FUNCTION CATEGORY

The following items are related to Body Functions.
Body function items relate to the physiological functions of body structure, including psychological function. Impairments are problems in body function as a significant deviation of loss.

PLEASE RATE THE IMPORTANCE OF EACH OF THE FOLLOWING ITEMS WHEN ASSESSING FALL RISK IN OLDER ADULTS.

Consciousness functions (e.g. state of one's awareness or alertness)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Calculation functions (e.g. specific mental functions of determination, approximation and manipulation of mathematical symbols and processes)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Orientation functions (e.g. knowing where you are, your orientation to the environment, what time it is)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Intellectual functions (e.g. intellectual or mental retardation, dementia)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Temperament and personality functions (e.g. confidence, non-compliance, impulsiveness, emotional stability, personality type)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Sleep functions (e.g. sleep disturbances, lack of sleep, quality of sleep, insomnia)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important

Global mental functions, (e.g. global cognitive or mental status)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important

Memory functions (e.g. short- or long-term memory loss, amnesia, ability to remember)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important

Emotional functions (e.g. functions of appropriateness and regulation of emotions, fear of falling, happiness, sadness)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important

Perceptual functions (e.g. lack of insight, altered awareness, illusions)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important

Seeing function (e.g. clarity and quality of vision)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important

Hearing function (e.g. localizing sound, discriminating speech or words)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important

Vestibular function (e.g. sensory functions to keep your balance while moving)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important

Sensations associated with hearing and vestibular function (e.g. sensation of dizziness or vertigo)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important

Proprioception function (e.g. sense of joint position, function to enable moving your hand or arm)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important

Additional sensory functions (e.g. loss or dysfunction in any of the senses)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important

Fluency and rhythm of speech function (e.g. functions of fluency, rhythm, speed and melody of speech, impairments such as stuttering, stammering)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important

Sensations of pain (e.g. pain in legs, pain affecting levels of functioning)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important

Sensations associated with cardiovascular and respiratory functions (e.g. shortness of breath, oxygen requirements)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Mobility of joint functions (e.g. function to bend knees, elbows and other joints easily, range of motion)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Stability of joint function (e.g. function related or hip or shoulder stability)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Muscle power functions (e.g. contracting arm or leg muscle for movement)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Muscle endurance functions (e.g. function related to keep a single body position for a period of time)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Muscle functions (e.g. muscles needed to transfer oneself from bed to chair)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important

Involuntary reaction functions (e.g. functions related to postural reactions)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Control of voluntary movements (e.g. bending the legs or lifting the arms)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Gait pattern function (e.g. body functions used for walking or running)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Neuromusculoskeletal-and movement-related functions (e.g. impaired mobility)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Alternative vocalization functions (e.g. functions of the production of notes and range of sounds, such as in singing, chanting, babbling and humming; crying aloud and screaming)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

BODY STRUCTURE CATEGORY

The following items are related to Body Structures.

Body structure items relate to anatomical parts of the body such as organs, limbs and their components.
Impairments are problems in body structure as a significant deviation of loss.

PLEASE RATE THE IMPORTANCE OF EACH OF THE FOLLOWING ITEMS WHEN ASSESSING FALL RISK IN OLDER ADULTS.

Structure of the sympathetic nervous system (e.g. fibers and ganglia associated with the sympathetic nervous system)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Structure of lower extremity (e.g. thigh, lower leg, ankle, foot)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Structure of trunk (e.g. vertebrae, muscles and ligaments of the trunk)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Structure of salivary glands (e.g. salivary glands, secretion of salivation)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Structures related to movement (e.g. structure related to active movement such as leg muscle when walking)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Additional musculoskeletal structures related to movement (e.g. structure of the legs, hips, trunks and arms)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Structure of skin glands (e.g. sweat glands, sebaceous glands)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

ENVIRONMENTAL FACTORS CATEGORY

The following items are related to Environmental Factors.
Environmental factors make up the physical, social and attitudinal environment in which people live and conduct their lives.

PLEASE RATE THE IMPORTANCE OF EACH OF THE FOLLOWING ITEMS WHEN ASSESSING FALL RISK IN OLDER ADULTS.

Products or substances for personal consumption (e.g. medication, alcohol)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Products and technology for education (e.g. equipment, products, processes, methods and technology used for acquisition of knowledge, expertise or skill, including those adapted or specially designed)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Products and technology for personal use in daily living (e.g. footwear, clothing, mats and furniture, kitchen and cleaning equipment, support handles, buckets or containers for gathering water)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Products and technology for personal indoor and outdoor mobility and transportation (e.g. walking aids, crutches, canes)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Design, construction and building products and technology of buildings for public use (e.g. public spaces, stairs, floor surfaces, type of terrain you walk on, public bathrooms, guardrails and accessibility of public areas)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Design, construction and building products and technology of buildings for private use (e.g. bathrooms, railings, stairs in one's own home)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Products and technology for employment (e.g. equipment, products and technology used for employment to facilitate work activities)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Light (e.g. darkness, poor lighting)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Natural environment and human-made changes to environment (e.g. uneven surfaces, environmental hazard, crowding, land forms, bodies of water)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Immediate family (e.g. emotional or physical support from immediate family members)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Personal care providers and personal assistants (e.g. emotional or physical support from non-family members)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Domesticated animals (e.g. pets, small or large breed dogs, cats)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Support and relationships (e.g. physical support form non-family members)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Health services, system and policies (e.g. having access to rehabilitation and other health services)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Social norms, practices and ideologies (e.g. social norms of moral and religious behaviour or etiquette; religious doctrine and resulting norms and practices; norms governing rituals or social gatherings)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

PERSONAL FACTORS CATEGORY

The following items are related to Personal Factors.
Personal factors make up personal conditions or factors that might have an influence on an individual's risk of falling. Personal factors are not coded to the ICF.

PLEASE RATE THE IMPORTANCE OF EACH OF THE FOLLOWING ITEMS WHEN ASSESSING FALL RISK IN OLDER ADULTS.

Acute / chronic medical conditions (e.g. acute ischemic incident, chronic high blood pressure, blood sugar level disorders)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Online shopping (e.g. buying many items through online shopping)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Age (e.g. being over 65 years)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Fall history (e.g. previous falls in the last 12 months)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Physical disabilities (e.g. having one arm amputated)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Loving animals (e.g. have a great love for all animals and being an advocate for animal rights)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Post-operative (e.g. the first 48 hours after an operation or anesthesia)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Reduction in body mass (e.g. being thin or frail)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Symptoms of falling (e.g. loss of balance, unsteadiness, lightheadedness)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Trauma fractures (e.g. fractures in the upper or lower extremities)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Wealth (e.g. being wealthy and able to buy many materialistic items for yourself)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Please add any IMPORTANT items when assessing fall risk in older adults, which wasn't mentioned in this survey.

Thank you for your participation, we value your time and input!

Your responses will be recorded and feedback given in approximately two weeks.

Powered by Qualtrics

5/27/2021 Qualtrics Survey Software

Delphi Survey Round 3

Dear Sir / Madam

Thank you for participating in this research study, your time, expertise and input is very valuable and contribute positively towards the outcome of the project.

Based on the results of the second round, the data analysis has indicated the need for a third and final round.

This survey only contain the fall risk items that 80% of the participants in the second round indicated are important when assessing fall risk in older adults.
For that reason, some items you indicated as important, might not appear in this survey.

This round is again focusing on importance, in order to establish consensus among the participants that all the items included in this survey is indeed important.

During the survey, you can navigate between pages using the << back or >> next arrows at the bottom of the screen.

You can exit the survey at any time and continue later, the last completed responses will automatically be recorded.

On completion of the survey, your answers will be automatically submitted.

For this round, emphasis is placed on the **IMPORTANCE** of each survey item when assessing fall risk in older adults.

Even though some items might still be <u>highly relevant</u>, it does not necessarily mean it is <u>highly important</u>.

Please consider each item in light of how IMPORTANT that specific item is when you assess an older adult for fall risk. For example, should you have limited time available and you need to assess an older adult, consider how important would each item be to make sure you include or assess it, within your time limit.

Completing this survey will take about 15-20 minutes.

Please submit your responses as soon as possible, but no later than **Tuesday 7 April 2020.**

If you have any questions about the survey or technical difficulties completing this survey, please contact Hendrika de Clercq on hendrika@hdcinc.co.za

First name and surname

ACTIVITIES AND PARTICIPATION

The following items are related to Activities and Participation.
Activities relates to the execution of a task or action. Activity limitations are difficulties an individual may have in executing activities.
Participation relates to an individual's involvement in a life situation.
Participation restrictions are problems an individual may experience in involvement in life situations.

PLEASE RATE THE IMPORTANCE OF EACH OF THE FOLLOWING ITEMS WHEN ASSESSING FALL RISK IN OLDER ADULTS.

