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THE DEVELOPMENT OF AN AUTISM SPECTRUM DISORDER SCREENING QUESTIONNAIRE AIMED AT EARLY PRIMARY SCHOOL AGED LEARNERS WITHIN THE SOUTH AFRICAN CONTEXT: A PILOT STUDY

By

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DECLARATION

I, Liz-Marie Basson, hereby declare that this dissertation, to be submitted to the University of Pretoria for the degree of Master of Arts in Research Psychology, is my own original work and, to the best of my belief, contains no material previously published or written by another person, except where due reference is made. This mini dissertation has not been previously submitted to meet the requirements for a degree at this University or any other tertiary institution

Signed:

This______________ day of ______________ 2017

Abstract

There has been a notable increase in the prevalence rates of Autism Spectrum Disorder (ASD) over the last decade. Currently, the American Centre for Disease Control and Prevention estimates that 1 in every 68 children is diagnosed with ASD. The average age of diagnosis ranges from 3.1 to 5.7 years. However, the literature indicates that low socio-economic-status (SES) countries, such as South Africa could have higher prevalence rates and a later average age of diagnosis. This is due to the limited and strained resources on social and governmental levels. This is of great concern as research indicates that early diagnosis and intervention of learners with ASD leads to improved overall functioning. South Africa is not equipped to deal with services required to effectively screen and diagnose learners for ASD. The Modified Checklist for Autism in Toddlers (M-CHAT) is available in South Africa as a low cost and easy to administer screening tool for ASD. Unfortunately, it can only screen for ASD in learners up to the age of 5. No other similar low cost screening tool is available for use in South Africa which will be able to screen older learners. With the reality of a later age of diagnosis in South Africa, it is therefore pivotal to develop such a screening tool. This study set out to develop and pilot test the Autism Spectrum Disorder Screening Questionnaire (ASDSQ). The ASDSQ is a screening questionnaire that can be filled out by the parents or guardians of learners aged 6 to 9. It is low in cost and easy to administer, score and understand. It will assist in identifying learners that are at risk for an ASD diagnosis. This will ensure that learners who are identified as at risk for an ASD diagnosis can be referred to the correct professionals for ASD diagnostic tests. The current version of the ASDSQ (version three) is a 38 item, yes-no, questionnaire. In this pilot study the ASDSQ was able to successfully distinguish between learners with an ASD diagnosis and learners without an ASD diagnosis. Findings furthermore indicated that the ASDSQ was able to differentiate between the control and experimental group when compared to the results of the M-CHAT on the same sample. The ASDSQ shows great promise as a screening tool for ASD in South Africa. With further development, the ASDSQ could become an established level one screening questionnaire for ASD in South Africa. Future research on the ASDSQ should focus on validating, norming, and standardizing the questionnaire for use in the South African context.

Keywords

Autism Spectrum Disorder, Autism Screening, Questionnaire Development, Multiphase Mixed Methods, Expert Panel Review

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1. Introduction and Overview

1.1. Introduction

This study developed and pilot tested a screening questionnaire for Autism Spectrum Disorder (ASD) in South Africa. This questionnaire, the Autism Spectrum Disorder Screening Questionnaire ("ASDSQ"), was developed based on the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) criteria for ASD and followed six steps of questionnaire development as set out by De Vellis (2012). The study made use of a multiphase mixed methods research design which included both qualitative and quantitative steps. The final product of this study, version three of the ASDSQ, can be developed further through future research focussing on standardization, norming, and validation.

This first chapter will aim to provide the reader with background information regarding the research problem, followed by a discussion on the justification, aims, and objectives of this study. Finally the researcher will provide an overview of the various chapters in this dissertation.

1.2. Research problem

International research indicates that there has been a substantial increase in the prevalence rates of ASD throughout the last decade (Wingate et al., 2012; Wingate et al., 2014). The most recent findings from the American Centre for Disease Control and Prevention (CDC) estimate that approximately 1% of the global population is affected by ASD (Centre for Disease Control and Prevention, 2014). Statistics regarding ASD and ASD prevalence rates are limited within the South African context and experts in the field are of the opinion that the prevalence rates for ASD in South Africa will be similar to international rates (Bozalek, 2013; Springer, van Toorn, Laughton, & Kidd, 2013). This is alarming as it points to the fact that ASD in South Africa is an urgent social and mental health issue that is on the increase.