Focusing attention on the environment (e.g. changes in physical or social stimuli, paying attention to the type of surfaces you walk on)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Carrying out a daily routine (e.g. completing activities of daily living, managing one's activity level, sedentary lifestyle)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Communicating with - receiving - spoken messages (e.g. responding and comprehending questions or instructions)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Changing basic body position (e.g. sitting down on a chair from a standing position, getting up from the dinner table into a standing position)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Maintaining a basic body position (e.g. remaining standing in a queue at the bank, sitting on a bench)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Transferring oneself (e.g. moving from bed to chair)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Changing and maintaining a body position (e.g. turn around while walking without losing balance)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Lifting and carrying objects (e.g. lifting an object from the floor or a table to transport it from one place to another)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Hand and arm use (e.g. reaching for something, picking up an object, turning a door handle, opening or closing a door)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Basic walking (e.g. short and long distances)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Walking (e.g. stepping over objects, walking forwards, backwards or sideways)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Moving around (e.g. going up and down stairs, moving around obstacles)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Moving around in different locations (e.g. walking inside or outside the home on different terrains or surfaces)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Moving around using equipment (e.g. use of walking aids, canes)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Washing oneself (e.g. taking a bath or a shower)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Toileting (e.g. planning and carrying out a trip to the toilet and cleaning yourself afterwards)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Dressing (e.g. getting dressed, putting on shoes)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Looking after one's safety (e.g. not taking unnecessary risks, avoiding harm to one's safety)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Acquisition of goods and services (e.g. selecting and gathering food, fuel, household items or cooking necessities for daily living, going shopping)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Doing housework (e.g. sweeping, cleaning the house, collecting and washing clothes inside or outside the house)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

BODY FUNCTION CATEGORY

The following items are related to Body Functions.
Body function items relate to the physiological functions of body structure, including psychological function. Impairments are problems in body function as a significant deviation of loss.

PLEASE RATE THE IMPORTANCE OF EACH OF THE FOLLOWING ITEMS WHEN ASSESSING FALL RISK IN OLDER ADULTS.

Consciousness functions (e.g. state of one's awareness or alertness)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Orientation functions (e.g. knowing where you are, your orientation to the environment, what time it is)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Temperament and personality functions (e.g. confidence, non-compliance, impulsiveness, emotional stability, personality type)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Sleep functions (e.g. sleep disturbances, lack of sleep, quality of sleep, insomnia)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Memory functions (e.g. short- or long-term memory loss, amnesia, ability to remember)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Emotional functions (e.g. functions of appropriateness and regulation of emotions, fear of falling, happiness, sadness)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Perceptual functions (e.g. lack of insight, altered awareness, illusions)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important

○	○	○	○	○	○	○

Seeing function (e.g. clarity and quality of vision)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Hearing function (e.g. localizing sound, discriminating speech or words)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Vestibular function (e.g. sensory functions to keep your balance while moving)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Sensations associated with hearing and vestibular function (e.g. sensation of dizziness or vertigo)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Proprioception function (e.g. sense of joint position, function to enable moving your hand or arm)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Additional sensory functions (e.g. loss or dysfunction in any of the senses)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Sensations of pain (e.g. pain in legs, pain affecting levels of functioning)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Mobility of joint functions (e.g. function to bend knees, elbows and other joints easily, range of motion)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Stability of joint function (e.g. function related or hip or shoulder stability)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Muscle power functions (e.g. contracting arm or leg muscle for movement)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Muscle endurance functions (e.g. function related to keep a single body position for a period of time)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Muscle functions (e.g. muscles needed to transfer oneself from bed to chair)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Involuntary reaction functions (e.g. functions related to postural reactions)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Control of voluntary movements (e.g. bending the legs or lifting the arms)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Gait pattern function (e.g. body functions used for walking or running)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Neuromusculoskeletal-and movement-related functions (e.g. impaired mobility)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

BODY STRUCTURE CATEGORY

The following items are related to Body Structures.
Body structure items relate to anatomical parts of the body such as organs, limbs and their components.
Impairments are problems in body structure as a significant deviation of loss.

PLEASE RATE THE IMPORTANCE OF EACH OF THE FOLLOWING ITEMS WHEN ASSESSING FALL RISK IN OLDER ADULTS.

Structure of lower extremity (e.g. thigh, lower leg, ankle, foot)

Extremely	Very	Moderately	Neutral	Slightly	Low	Not at all

important	important	important		important	importance	important
○	○	○	○	○	○	○

Structure of trunk (e.g. vertebrae, muscles and ligaments of the trunk)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Structures related to movement (e.g. structure related to active movement such as leg muscle when walking)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Additional musculoskeletal structures related to movement (e.g. structure of the legs, hips, trunks and arms)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

ENVIRONMENTAL FACTORS CATEGORY

The following items are related to Environmental Factors.
Environmental factors make up the physical, social and attitudinal environment in which people live and conduct their lives.

PLEASE RATE THE IMPORTANCE OF EACH OF THE FOLLOWING ITEMS WHEN ASSESSING FALL RISK IN OLDER ADULTS.

Products or substances for personal consumption (e.g. medication, alcohol)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Products and technology for personal use in daily living (e.g. footwear, clothing, mats and furniture, kitchen and cleaning equipment, support handles, buckets or containers for gathering water)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Products and technology for personal indoor and outdoor mobility and transportation (e.g. walking aids, crutches, canes)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Design, construction and building products and technology of buildings for public use (e.g. public spaces, stairs, floor surfaces, type of terrain you walk on, public bathrooms, guardrails and accessibility of public areas)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Design, construction and building products and technology of buildings for private use (e.g. bathrooms, railings, stairs in one's own home)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Light (e.g. darkness, poor lighting)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Natural environment and human-made changes to environment (e.g. uneven surfaces, environmental hazard, crowding, land forms, bodies of water)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Immediate family (e.g. emotional or physical support from immediate family members)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Personal care providers and personal assistants (e.g. emotional or physical support from non-family members)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Domesticated animals (e.g. pets, small or large breed dogs, cats)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Support and relationships (e.g. physical support from non-family members)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Health services, system and policies (e.g. having access to rehabilitation and other health services)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

PERSONAL FACTORS CATEGORY

The following items are related to Personal Factors.
Personal factors make up personal conditions or factors that might have an influence on an individual's risk of falling. Personal factors are not coded to the ICF.

PLEASE RATE THE IMPORTANCE OF EACH OF THE FOLLOWING ITEMS WHEN ASSESSING FALL RISK IN OLDER ADULTS.

Acute / chronic medical conditions (e.g. acute ischemic incident, chronic high blood pressure, blood sugar level disorders)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Age (e.g. being over 65 years)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Fall history (e.g. previous falls in the last 12 months)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Physical disabilities (e.g. having one arm amputated)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Post-operative (e.g. the first 48 hours after an operation or anesthesia)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Reduction in body mass (e.g. being thin or frail)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Symptoms of falling (e.g. loss of balance, unsteadiness, lightheadedness)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Trauma fractures (e.g. fractures in the upper or lower extremities)

Extremely important	Very important	Moderately important	Neutral	Slightly important	Low importance	Not at all important
○	○	○	○	○	○	○

Please add any IMPORTANT items when assessing fall risk in older adults, which wasn't mentioned in this survey.

Thank you for your participation, we value your time and input!

Your responses will be recorded and feedback given in approximately two weeks.

Powered by Qualtrics

5/27/2021 Qualtrics Survey Software

Appendix 5A: Written case history (main study)

Name: Martin Smith Date of birth: 1952/07/14 Date: 03/12/2020

<u>Presenting Problem</u>

1. What is your primary complaint about your ears or hearing?
   I have difficulty hearing in certain situations, especially when there are a lot of noise or people talking.

2. What do you think caused your hearing problem?
   I think it's probably age. I've also worked in the mine for 45 years with a lot of noise and machinery.

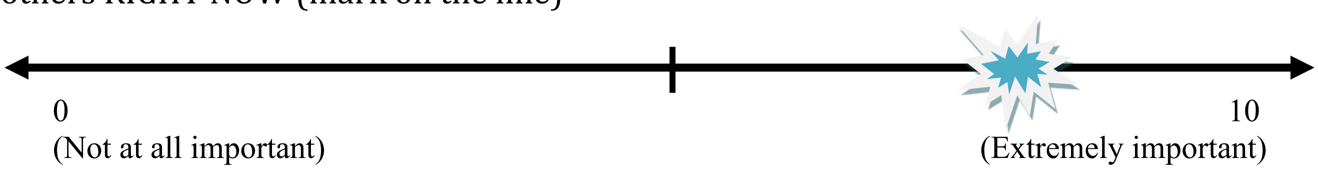
3. If you have a hearing loss, how long have you noticed this?
   It's been years, the last few times they tested my hearing for my annual medical at the mine, they said I have a problem.

4. Which is your worse ear (if they are different):
   I haven't noticed one being better or worse than the other one.

5. Do you have difficulty understanding:

   TV: Yes Telephone: Yes In groups: Yes

6. How important is it for you to improve how you hear, understand, or communicate with others RIGHT NOW (mark on the line)



<u>History</u>

1. Have you had your hearing tested before? Yes
   If yes, when and where?
   About 8 years ago when I retired. Done at Denver Mining Industries in Welkom.

2. Any drainage from the ear within the past 90 days? No

3. Have you experienced any dizziness, balance problems, or falls? Yes
   If yes, please explain:
   Sometimes I feel a little bit dizzy, like everything is spinning around me.

4. Have you had any pain/discomfort in your ears within the past 90 days: No

   If yes, rate your pain on a scale of 0 (no pain) to 10 (worst pain possible) N/A

5. Have you ever lost hearing in one ear *suddenly*? No

6. Do you have any noises or ringing in your ears? Yes left/right/both

   If present, is it: Constant / Intermittent
   When did you first notice it? I can't remember.

7. Have you received any medical or surgical treatment for hearing loss? No

8. Do you have trouble with arthritis, stiffness, numbness in your fingers? No

9. Have you ever been exposed to loud noise? Military Occupation/Job Recreational

   If yes, describe the type of noise: Machinery.

   Did you use ear plugs/muffs? Not always

10. Is there a history of hearing loss in your immediate family? No

    If yes, who: ____

11.1 Medical problems (mark all that apply):

Infectious disease: Yes, taking medication / Yes, but not taking medication / No
Diabetes: Yes, taking medication / Yes, but not taking medication / No
Heart problems: Yes, taking medication / Yes, but not taking medication / No
Recent head injury: Yes / No
High blood pressure: Yes, taking medication / Yes, but not taking medication / No
Migraine: Yes, taking medication / Yes, but not taking medication / No
Kidney failure: Yes, taking medication / Yes, but not taking medication / No
Pacemaker/Defibrillator: Yes / No
Other (please explain): None

11.2 Medication – please list all the chronic medication you are currently taking:
I take tablets for my diabetes and high blood pressure, I'm not sure what the names are.

12. Have you ever worn a hearing aid(s)? No

13. In what situations would you most like hearing aids to help you (if recommended)?:
Conversations with family or friends Yes / No
TV Yes / No
Telephone Yes / No
In the car Yes / No
Places of worship Yes / No
Music Yes / No
Other: ______________________

14. Please list anything you think assist you in general to hear better or improve your balance.
    I read lips when I can't hear properly and when I put my hand behind my ear, I can hear better. We have a medic alert button at home, so when my wife isn't home, I can use that if I ever have a problem or fall down. Fortunately, I can walk around easily, but when I go out or shopping, I take my walking stick with me just for in case. Oh yes, and in the bathroom we have railings for the bath and the shower, so we don't slip or fall in there.

Additional comments or questions for the audiologist or any information you would like to give us:

My wife complains that I can't hear, so I suppose I'll have to get hearing aids.
She is also a bit concerned about my dizzy spells, but I think it's because of my high blood pressure. Although the dizziness might be because of my ears, I don't know?

Appendix 5B: ICF code set (main study)

Fall risk factors in older adults: ICF code set

BODY FUNCTIONS

Consciousness functions[*N] *(e.g. state of one's awareness or alertness)*
Orientation functions[*N] *(e.g. knowing where you are, what time it is and what is your orientation to your environment)*
Perceptual functions[*N / P] *(e.g. lack of insight, altered awareness, illusions)*
Seeing function[*O] *(e.g. clarity and quality of vision)*
Vestibular functions[*A / P] *(e.g. sensory functions to keep your balance while moving)*
Additional sensory functions[*P / OT] *(e.g. loss or dysfunction in any of the senses)*
Sensations of pain[*M] *(e.g. pain in legs, pain affecting level of functioning)*
Sensations associated with hearing and vestibular function[*E / A] *(e.g. sensations of dizziness / vertigo)*
Sensations associated with cardiovascular and respiratory functions[*C] *(e.g. shortness of breath, oxygen requirements)*
Mobility of joint functions[*P / PO / A] *(e.g. function to bend knees, elbows, and other joints easily, range of motion)*
Stability of joint function[*P / PO / A] *(e.g. function related to hip or shoulder stability)*
Muscle power functions[*P] *(e.g. contracting arm or leg muscle for movement)*
Muscle endurance functions[*P] *(e.g. function related to keep a single body position for a period of time)*
Muscle functions[*P] *(e.g. muscles needed to transfer oneself form the bed to a chair)*
Involuntary movement reaction functions[*P / A] *(e.g. functions related to postural reactions)*
Control of voluntary movement functions[*P] *(e.g. bending the legs or lifting the arms)*
Gait pattern function[*P / PO / A] *(e.g. body functions used for walking or running)*
Neuromusculoskeletal- and movement-related functions[*P / PO] *(e.g. impaired mobility)*

BODY STRUCTURES

Structure of lower extremity[*M / P / PO] *(e.g. thigh, lower leg, ankle and foot)*
Structure of the trunk[*M / P] *(e.g. vertebrae, muscles and ligaments of the trunk)*
Additional musculoskeletal structures related to movement[*M / P] *(e.g. structure of the legs, hips, trunk and arms)*
Structures related to movement[*M / P] *(e.g. structure related to active movement such as leg muscles when walking)*
Structures of the inner ear[*E] *(e.g. vestibular apparatus and cochlea)*

ACTIVITIES & PARTICIPATION

Watching[*O] *(e.g. looking at object or people in the environment, watching a sports event)*
Focussing attention on the environment [*P / A / O] *(e.g. changes in physical or social stimuli)*
Carrying out daily routine[*P / A] *(e.g. completing activities of daily living, activity level, sedentary lifestyle)*
Changing basic body position[*P / A] *(e.g. sitting down on a chair from a standing position, getting up from the dinner table into a standing position)*
Maintaining a body position[*P / A] *(e.g. remaining standing in a queue at the bank, sitting on a bench)*
Transferring oneself[*P / A] *(e.g. moving from bed to chair)*
Changing and maintaining body position, other specified and unspecified[*P / A] *(e.g. turn around while walking without losing balance)*
Lifting and carrying objects[*P] *(e.g. lifting an object from the floor or a table to transport it from one place to another)*
Hand and arm use[*P / OT] *(e.g. reaching for something, picking up an object, turning a door handle, opening or closing a door)*
Basic walking[*PO / P / A] *(e.g. short and long distances)*
Walking[*P / PO / A] *(e.g. walking on different surfaces, stepping over objects, walking forwards, backwards or sideways)*
Moving around[*P] *(e.g. going up and down stairs, moving around obstacles)*
Moving around in different locations[*P] *(e.g. walking inside or outside the home)*
Moving around using equipment[*P / A] *(e.g. use of walking aids, cane)*
Washing oneself[*P / OT] *(e.g. taking a bath or shower)*
Toileting[*P / OT] *(e.g. planning and carrying out a trip to the toilet and cleaning yourself afterwards)*
Dressing[*P / OT] *(e.g. getting dressed, putting on shoes)*
Looking after one's safety[*P / OT] *(e.g. not taking unnecessary risk, avoiding harm to one's safely)*
Acquisition of goods and services[*OT] *(e.g. going shopping)*
Doing housework[*P / OT] *(e.g. sweeping, cleaning the house)*

ENVIRONMENTAL FACTORS

Products or substances for personal consumption[*M] *(e.g. medication, alcohol)*
Products and technology for personal use in daily living[*OT / P / PO] *(e.g. footwear, clothing, mats and furniture, kitchen and cleaning equipment, support handles)*
Products and technology for personal indoor and outdoor mobility and transportation[*OT / P] *(e.g. walking aids, crutches, canes)*
Design, construction and building products and technology of buildings for public use[*P] *(e.g. public spaces, stairs, floor surfaces, public bathrooms and guardrails)*
Design, construction and building products and technology of buildings for private use[*P] *(e.g. bathrooms, railings, stairs in one's own home)*
Natural environment and human-made changes to environment, other specified[*P / OT / PO] *(e.g. uneven surface, environmental hazard, crowding, land forms, bodies of water)*
Light[*O] *(e.g. darkness, poor lighting)*
Domesticated animals *(e.g. pets)*
Health services, system and policies *(e.g. having access to rehabilitation and other health services)*

PERSONAL FACTORS

Age *(e.g. being over 65 years old)*
Fall history *(e.g. previous falls in the last 12 months)*
Medical conditions[*M] *(e.g. chronic / acute conditions)*

*Possible referral sources: N = Neurologist; P = Physiotherapist who does vestibular testing/rehabilitation; A = Audiologist who does vestibular testing/rehabilitation; O = Ophthalmologist / Optometrist; OT = Occupational therapist; M = Medical practitioner; E = Ear, Nose and Throat (ENT) specialist; C = Cardiologist, PO = Podiatrist

Appendix 5C: Informed consent form - audiologists (pilot study)

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities

5 July 2020

Request for participation in a research study

Dear Sir / Madam

I am a PhD candidate at the Centre for Augmentative and Alternative Communication (CAAC) at the University of Pretoria in South Africa. In order to comply with the requirements of the degree, I have to complete an extensive research project resulting in a thesis. This study has received permission from the Ethics Committee, Faculty of Humanities, at the University of Pretoria.

Research title: Developing an ICF code set for fall risk in older adults: Implications for intervention and assessment.

Objectives of the study: The overall aim of the research study is to develop an International Classification of Functioning, Disability and Health (ICF) code set for assessing fall risk in older adults. The research study followed a mixed-method sequential design and the initial ICF code was developed during the first and second phases of the study by means of a systematic review and focus groups and a Delphi expert panel. For this last and final phase, the aim is to establish the clinical utility of the developed ICF code set for fall risk assessment in older adults.

Why should you participate? Your participation in this research study will contribute to the development of an ICF code set for fall risk in older adults and recommendations resulting from this research will encourage new research in related fields. Each participant will also receive a copy of the final ICF code set to be used in their practice or for further research.

Who will participate in the study? Audiologists who regularly consult with older adults for audiological and/or vestibular assessments.