Furthermore, South Africa have limited capability for addressing ASD due to various social, governmental, and resource constraints (Bozalek, 2013; Saloojee, Phohole, Saloojee, & Isselmuiden, 2007). Due to these constraints, limited diagnostic and intervention services are available at government healthcare facilities in South Africa (Stephens, 2012). The limited resources that are available are strained by large amounts of South Africans seeking assistance with ASD (Malcolm-Smith, Hoogenhout, Ing, Thomas, & de Vries, 2013). Various international standardised screening and diagnostic assessments for ASD are available in South Africa, but the majority of them has not been developed or validated for use in South Africa (Mattila et al., 2012; Posserud, Lundervold, & Gillberg, 2008; Qingguo et al., 2011).

In addition to the limited amount of ASD services available and the likely increase of ASD prevalence in South Africa, a strong possibility exists that the age of diagnosis for ASD in South Africa is higher than in other countries (Bozalek, 2013; Wingate et al., 2014). In contrast to the accepted age of diagnosis (between 3.1 and 5.7 years of age), it is speculated that children from low socio economic status (SES) areas – such as South Africa – will most likely only be diagnosed at a later age, most likely after entering the school system (Bozalek, 2013; Honigfeld, Chandhok, & Spiegelman, 2011; Stephens, 2012). This is troublesome as research suggests that early diagnosis and intervention for ASD could lead to improvements in the overall functioning of children (Chakrabarti, Haubus, Dugmore, Orgill, & Devine, 2005; Matson, Rieske, & Tureck, 2011; Moolman-Smook, Vermoter, Buckle, & Linderberg, 2008; Stephens, 2012).

From the above discussion it is clear that South Africa is in dire need of screening, diagnostic, and intervention processes for ASD (Malcom-Smith et al., 2013; Schendel et al., 2012). This study aimed to develop and pilot test the ASDSQ, a screening questionnaire for ASD in South Africa, which will be cost effective, easy to administer, and understand. The focus of this screening questionnaire is to screen for ASD in early primary school age children (ages 6 to 9). The ASDSQ is designed so that the parents or guardians of the learner in question can complete it. The parents or guardians typically spend the most time with the child and therefore the information they provide regarding the child's behaviour is seen as extremely useful for the ASDSQ. Therefore the learner does not have to be present for, or involved in the screening process. This is a further advantage of the ASDSQ, as it decreases the levels of discomfort and distress for the children involved. The development of the questionnaire was guided by six steps set out by De Vellis (2012) for scale development up to the pilot testing phase.

1.3. Justification, aims and objectives

The ASDSQ was developed as part of a larger project at the Itsoseng Clinic. The Itsoseng clinic is a free mental health clinic in Mamelodi, South Africa. The Itsoseng clinic forms part of the Department of Psychology at the University of Pretoria and is situated on the Mamelodi campus. Funding at the clinic is limited and the availability of services relies on the amount of volunteers and Psychology Masters students doing practical work for degree purposes. Mamelodi is a large semi urban settlement east of Pretoria with functioning infrastructure such as schools, religious institutions, law enforcement, and governmental facilities. It is a low SES area plagued by various social issues such as limited access to healthcare services, domestic violence, inadequate schooling, poverty, unemployment, and crime. The Itsoseng clinic aims to offer various psychological services to the community, including scholastic assessments. It has become evident that several learners who seem likely to have ASD are often brought to the clinic by parents or family members as they feel there is something amiss with the child.

The Itsoseng clinic has limited access to ASD screening questionnaires or intervention services and the learners are often referred to the occupational therapists available on campus. Unfortunately, the occupational therapists face the same limitations as the staff at the Itsoseng clinic with regards to ASD screening and intervention and therefore the learner is referred again to other governmental healthcare institutions. This results in numerous learners being lost in the system due to the lack of ASD screening measures. Therefore, staff at the Itsoseng clinic is in the process of developing screening questionnaires for ASD which could be used at the clinic and later throughout South Africa. The first screening questionnaire will be completed by parents and guardians and the learner does not have to be present. The focus of this dissertation was to develop and pilot test the first screening questionnaire. The second screening questionnaire will be completed by professionals such as psychologists, occupational therapists, and speech therapists. It will entail observing the learner for a session and filling out a checklist of behaviours. Thus the learner will have to be present for the second screening questionnaire being developed. It should be noted that the development of the second screening questionnaire is separate from this dissertation and did not have an influence on this study.