What will be expected of you? Should you wish to participate in this study, you will be asked for your informed consent to participate and complete a short biographic questionnaire. Thereafter, you will be asked to complete a clinical utility questionnaire based on a written case history as well as a feedback questionnaire with possible suggestions to improve the clinical utility questionnaire. It should take you approximately 20 – 30 minutes to complete the questionnaires.

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Fax +27 (0) 86 5100841
Email saak@up.ac.za
wwwcaac.up.ac.za

Faculty of Humanities
Fakulteit Geesteswetenskappe
Lefapha la Bomotho

Will you experience any risk or discomfort during the study? You will experience no harm or discomfort during the completion of the questionnaires, and you may at any time throughout the study decide to withdraw without any penalization or negative consequences.

Confidentiality: The biographic and clinical utility questionnaires are completely anonymous. Data collected from the feedback questionnaire will be confidential and all data collected will be entirely depersonalized by using participation numbers and would therefore not be harmful in any way. Confidentially will be ensured by the researcher taking the following steps:

- No personal information will be documented or used that can link you to this study;
- Your name will only be recorded to prevent duplicate entries, thereafter a participant number will be assigned to you.

All information gathered during the study will be treated as confidential and data will be stored at the Centre for Alternative and Augmentative Communication at the University of Pretoria and destroyed after the mandatory 15 years. Results from this study will be presented as a PhD thesis, scientific research papers and as conference presentations. Should you wish, the results of the study would be made available to you following the completion of the research study.

Date of the data collection: The questionnaires will be send out on Monday **13 July 2020 and you will have five days to complete these questionnaires and send it back to the researcher.**

Should you have any further questions, please feel free to contact Prof. Juan Bornman at +2712 420 2001 or the researcher, Mrs. Hendrika de Clercq, at +2712 755 9711.

I trust that this letter has provided you with sufficient information to make an informed decision about the participation in this research study.

Should you agree to participate, please complete the reply slip attached and return it to me on or before **10 July 2020.**

Kind regards,

Mrs H de Clercq	Prof J Bornman
Researcher	Supervisor

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UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities

Reply slip: Participation in research study

Researcher: Hendrika de Clercq

Supervisor: Prof J Bornman

By signing this form, I acknowledge that I have read the information on the proposed study and have been given adequate time to consider this request. I have not been pressured to participate in any way and I understand participation in this study is completely voluntary and that I may withdraw from it at any time without supplying reasons. I am aware the University of Pretoria has approved this study and that results of this study will be used for scientific purposed and will be published. I agree to participate in this study and hereby give consent for participation.

Yes, I give permission to participate in this research study ☐

No, I do not give permission to participate in this research study ☐

Name & surname: ______________________________

Contact number: ______________________________

Email address: ______________________________

Signature of participant: ______________________________

Date: ______________________________

I would like to receive a copy of the final ICF code set on completion of the study: Yes / No

If yes, the final ICF code set will be emailed to you on completion of the research study.

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Appendix 5D: Informed consent form - audiologists (main study)

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities

2 April 2020

Request for participation in a research study

Dear Sir / Madam

I am a PhD candidate at the Centre for Augmentative and Alternative Communication (CAAC) at the University of Pretoria in South Africa. In order to comply with the requirements of the degree, I have to complete an extensive research project resulting in a thesis. This study has received permission from the Ethics Committee, Faculty of Humanities, at the University of Pretoria.

Research title: Developing an ICF code set for fall risk in older adults: Implications for intervention and assessment.

Objectives of the study: The overall aim of the research study is to develop an International Classification of Functioning, Disability and Health (ICF) code set for assessing fall risk in older adults. The research study followed a mixed-method sequential design and the initial ICF code was developed during the first phase of the study by means of a systematic review and focus groups. For this last and final phase, the aim is to establish the usability of the developed ICF code set for fall risk assessment in older adults.

Why should you participate? Your participation in this research study will contribute to the development of an ICF code set for fall risk in older adults and recommendations resulting from this research will encourage new research in related fields. Each participant will also receive a copy of the final ICF code set to be used in their practice or for further research.

Who will participate in the study? Audiologists who regularly consult with older adults for audiological and/or vestibular assessments.

What will be expected of you? Should you wish to participate in this study, you will be asked for your informed consent to participate. You will then be asked to complete a short biographic questionnaire. Thereafter, you will be asked to complete two ICF code sets and feedback forms for two fictional patients in the form of a case study. It should take you approximately 20 minutes to complete the code sets.

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Faculty of Humanities
Fakulteit Geesteswetenskappe
Lefapha la Bomotho

Will you experience any risk or discomfort during the study? You will experience no harm or discomfort during the completion of the code sets, and you may at any time throughout the study decide to withdraw without any penalization or negative consequences.

Confidentiality: The survey will not be completely anonymous, but all data collected will be entirely depersonalized by using participation numbers and would therefore not be harmful in any way. Confidentially will be ensured by the researcher taking the following steps:

- No personal information will be documented or used that can link you to this study;
- Your name will only be recorded to prevent duplicate entries, thereafter a participant number will be assigned to you.

All information gathered during the study will be treated as confidential and data will be stored at the Centre for Alternative and Augmentative Communication at the University of Pretoria and destroyed after the mandatory 15 years. Results from this study will be presented as a PhD thesis, scientific research papers and as conference presentations. Should you wish, the results of the study would be made available to you following the completion of the research study.

Date of the data collection: The case studies will be send out on Monday **13 April 2020 and you will have five days to complete the ICF code sets.**

Should you have any further questions, please feel free to contact Prof. Juan Bornman at +2712 420 2001 or the researcher, Mrs. Hendrika de Clercq, at +2712 755 9711.

I trust that this letter has provided you with sufficient information to make an informed decision about the participation in this research study.

Should you agree to participate, please complete the reply slip attached and return it to me on or before **10 April 2020.**

Kind regards,

Mrs H de Clercq
Researcher

Prof J Bornman
Supervisor

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UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
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Faculty of Humanities

Reply slip: Participation in research study

Researcher: Hendrika de Clercq

Supervisor: Prof J Bornman

By signing this form, I acknowledge that I have read the information on the proposed study and have been given adequate time to consider this request. I have not been pressured to participate in any way and I understand participation in this study is completely voluntary and that I may withdraw from it at any time without supplying reasons. I am aware the University of Pretoria has approved this study and that results of this study will be used for scientific purposed and will be published. I agree to participate in this study and hereby give consent for participation.

Yes, I give permission to participate in this research study ☐

No, I do not give permission to participate in this research study ☐

Name & surname: ______________________________

Contact number: ______________________________

Email address: ______________________________

Signature of participant: ______________________________

Date: ______________________________

I would like to receive a copy of the final ICF code set on completion of the study: Yes / No

If yes, the final ICF code set will be emailed to you on completion of the research study.

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Clinical Utility Questionnaire Pilot study

Informed consent for participation

Developing an ICF code set for fall risk in older adults: Implications for intervention and assessment

Dear Audiologist

Your are invited to participate in a survey on fall risk identification in older adults.

The overall aim of this research study is to develop an International Classification of Functioning, Disability and Health (ICF) code set for assessing fall risk in older adults. The research study followed a mixed-method sequential design and the initial ICF code set was developed during the first phase of the study by means of a systematic review and focus groups. This final phase aims is to investigate the developed ICF code set's clinical usefulness for audiologists.

Any audiologist practicing in South Africa and who is registered with the HPCSA is eligible to participate in this survey.

Please note the following:

This study involves completing a survey and your participation is very important.

This survey is completely anonymous. All responses will be treated with utmost confidentiality and only be analyzed in aggregated form. Under no

circumstances will we publish the findings of this study in such a way that the responses can be traced or linked to any individual respondent.

In addition, all data collected during these sessions will be entirely depersonalised by the Qualtrics software by using participation numbers and would therefore not be harmful in any way.

You will experience no harm or discomfort during the survey and you may at any time throughout the survey decide to withdraw without any penalization or negative consequences.

Completing the survey will take about 20 to 30 minutes.

Please indicate if you have read and understood the above consent form and desire of your own free will to participate in this study.

- ○ Yes, I understand and agree to participate
- ○ No, I do not agree to participate

To continue to the first question, please click the >> arrow below.

During the survey, you can navigate between pages using the << back or >> next arrows at the bottom of the screen.

Note that your progress is autosaved as you complete the survey. You can exit the survey at any time and continue later, as the last completed responses will automatically be recorded.

On completion of the survey, your answers will be automatically submitted.

Please read each question carefully and take your time to answer each question.

At certain intervals, you will be asked to record the time it takes you to download the relevant documents and complete a specific section. Please record these times when prompted at the relevant questions.

Definitions:

The ICF refers to the **International Classification of Functioning, Disability and Health.**
The ICF was endorsed by the World Health Organization (WHO) in 2001. The ICF framework depicts a person's level of functioning and disability as umbrella terms, providing a common language for the description of both the positive aspect (facilitators) and negative aspects (barriers) related to a person's risk of falling. The ICF can be used to identify fall risk factors at three levels, namely: at impairment level (referring to body structures and function), at individual level (referring to activity limitation and participation restrictions), and at contextual level (referring to environmental and personal factors). This enables all healthcare practitioners to discuss a patient's level of functioning using a common language.

Fall risk factors refers to several intrinsic and extrinsic factors that can cause a fall and increase a person's risk of falling. The more risk factors an older adults have, the more likely the person is to fall. Identifying fall risk factors could assist in the further assessment, management and intervention strategies of an older adult with a risk of falling, which would increase the personal benefit to the older adults and impact positively on their quality of life.

Health-related quality of life (HRQoL) refers to a person's perceived quality of life, specifically related to their health and well-being, or lack thereof, including their physical, mental and emotional health status.

Older adults, in this survey, refers to all adults between the ages of 65 - 74 years.

Please record the time at the start of the next question to document how long it takes you to complete this section. Please do not rush through the questions, the time will only be used for feedback and analysis purposes.

Are you registered with the HPCSA?

- ◯ Yes
- ◯ No

Please state your qualification.

- ◯ As an audiologist
- ◯ As an audiologist and speech-language therapist

Please state your registered profession with the HPCSA.

- ◯ As an audiologist
- ◯ As an audiologist and speech-language therapist

At which University did you complete your degree in Audiology and/or Speech-language Therapy?

- ◯ Sefako Makgatho Health Sciences University (previously MEDUNSA)
- ◯ Stellenbosch University
- ◯ University of Cape Town
- ◯ University of Johannesburg
- ◯ University of Pretoria
- ◯ University of the Witwatersrand
- ◯ ________ Other

In which year did you obtain your bachelor's degree in Audiology or dual degree in Audiology and Speech-language therapy?

How long have you been practicing as an audiologist?

- ○ 1 - 5 years
- ○ 6 - 10 years
- ○ 11 - 15 years
- ○ 16 - 20 years
- ○ More than 20 years

Do you consult with older adults (65 years and older) in your practice?

- ○ Yes
- ○ No

On average, how many older adults do you consult with per week?

- ○ 1 - 5 older adults
- ○ 6 - 10 older adults
- ○ 11 - 15 older adults
- ○ 16 - 20 older adults
- ○ More than 20 older adults

Do you routinely assess older adults – formally or informally – for fall risk in your practice?

- ○ Yes
- ○ No

Do you currently use any tool/s to identify fall risk factors in older adults you consult with in your practice?

- ○ Yes
- ○ No

Please specify the type of formal and/or informal the tool/s you use? Please name as many of the tools you use as possible.

- ☐ Formal FRAT (e.g. Berg Balance Scale, STRATIFY, etc.) - please specify:
- ☐ Informal FRAT (e.g. gait observation, general mobility, ability to transfer oneself) - please specify:

Please indicate why not (choose as many of the following options as you deem relevant)?

- ☐ I don't believe that fall risk screening is within my scope of practice
- ☐ I don't feel comfortable to perform a fall risk screening
- ☐ I have not been trained in fall risk screening
- ☐ There is no code to charge for fall risk screening
- ☐ I don't have enough time during a routine consultation to add a fall risk screening
- ☐ Fall risk is part of vestibular audiology and not part of my current practice
- ☐ Other, please specify:

How familiar are you with the International Classification of Functioning, Disability and Health (ICF)?

- ○ I don't know what the ICF is
- ○ I have heard about the ICF before
- ○ I have used the ICF before
- ○ I regularly use the ICF as part of clinical practice
- ○ I cannot function without the ICF in my practice

How often do you use any ICF core set or ICF code set in your practice?

- ○ Never
- ○ Rarely
- ○ Sometimes
- ○ Often
- ○ Always

Would you like more information on the ICF and its clinical application?

- ○ Yes
- ○ No

Please provide your email address or send an email to hendrika@hdcinc.co.za for more information on the ICF.

Would you like more information on fall risk assessment?

- ○ Yes
- ○ No

Please provide your email address or send an email to hendrika@hdcinc.co.za for more information on fall risk assessment.

Please record how long it took you to complete this section.

Please record the time at the start of the next question to document how long it takes you to complete this section. Please do not rush through the questions, the time will only be used for feedback and analysis purposes.

In order to comply with current health regulations, this survey makes use of a written case history of a fictional patient (Mr. Smith).
On this case history, the patient's answers and written in blue.
Please use this case history to answer the following questions. Please read the case history carefully before continuing to the next question. You can save the

case history and refer back to it when completing the questions. After you have downloaded and saved the case history, please click the 'back' button on your browser to return to this survey. If you close the case history, you will have again to click on the survey link in the email that was sent to you.

Please click on this link to download and save the case history to use for this survey Case history Mr Smith.

Identify the fall risk factors, if any, applicable to Mr. Smith.

Identify the positive factors, if any, that could potentially assist in reducing Mr. Smith's fall risk.

Determine the specific fall risk factors, if any, which would warrant assessment by an audiologist.

Identify the different healthcare disciplines, if any, to which you would refer Mr. Smith.

Please record how long it took you to complete this section.

Please record the time at the start of the next question to document how long it takes you to complete this section. Please do not rush through the questions, the time will only be used for feedback and analysis purposes.

In conjunction with the provided case history, please consult the ICF code set for identifying fall risk in older adults and answer the following four questions. Please download and save the ICF code set. After you have downloaded and saved the ICF code set, please click the 'back' button on your browser to return to this survey. If you close the case history, you will have again to click on the survey link in the email that was sent to you.

Please click on this link to download and save the ICF code set to use in conjunction with the case history you just used ICF Code Set

Identify the fall risk factors, if any, applicable to Mr. Smith.

Identify the positive factors, if any, that could potentially assist in reducing Mr. Smith's fall risk.

Determine the specific fall risk factors, if any, which would warrant assessment by an audiologist.

Identify the different healthcare disciplines, if any, to which you would refer Mr. Smith.

Please record how long it took you to complete this section.

Please reflect on the difference that you experienced between completing the questions for the first time, (without the ICF code set) versus completing it the

second time (with the ICF code set), and answer the following questions.

Please record the time at the start of the next question to document how long it takes you to complete the rest of the questionnaire. Please do not rush through the questions, the time will only be used for feedback and analysis purposes.

Using this ICF code set enabled me to identify fall risk factors more easily than without using it.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

Using this ICF code set enabled me to identify positive factors more easily than without using it.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I do NOT think this ICF code set could assist me to identify fall risk factors in older adults.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I would be able to use this ICF code set to identify fall risk factors in older adults prior to the use of further assessment methods.

- Strongly agree

- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

I do NOT think using this ICF code set would increase the time spent on consulting with older adults.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

I can see myself implementing the ICF code set in routine daily practice.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

I would be able to seamlessly integrate this ICF code set in my existing consultations with older adults.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

I do NOT think using this ICF code set is something I would routinely use in my consultations with older adults.

- ◯ Strongly agree

- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

In my experience this ICF code set is compatible with existing fall risk assessment tools (e.g. Berg Balance Scale / STRATIFY).

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

I would be able to use this ICF code set as a standard tool to document the fall risk factors of all the older adults I consult with in the practice.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

This ICF code set would assist me to identify the fall risk factors that warrant further referrals to other practitioners.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

This ICF code set would enable me to identify the type of healthcare disciplines to refer a patient to more easily than without using the code set.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

This ICF code set provides me with a common list of terminology to identifying fall risk factors when communicating with other team members about specific patients.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

Using this ICF code set would enable me to discuss specific fall risk factors with each older adult I consult with in my practice.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

Discussing fall risk factors with the older adults I consult with could potentially decrease their fall risk and impact positively their health-related quality of life.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

This ICF code set provides me with a tool to enrich the clinical process of identifying the fall risk factors relevant to the older adults I consult with in my practice.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

This ICF code set could be a unique addition to the formal or informal clinical measures I use in practice.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

This ICF code set failed to provide me with enough information to identify fall risk factors in older adults.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

I was able to answer the questions regarding the case study quicker without using this ICF code set.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

I consider spending extra time to use this ICF code set worthwhile as I think it increases the number of fall risk factors I'm able to identify.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

I would use this ICF code set during consultations with older adults even if it increases the length of consultation time.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

I do NOT think using this ICF code set should increase the cost of consulting with older adults.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

I would use the code set in my practice if it is provided as a free resource.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

It is important to me that patients or medical aids would reimburse me for using this ICF code set during consultations in addition to my usual procedures in the practice.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

I would NOT use this ICF code set during consultations with older adults if I'm NOT reimbursed for doing so.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

Considering that there is currently no procedure code for using this code set, I would ask the patients to pay me for using this code set out of their own pocket.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

This ICF code set provided me with all the information I needed to identify fall risk factors in older adults.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

I feel there are certain fall risk factors that are NOT included in this ICF code set that I think is important when consulting with older adults.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

I find the layout of this ICF code set logical and clear.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

I find the fall risk factors used this ICF code set clear and easy to understand.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

I do NOT routinely search online or at libraries for new audiological measures or tools.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

I regularly keep myself informed about current research and new publications in the field of audiology.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

I would know where to find this resource once it is available for use.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

I do NOT think this ICF code set should be an integral part of an audiologist's scope of practice.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

This ICF code set is something I should use with every older adult I consult with in clinical practice.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