ASD can be seen as an increasing mental and social health problem in South Africa which urgently needs to be addressed on screening, diagnostic, and intervention levels (Bozalek, 2013; Malcolm-Smith et al., 2013; Stephens, 2012). Although research about ASD and ASD screening receives substantial attention internationally, this phenomenon remains severely under researched in the South African context. This study can be seen as beneficial as it will aim to address the lack of available ASD screening questionnaires for school aged learners in the South African context. As noted earlier, international studies indicate that the age of diagnosis for ASD is higher in low SES communities such as South Africa (Bozalek, 2013; Honigfeld et al., 2011; Stephens, 2012). Therefore the researcher deems it important to develop the ASDSQ for this group of learners aged between 6 and 9.

The main aim of this study was to develop and pilot test the ASDSQ aimed at early primary school aged learners in South Africa, which will be easy to administer and cost effective. The objectives for this study therefore include:

- Creating a first version of the ASDSQ
- Reviewing the first version of the ASDSQ by an expert panel

- To create an improved second version of the ASDSQ based on the findings of the expert panel
- Administering the second version of the ASDSQ to a pilot sample
- To identify ambiguous questions and items that is difficult to understand as well as suggestions for additional items and improvements for current items.
- To establish whether the proposed screening questionnaire will be able to successfully predict the presence of an ASD diagnosis
- To create an improved third version of the ASDSQ based on findings from the pilot test

1.4. Outline of mini dissertation

This mini dissertation consists out of various chapters related to the topic of ASD, questionnaire development as well as the methodology and findings of this study. Chapter two will provide the reader with an overview of the available literature on ASD. The chapter will touch on the history and definitions of ASD, the current trends in ASD prevalence worldwide, ASD and gender as well as the benefits of screening and early intervention. The overall aim of chapter two will be to familiarise the reader with the topic of ASD and the current state of ASD research regarding screening and intervention, both internationally and in South Africa.

Chapter three focuses on the questionnaire development theory that was used to guide this study. This chapter presents a discussion on ASD and the various features of the DSM-5 definition as latent variables which will be measured by the ASDSQ. The remainder of the chapter offers a detailed discussion on the six steps of questionnaire development, from item generation through to pilot testing, as outlined by De Vellis (2012).

The intention of the fourth chapter is to show the reader how this study was planned and conducted. As this study was based on a multiphase mixed methods design, there will be three main phases to this research project, each of which will be discussed in more detail in chapter four. This will be followed by a discussion on the sampling procedures employed as well as the various measurement instruments that were administered in the field. This chapter will devote a thorough discussion on the operationalization of the definitions and variables in this study. Next, the chapter will turn to a discussion of the data analysis methods utilized for the various phases in this study. The researcher will also provide a detailed discussion on reliability and validity as it related to this study. Lastly, chapter four will present an overview of the ethical considerations for this study.

Chapter five will focus solely on the findings of the study. As mentioned earlier, this study employed a multiphase mixed methods design and therefore the study consisted of three phases. This chapter will discuss the findings, both quantitative and qualitative, from each phase of the study separately.

Chapter six will provide a discussion of the findings, as it relates to the literature and questionnaire development chapters, according to the various phases of the study. This chapter will link the aims and objectives of the study with the findings and finally provide a discussion on the limitations of the study and recommendations for future research on the ASDSQ.

2. Literature Review

2.1. Introduction

The intent of this chapter is to equip the reader with an overview of the literature available on the topic of ASD and ASD screening. After reading this chapter, the reader should have an improved understanding of ASD as well as ASD screening and how it relates to this study. This chapter will firstly provide a discussion on the history and definitions of ASD. This is deemed as important as the definition of ASD has changed greatly over the past few decades, with a new change that was employed recently with the publication of the DSM-5 diagnostic criteria. The history of ASD and its definitions are important as it shows the reader how research on ASD as well as ASD screening and intervention changed throughout the past decades. It will also highlight the importance of developing an ASD screening instrument that is based on the most recent definitions of ASD.