I found that using this ICF code set was easy for me.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I think this ICF code set would be easy to use for healthcare practitioners in other disciplines (e.g. physiotherapy, ENT) who consult with older adults.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I find this ICF code too complex to be used effectively in my everyday clinical practice.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I do NOT think I would need any additional training to be able to use this ICF code set in my practice.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I would only be able to use this ICF code set in my practice if I undergo additional training on the use of the ICF.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I think each patient should give informed consent before I use this ICF code set to perform a fall risk factors screening.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I do NOT think each patient should be given the choice whether they want me to use this ICF code set on them as it forms part of my clinical judgement.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

In my opinion, this ICF code set could potentially cause harm to the older adults I consult with in my practice.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

In my opinion, NOT performing a fall risk assessment using this ICF code set on every older adult in my practice could potentially cause harm to them.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

I think using this ICF code would NOT assist me in playing an active role in potentially reducing falls in older adults and potentially increasing their health-related quality of life.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

I think using the ICF code set would enable me to play an active role in advocating for the use of fall risk identification measures by audiologists.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

In my opinion, this ICF code set could aid me in fulfilling my role of educating patients regarding reducing fall risks.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree

- ○ Strongly disagree

I would be able to use this ICF code set to ensure a continuity of care of my patients when they consult with other audiologists in the practice.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

Using this ICF code set in my practice would NOT be advantageous to my patients as it would NOT enable me to provide a higher quality service to them.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

I think using this ICF code set could assist me in educating the older adults I consult with regarding fall risk factors to potentially reduce their risk of falling.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

This ICF code set is a desirable measure for identifying fall risk factors in older adults.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree

- Disagree
- Strongly disagree

Using the code set would establish me as a leader in the field of vestibular audiology.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

Using the code set and performing fall risk assessments could ensure more referrals to my practice

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I think this ICF code set could assist me in determining the factors that need further intervention strategies.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

By using this ICF code set, I would be able to implement further intervention strategies more easily than I would have been able to without this code set.

- Strongly agree
- Agree

- Neither agree nor disagree
- Disagree
- Strongly disagree

Please record the time it took you to complete this last section of the questionnaire and write down the time.

Thank you for completing this survey.

Should you have any questions or feel the need for additional information regarding the research study, please contact Hendrika de Clercq on hendrika@hdcinc.co.za

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Appendix 5F: Written case history (pilot study)

Patient name: **John Smith** **Age:** **68 years 8 months** **Gender:** **Male**

1. DESCRIPTION OF THE DIZZINESS SENSATION / BALANCE PROBLEM

1.1 Describe what you are experiencing, in your own words, without using the word 'dizziness'

Sometimes I just feel dizzy, like everything is spinning around me and I can't walk without holding on to something.

1.2 Do you experience any of the following symptoms? Please mark all applicable symptoms:

1.2.1	Vertigo (false sense of movement of yourself or the world around you)	**Yes**	No
1.2.2	Spinning sensation	**Yes**	No
1.2.3	Whirling sensation	**Yes**	No
1.2.4	Rolling, rocking or bouncing sensation	**Yes**	No
1.2.5	Floating sensation	**Yes**	No
1.2.6	Movement of the world / objects (during walking or with fast head movements)	**Yes**	No
1.2.7	Feeling of eyes moving when head is stationary (of after head has stopped moving)	**Yes**	No

2. DURATION OF THE DIZZINESS SENSATION / BALANCE PROBLEM

2.1	Do you experience dizziness attacks?	**Yes**	No
2.2	If yes, are you symptom free in between the attacks?	Yes	**No**
2.3	How long does the dizziness / imbalance typically last:		
2.3.1	Seconds (less than one minute)	Yes	**No**
2.3.2	Minutes to hours	Yes	**No**
2.3.3	Days (3 – 5 days)	**Yes**	No
2.3.4	Continuous feeling of disequilibrium	**Yes**	No

3. ONSET OF THE DIZZINESS SENSATION / BALANCE PROBLEM

3.1 Did anything happen to you prior to the first time the dizziness started (e.g. illness, noise exposure, flu, fever blister, fullness in the ear/s, ringing sound/s in the ear/s etc.)? If yes, please describe:

Not that I can remember.

3.2 Is the dizziness sensation set off by anything?

3.2.1	Abrupt onset without prior movement or notice	Yes	**No**
3.2.2	Few seconds after head movement / lying down / turning in bed	Yes	**No**
3.2.3	When there are loud sounds / noise levels (sound sensitivity)	Yes	**No**
3.2.4	When there is bright light (light sensitivity)	**Yes**	No

4. TIME COURSE OF THE DIZZINESS SENSATION / BALANCE PROBLEM

4.1 How often do you experience the dizziness sensation / imbalance (e.g. once / attacks, daily, recurrent, every few weeks / months)?

Usually it happens every two months, but the last few months it got more often, now it's every few weeks.

4.2 If you experience dizziness attacks where you have a specific start and end to the dizziness / imbalance, how many attacks have you had?

Too many to count.

5. ASSOCIATED SYMPTOMS

Please indicate if you have any of the following associated symptoms:

5.1	Nausea	**Yes**	No
5.2	Vomiting	**Yes**	No
5.3	Difficulty with speech	**Yes**	No
5.4	Difficulty swallowing	Yes	**No**
5.5	Double vision	**Yes**	No
5.6	Loss of sensation / weakness on one side of the face	Yes	**No**

5.7 Seizures — Yes **No**
5.8 Memory loss — Yes **No**
5.9 Other, please specify: My head feels fuzzy, like I can't focus properly and that everything is dull.

6. EAR / HEARING SYMPTOMS

Do you experience any of the following symptoms before, during or after the dizziness attack / sensation? Please indicate all relevant symptoms and in which ear / on which side.

6.1	Hearing loss	**Yes**	No	
	If yes:			
6.1.1	In which ear	Left	Right	**Both**
6.1.2	Does the hearing loss fluctuate	Yes	**No**	
6.1.3	Does the hearing loss get progressively worse	**Yes**	No	
6.1.4	Did the hearing loss happen suddenly	Yes	**No**	
6.1.5	Does the hearing loss get worse during attacks / dizziness	**Yes**	No	
6.2	Tinnitus (ringing / buzzing / roaring / whistling sounds in the ear/s)	**Yes**	No	
	If yes:			
6.2.1	In which ear	Left	Right	**Both**
6.2.2	Always noticeable	Yes	**No**	
6.2.3	Only when it's quiet / at night	**Yes**	No	
6.2.4	Does the tinnitus get worse during attacks / dizziness	Yes	**No**	
6.3	Fullness in the ear/s or head	**Yes**	No	
6.4	Pressure in the head / sinus area	**Yes**	No	
6.5	Blocked feeling in the ear/s (like cotton wool is stuck in the ear/s)	**Yes**	No	
6.6	Ear pain	Yes	**No**	
6.7	Ear discharge	Yes	**No**	

7. GENERAL NEUROLOGICAL SYMPTOMS

7.1 Please indicate if you experience any of the following symptoms

7.1.1	Loss of consciousness	Yes	**No**
7.1.2	Headaches	Yes	**No**
7.1.2.1	If yes, how severe (scale of 1 – 10)	______________	
7.1.2.2	If yes, how often (per week / month)	______________	
7.1.3	Trouble walking in the dark	**Yes**	No
7.1.4	Vision		
7.1.4.1	Double vision	**Yes**	No
7.1.4.2	Blurry vision	**Yes**	No
7.1.4.3	Light sensitivity	**Yes**	No

7.1.5 Head trauma (please describe): None

8. GENERAL AND PAST MEDICAL HISTORY

Please indicate all relevant options (occurred / diagnosed within the last twelve months)

8.1	Have you had a fall	**Yes**	No
	If yes, when did you fall? I have fallen twice, in 2018 and 2019		
8.2	Viral infection (cold / flu)	Yes	**No**
	If yes, specify when ______________		
8.3	Bacterial infection	Yes	**No**
	If yes, specify when and type ______________		
8.4	Sinusitis with airway obstruction	Yes	**No**
8.5	Sleep apnoea	Yes	**No**
8.6	Noise exposure (without hearing protection)	Yes	**No**
8.7	Excessive intake of		
8.7.1	Caffeine (4+ cups of coffee / glasses of cola per day)	**Yes**	No
8.7.2	Nicotine (4+ cigarettes per day)	**Yes**	No
8.7.3	Alcohol (regular use, not just occasional / social use)	Yes	**No**

8.8 Chronic diseases

8.8.1	Diabetes	**Yes**	No
8.8.2	Thyroid dysfunction	Yes	**No**
8.8.3	Cardiac disease	Yes	**No**
8.8.4	Low blood pressure disorder	Yes	**No**
8.8.5	High blood pressure disorder	**Yes**	No
8.8.6	Other: ______________________________		

8.9 Please list all chronic medication used (excluding vitamins / supplements)

High blood pressure; diabetes; sleeping tablet

8.10 Please describe all surgery within the past 12 months

Hip replacement in November 2019 - left

8.11 Please describe any other tests / assessments / scans / procedures you have had in the past 12 months

X-rays and test for hip surgery

9. PLEASE ANY OTHER RELEVANT INFORMATION / SYMPTOMS NOT MENTIONED ABOVE

Generally, I'm in very good health and still plays golf every week without problems. I can still help my wife around the house, wash and dress myself and is able to drive on my own.