This discussion will be followed by an overview of the international prevalence rates of ASD and how it has changed over the last decade. The researcher will also aim to provide the reader with an overview of the prevalence rates of ASD in South Africa and how it relates to international prevalence rates. This will be followed by a summary of the debates in research regarding gender and ASD. Finally, this chapter will end off with a discussion on ASD screening and intervention. The researcher will provide an overview of ASD screening nationally as well as internationally and how it relates to early intervention and its subsequent advantages. Throughout this discussion the researcher will aim to highlight the difficulties that South Africa is facing with regards to limited resources when it comes to screening and intervention processes for ASD.

2.2. History and definitions of Autism Spectrum Disorder

ASD can be defined as a neurodevelopmental disorder that is mostly identified during childhood (American Psychiatric Association, 2013; Elsabbagh et al., 2012). It is a lifelong disorder that may impair or limit the everyday functioning of an individual (American Psychiatric Association, 2013). ASD affects an individual’s mental state, emotional capacity, learning capability, verbal and non-verbal communication as well as their ability to interact with and relate to other individuals (Chakrabarti et al., 2005; Elsabbagh et al., 2012). The term autism stems from the Greek word autos which mean ‘self’ (Sasson, Pinkham, Carpenter, & Belger, 2010). The term autism was first used by a Swiss psychiatrist Bleuler, who used the term to describe the characteristics of schizophrenia (Lyons & Fitzgerald, 2007).

ASD is currently considered as one of the most widespread and debilitating childhood disorders (Fombonne, 2005). Even though there are treatments available for ASD, it is a lifelong disorder which symptoms can be managed or lessened through available treatments (Cederlund, Hagberg, & Gillberg, 2010; Johansson, Gillberg, & Råstam, 2010; Matson, Fodstad, & Rivet, 2009; Matson & Neal, 2009).

It is important to understand the history of the diagnostic criteria for ASD as this had an impact on diagnosis, treatment, and subsequent prevalence rates which will be discussed later in this chapter.

The years 1943 and 1944 can be seen as landmark years when referring to the history of ASD definitions. Both Leo Kanner (1943) and Hans Asperger (1944) published articles describing children who displayed social deficits and strange behaviours (Lyons & Fitzgerald, 2007). It is particularly interesting that both authors used the term autism to describe the children observed in their studies, as it appears that they were not aware of each other's work (Sasson et al., 2010).

Kanner, widely believed to be the pioneer of autism, published his paper 'Autistic disturbances of affective contact' in which he described what he called 'early infantile autism'. Kanner draws attention to the fact that he noticed children with early infantile autism since 1938. His paper provides detailed descriptions of 11 children who he believed had early infantile autism. Kanner believed that these children differed from children who suffer from mental retardation or schizophrenia (Kanner 1943). Even though Kanner acknowledges that each of the children in his study showed varying degrees of the disorder and its features, he found similar traits that defined early infantile autism. Early infantile autism was firstly characterised by deficits in social interaction. "The outstanding, 'pathognomonic', fundamental disorder is the children's inability to relate themselves in the ordinary way to people and situations from the beginning of life" (Kanner, 1943, p. 242).

The second major characteristic was what is now known as repetitive and stereotypical behaviour.

> But the child's noises and motions and all of his performances are as monotonously repetitious as are his verbal utterances. There is a marked limitation in the variety of his spontaneous activities. The child's behaviour is governed by an anxiously obsessive desire for the maintenance of sameness (Kanner, 1943, p. 245).

Other characteristics observed by Kanner were abnormalities in motor control, delayed development of speech (or in some cases muteness), language and speech difficulties, problems with food (overeating, being picky), and finally an aversion to loud noises and moving objects (Kanner, 1943).