I have difficulty walking only when I have the dizziness spells, like my leg muscles don't want to work. Most movements are difficult, and I cannot orientate myself to the environment. It's not my eyes that's the problem, as I can still see clearly and had my eyes tested to make sure it's not a problem. We do not have any animals in the house.

It's difficult to focus my attention and feels like I have cottonwool in my brain. Walking, moving around and even doing basic household tasks are a problem. We live in a single-story house without any steps or stairs, but when I'm in the shops where there are stairs, it's difficult to walk up and down the stairs. I do not use a walking aid, but fortunately my daughter comes with us when we go shopping, so I can hold on to her when I need to. She assists us with most of our shopping and making sure we are taken care of.

Appendix 5G: ICF code set (pilot study)

Fall risk factors in older adults: ICF code set

Body Functions

Consciousness functions[*N]
Orientation functions[*N]
Perceptual functions[*N / P / OT]
Seeing function[*O]
Vestibular functions[*A / P / E]
Additional sensory functions[*P / OT]
Sensations of pain[*M]
Sensations associated with hearing and vestibular function[*E / A]
Sensations associated with cardiovascular and respiratory functions[*C]
Mobility of joint functions[*P / A]
Stability of joint function[*P / A]
Muscle power functions[*P]
Muscle endurance functions[*P]
Muscle functions[*P]
Involuntary movement reaction functions[*P / A]
Control of voluntary movement functions[*P]
Gait pattern function[*P / A / PO]
Neuromusculoskeletal- and movement-related functions[*P / PO]

Body Structures

Structure of lower extremity[*M / P]
Structure of the trunk[*M / P]
Additional musculoskeletal structures related to movement[*M / P]
Structures related to movement[*M / P]
Structures of the inner ear[*E / A]

Activities & Participation

Watching[*O / OT]
Focussing attention on the environment [*P / A / OT]
Carrying out daily routine[*P / A / PO]
Changing basic body position[*P / A]
Maintaining a body position[*P / A]
Transferring oneself[*P / A]
Changing and maintaining body position, other specified and unspecified[*P / A]
Lifting and carrying objects[*P / OT]
Hand and arm use[*P / OT]
Basic walking[*P / A]
Walking[*P / A]
Moving around[*P]
Moving around in different locations[*P]
Moving around using equipment[*P / A]
Washing oneself[*P / OT]
Toileting[*P / OT]
Dressing[*P / OT]
Looking after one's safety[*P / OT]
Acquisition of goods and services[*P / OT]
Doing housework[*P / OT]

Environmental Factors

Products or substances for personal consumption (e.g. medication)[*SR; OA; HCP]
Products and technology for personal use in daily living (e.g. walking aids, hearing aids)[*SR; OA; HCP]
Products and technology for personal indoor and outdoor mobility and transportation (e.g. driving a car)[*SR; OA]
Design, construction and building products and technology of buildings for public use (e.g. stairs/railings in public places)[*SR; OA]
Design, construction and building products and technology of buildings for private use (e.g. stairs/railings in own home)[*SR; OA; HCP]
Natural environment and human-made changes to environment, other specified (e.g. rain, wet surfaces)[*SR; OA; HCP]
Light[*SR; OA] Domesticated animals[*SR; OA; HCP] Health services, systems and policies[*OA]

Personal Factors

Age
Fall history
Medical conditions[*M]

*Possible referral sources: N = Neurologist; P = Physiotherapist who does vestibular testing/rehabilitation; A = Audiologist who does vestibular testing/rehabilitation; O = Ophthalmologist / Optometrist; OT = Occupational therapist; M = Medical practitioner; E = Ear, Nose and Throat (ENT) specialist; C = Cardiologist; PO = Podiatrist

[$] Items are relevant, but not critical to the assessment of fall risk to older adults

Appendix 5H: Pilot study feedback form - audiologists

Please answer the following questions on completion of the clinical utility questionnaire.

1. Technical aspects of the questionnaire

1a. Did the link to the questionnaire open the questionnaire without any technical challenges? Please mention any technical challenges when opening the link.

Answer:

1b. Which web browser did you use to open and complete the questionnaire?

Answer:

1c. Were you able to complete all the questions in the questionnaire? Please mention any questions you were unable to complete due to technical challenges.

Answer:

1d. Did you complete the questionnaire on a laptop, desktop computer or on a mobile device?

Answer:

2. Layout and visual representation of the questionnaire

2a. Was the layout and flow of the questionnaire intuitive? Please mention any aspect that could be changed or enhanced in the questionnaire's layout.

Answer:

2b. In your opinion, was the horizontal layout of the response options easy to complete or would you have preferred the response options to be in a vertical direction?

Answer:

3. Questionnaire items

3a. Please comment on the clarity of each question by mentioning all questions that were unclear or ambiguous.

Answer:

3b. In your opinion, were there any repetition in the questionnaire? Please mention any repetitive questions.

Answer:

3c. Were the instructions given to complete the questionnaire clear? Please provide suggestions for clarification.

Answer:

4. General aspects

4a. In your opinion, is the suggested time of 20 – 30 minutes to complete the questionnaire appropriate or should more or less time be suggested to complete the questionnaire?

Answer:

5. Further suggestions or comments

5a. Do you have any additional comments or further suggestions to enhance the questionnaire?

Answer:

Clinical Utility Questionnaire

Informed consent for participation

Developing an ICF code set for fall risk in older adults: Implications for intervention and assessment

Dear Audiologist

Your are invited to participate in a survey on fall risk identification in older adults.

The overall aim of this research study is to develop an International Classification of Functioning, Disability and Health (ICF) code set for assessing fall risk in older adults. The research study followed a mixed-method sequential design and the initial ICF code set was developed during the first phase of the study by means of a systematic review and focus groups. This final phase aims is to investigate the developed ICF code set's clinical usefulness for audiologists.

Any audiologist practicing in South Africa and who is registered with the HPCSA is eligible to participate in this survey.

Please complete this survey no later than **21 December 2020**.

Please note the following:

This study involves completing a survey and your participation is very important.

5/27/2021 Qualtrics Survey Software

This survey is completely anonymous. All responses will be treated with utmost confidentiality and only be analyzed in aggregated form. Under no circumstances will we publish the findings of this study in such a way that the responses can be traced or linked to any individual respondent.

In addition, all data collected during these sessions will be entirely depersonalised by the Qualtrics software by using participation numbers and would therefore not be harmful in any way.

You will experience no harm or discomfort during the survey and you may at any time throughout the survey decide to withdraw without any penalization or negative consequences.

Completing the survey will take about 30 to 40 minutes.

Please indicate if you have read and understood the above consent form and desire of your own free will to participate in this study.

- ○ Yes, I understand and agree to participate
- ○ No, I do not agree to participate

To continue to the first question, please click the >> arrow below.

During the survey, you can navigate between pages using the << back or >> next arrows at the bottom of the screen.

Note that your progress is autosaved as you complete the survey. You can exit the survey at any time and continue later, as the last completed responses will automatically be recorded. The progress bar at the top of each page will indicate, in red, how much of the survey you have completed.

On completion of the survey, your answers will be automatically submitted.

Please read each question carefully and take your time to answer each question.

Definitions:

The ICF refers to the **International Classification of Functioning, Disability and Health.**
The ICF was endorsed by the World Health Organization (WHO) in 2001. The ICF framework depicts a person's level of functioning and disability as umbrella terms, providing a common language for the description of both the positive aspect (facilitators) and negative aspects (barriers) related to a person's risk of falling. The ICF can be used to identify fall risk factors at three levels, namely: at impairment level (referring to body structures and function), at individual level (referring to activity limitation and participation restrictions), and at contextual level (referring to environmental and personal factors). This enables all healthcare practitioners to discuss a patient's level of functioning using a common language.

Fall risk factors refers to several intrinsic and extrinsic factors that can cause a fall and increase a person's risk of falling. The more risk factors an older adults have, the more likely the person is to fall. Identifying fall risk factors could assist in the further assessment, management and intervention strategies of an older adult with a risk of falling, which would increase the personal benefit to the older adults and impact positively on their quality of life.

Health-related quality of life (HRQoL) refers to a person's perceived quality of life, specifically related to their health and well-being, or lack thereof, including their physical, mental and emotional health status.

Older adults, in this survey, refers to all adults between the ages of 65 - 74 years.

Are you registered with the HPCSA?

- Yes
- No

Please state your qualification.

- As an audiologist
- As an audiologist and speech-language therapist

Please state your registered profession with the HPCSA.

- As an audiologist
- As an audiologist and speech-language therapist

At which University did you complete your degree in Audiology and/or Speech-language Therapy?

- Sefako Makgatho Health Sciences University (previously MEDUNSA)
- Stellenbosch University
- University of Cape Town
- University of Johannesburg
- University of Pretoria
- University of the Witwatersrand
- Other

In which year did you obtain your bachelor's degree in Audiology or dual degree in Audiology and Speech-language therapy?

How long have you been practicing as an audiologist?

- 1 - 5 years
- 6 - 10 years

- ○ 11 - 15 years
- ○ 16 - 20 years
- ○ More than 20 years

Do you consult with older adults (65 years and older) in your practice?

- ○ Yes
- ○ No

On average, how many older adults do you consult with per week?

- ○ 1 - 5 older adults
- ○ 6 - 10 older adults
- ○ 11 - 15 older adults
- ○ 16 - 20 older adults
- ○ More than 20 older adults

Do you routinely assess older adults – formally or informally – for fall risk in your practice?

- ○ Yes
- ○ No

Do you currently use any tool/s to identify fall risk factors in older adults you consult with in your practice?

- ○ Yes
- ○ No

Please specify the type of formal and/or informal the tool/s you use? Please name as many of the tools you use as possible.

- ☐ Formal FRAT (e.g. Berg Balance Scale, STRATIFY, etc.) - please specify:

- ☐ Informal FRAT (e.g. gait observation, general mobility, ability to transfer oneself) - please specify:

Please indicate why not (choose as many of the following options as you deem relevant)?

- ☐ I don't believe that fall risk screening is within my scope of practice
- ☐ I don't feel comfortable to perform a fall risk screening
- ☐ I have not been trained in fall risk screening
- ☐ There is no code to charge for fall risk screening
- ☐ I don't have enough time during a routine consultation to add a fall risk screening
- ☐ Fall risk is part of vestibular audiology and not part of my current practice
- ☐ Other, please specify:

How familiar are you with the International Classification of Functioning, Disability and Health (ICF)?

- ○ I don't know what the ICF is
- ○ I have heard about the ICF before
- ○ I have used the ICF before
- ○ I regularly use the ICF as part of clinical practice
- ○ I cannot function without the ICF in my practice

How often do you use any ICF core set or ICF code set in your practice?

- ○ Never
- ○ Rarely
- ○ Sometimes
- ○ Often
- ○ Always

Would you like more information on the ICF and its clinical application?

- ○ Yes
- ○ No

Please provide your email address or send an email to hendrika@hdcinc.co.za for more information on the ICF.

Would you like more information on fall risk assessment?

- Yes
- No

Please provide your email address or send an email to hendrika@hdcinc.co.za for more information on fall risk assessment.

In order to comply with current health regulations, this survey makes use of a written case history of a fictional patient (Mr. Smith).
On this case history, the patient's answers and written in blue.
Please use this case history to answer the following questions. Please read the case history carefully before continuing to the next question. You can save the case history and refer back to it when completing the questions. After you have downloaded and saved the case history, please click the 'back' button on your browser to return to this survey. If you close the case history, you will have to again click on the survey link in the email that was sent to you.

Please click on this link to download and save the case history to use for this survey Case history Mr. M Smith

Identify the fall risk factors, if any, applicable to Mr. Smith.

Identify the positive factors, if any, that could potentially assist in reducing Mr. Smith's fall risk.

Determine the specific fall risk factors, if any, which would warrant assessment by an audiologist.

Identify the different healthcare disciplines, if any, to which you would refer Mr. Smith.

In conjunction with the provided case history, please consult the ICF code set for identifying fall risk in older adults and answer the following four questions. *These are the same questions you have just answered using on Mr. Smith's case history. This time, please use the information in the ICF code set, in addition to the case history information, to again answer the four questions related to Mr. Smith.*

Please download and save the ICF code set. After you have downloaded and saved the ICF code set, please click the 'back' button on your browser to return to this survey. If you close the case history, you will have to again click on the survey link in the email that was sent to you.

Please click on this link to download and save the ICF code set to use in conjunction with the case history you just used ICF code set

Identify the fall risk factors, if any, applicable to Mr. Smith.

Identify the positive factors, if any, that could potentially assist in reducing Mr. Smith's fall risk.

Determine the specific fall risk factors, if any, which would warrant assessment by an audiologist.

Identify the different healthcare disciplines, if any, to which you would refer Mr. Smith.

Please reflect on the difference that you experienced between completing the questions for the first time, (without the ICF code set) versus completing it the second time (with the ICF code set), and answer the following questions as honestly as possible.
Please read each question carefully before answering.

Using this ICF code set enabled me to identify fall risk factors more easily than without using it.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

Using this ICF code set enabled me to identify positive factors more easily than without using it.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree

- Strongly disagree

I do NOT think this ICF code set could assist me to identify fall risk factors in older adults.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I would be able to use this ICF code set to identify fall risk factors in older adults prior to the use of further assessment methods.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I do NOT think using this ICF code set would increase the time spent on consulting with older adults.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I can see myself implementing the ICF code set in routine daily practice.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree

- Strongly disagree

I would be able to seamlessly integrate this ICF code set in my existing consultations with older adults.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I do NOT think using this ICF code set is something I would routinely use in my consultations with older adults.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

In my experience this ICF code set is compatible with existing fall risk assessment tools (e.g. Berg Balance Scale / STRATIFY).

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I would be able to use this ICF code set as a standard tool to document the fall risk factors of all the older adults I consult with in the practice.

- Strongly agree
- Agree
- Neither agree nor disagree

- Disagree
- Strongly disagree

This ICF code set would assist me to identify the fall risk factors that warrant further referrals to other practitioners.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

This ICF code set would enable me to identify the type of healthcare disciplines to refer a patient to more easily than without using the code set.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

This ICF code set provides me with a common list of terminology to identifying fall risk factors when communicating with other team members about specific patients.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

Using this ICF code set would enable me to discuss specific fall risk factors with each older adult I consult with in my practice.

- Strongly agree

- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

Discussing fall risk factors with the older adults I consult with could potentially decrease their fall risk and impact positively their health-related quality of life.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

This ICF code set provides me with a tool to enrich the clinical process of identifying the fall risk factors relevant to the older adults I consult with in my practice.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

This ICF code set could be a unique addition to the formal or informal clinical measures I use in practice.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

This ICF code set failed to provide me with enough information to identify fall risk factors in older adults.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I was able to answer the questions regarding the case study quicker without using this ICF code set.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I consider spending extra time to use this ICF code set worthwhile as I think it increases the number of fall risk factors I'm able to identify.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I would use this ICF code set during consultations with older adults even if it increases the length of consultation time.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I do NOT think using this ICF code set should increase the cost of consulting with older adults.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I would use the code set in my practice if it is provided as a free resource.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

It is important to me that patients or medical aids would reimburse me for using this ICF code set during consultations in addition to my usual procedures in the practice.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I would NOT use this ICF code set during consultations with older adults if I'm NOT reimbursed for doing so.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

Considering that there is currently no procedure code for using this code set, I would ask the patients to pay me for using this code set out of their own pocket.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

This ICF code set provided me with all the information I needed to identify fall risk factors in older adults.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I feel there are certain fall risk factors that are NOT included in this ICF code set that I think is important when consulting with older adults.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I find the layout of this ICF code set logical and clear.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I find the fall risk factors used this ICF code set clear and easy to understand.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

I do NOT routinely search online or at libraries for new audiological measures or tools.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

I regularly keep myself informed about current research and new publications in the field of audiology.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

I would know where to find this resource once it is available for use.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

I do NOT think this ICF code set should be an integral part of an audiologist's scope of practice.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

This ICF code set is something I should use with every older adult I consult with in clinical practice.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

I found that using this ICF code set was easy for me.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

I think this ICF code set would be easy to use for healthcare practitioners in other disciplines (e.g. physiotherapy, ENT) who consult with older adults.

- ◯ Strongly agree
- ◯ Agree
- ◯ Neither agree nor disagree
- ◯ Disagree
- ◯ Strongly disagree

I find this ICF code too complex to be used effectively in my everyday clinical practice.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I do NOT think I would need any additional training to be able to use this ICF code set in my practice.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I would only be able to use this ICF code set in my practice if I undergo additional training on the use of the ICF.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I think each patient should give informed consent before I use this ICF code set to perform a fall risk factors screening.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I do NOT think each patient should be given the choice whether they want me to use this ICF code set on them as it forms part of my clinical judgement.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

In my opinion, this ICF code set could potentially cause harm to the older adults I consult with in my practice.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

In my opinion, NOT performing a fall risk assessment using this ICF code set on every older adult in my practice could potentially cause harm to them.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I think using this ICF code would NOT assist me in playing an active role in potentially reducing falls in older adults and potentially increasing their health-related quality of life.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree

- Strongly disagree

I think using the ICF code set would enable me to play an active role in advocating for the use of fall risk identification measures by audiologists.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

In my opinion, this ICF code set could aid me in fulfilling my role of educating patients regarding reducing fall risks.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

I would be able to use this ICF code set to ensure a continuity of care of my patients when they consult with other audiologists in the practice.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

Using this ICF code set in my practice would NOT be advantageous to my patients as it would NOT enable me to provide a higher quality service to them.

- Strongly agree
- Agree
- Neither agree nor disagree

- Disagree
- Strongly disagree

I think using this ICF code set could assist me in educating the older adults I consult with regarding fall risk factors to potentially reduce their risk of falling.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

This ICF code set is a desirable measure for identifying fall risk factors in older adults.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

Using the code set would establish me as a leader in the field of vestibular audiology.

- Strongly agree
- Agree
- Neither agree nor disagree
- Disagree
- Strongly disagree

Using the code set and performing fall risk assessments could ensure more referrals to my practice

- Strongly agree
- Agree

- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

I think this ICF code set could assist me in determining the factors that need further intervention strategies.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

By using this ICF code set, I would be able to implement further intervention strategies more easily than I would have been able to without this code set.

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

Thank you for completing this survey.

Should you have any questions or feel the need for additional information regarding the research study, please contact Hendrika de Clercq on hendrika@hdcinc.co.za

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