Hans Aspergers' thesis entitled 'Autistic psychopathy in childhood' was published in 1944. Asperger made the same fundamental discoveries as Kanner, which he referred to as 'autistic psychopathy'. Asperger explained that children with this disorder had poor emotional and social relationships, stereotypical behaviours and pervasive particular interests (Wolff, 2004). He described the children in his study as 'little professors' who displayed a lack of empathy, struggled to form friendships, conducted conversations that were one sided, and became intensely absorbed in special interests (Asperger as cited in Sasson et al., 2010, p. 87). Furthermore he noted that the disorder was also characterized by maliciousness, clumsiness, and the idiosyncratic use of language (Wolff, 2004). Unfortunately, Aspergers' work was only fully appreciated since 1981 when his disorder was described in a paper by Lorna Wing (Wolff, 2004).

Both Kanner and Asperger saw their disorders as separate from schizophrenia, but the distinction between autism and schizophrenia continued to be unclear for approximately 30 years (Dvir & Frazier, 2016). In 1952 the DSM-1 was published and the word autism was mentioned in the definition of 'schizophrenic reaction, childhood type', which was characterized by "psychotic reactions in children, manifesting primarily autism" (American Psychiatric Association, 1952; Sasson et al., 2010). In 1956 Eisenberg and Kanner isolated two main features of autism namely "extreme self-isolation and the obsessive insistence on the preservation of sameness" (Eisenberg & Kanner, 1956, p.557). Both of these features had to be present for an autism diagnosis to be made. Other features such as language use and repetitive behaviours were considered to form part of the two main features.

When the DSM-2 was published in 1968, autism was included in the diagnostic features of schizophrenia, childhood type:

> The condition may be manifested by autistic, atypical, and withdrawn behaviour; failure to develop identity separate from the mother's; and general unevenness, gross immaturity and inadequacy in development (American Psychiatric Association, 1968, p. 35).

An important shift came in 1971, when Israel Kolvin (1971) emphasised the differences between schizophrenia and autism (Dvir & Frazier, 2016; Sasson et al., 2010). Kolvin highlighted that both disorders had different ages of onset and autonomous developmental pathways (Kolvin 1971; Sasson et al., 2010). The idea was put forth that autism could be observed by age 3 while childhood schizophrenia usually manifested during late adolescence (Sasson et al., 2010). It was furthermore reasoned that psychotic symptoms, for example hallucinations and delusions, were key features of childhood schizophrenia, but not autism (Green et al. 1984). The case of two separate disorders made by Kolvin was supported by Michael Rutter who in 1978 provided four key variables that distinguished autism from schizophrenia (Sasson et al., 2010). Both Kolvin and Rutter did extensive research during which they compared autism with childhood schizophrenia and the debates that arose from this research had a significant impact on the decision to provide two separate categories for the disorders in the DSM-3 (Dvir & Frazier, 2016). Yet it was not until 1980, with the publication of the DSM-3, that this distinction between the two disorders was made official (Sasson et al., 2010). The diagnostic criteria for ASD further developed with the publication of the DSM-4.

In the DSM-4, four separate disorders existed namely: pervasive developmental disorder-not otherwise specified (PDD-NOS), autistic disorder, childhood disintegrative disorder, and Asperger's disorder (American Psychiatric Association, 1994). With the new DSM-5 criteria, all four of the above disorders now fall under the umbrella term Autism Spectrum Disorder (American Psychiatric Association, 2013; Lai, Lombardo & Baron-Cohen, 2014). The term spectrum is used as it refers to the fact that individuals may be affected by the disorder in different ways and therefore symptoms can range from mild to severe (Wingate et al., 2012). According to the DSM-5, this developmental disorder is usually characterised by two main symptoms namely (a) impaired social interaction and communication as well as (b) interests or behaviours that are repetitive and restrictive (American Psychiatric Association, 2013; Fuentes et al., 2012; Lai et al., 2014; Moolman-Smook et al., 2008).

2.3. ASD prevalence

The American Centre for Disease Control and Prevention released findings from their most recent study which estimates that approximately 1% of the world population is affected by ASD (Centre for Disease Control and Prevention, 2014). The CDC's Autism and Developmental Disabilities Monitoring Network (ADDM) provides estimated ASD prevalence rates every two years which is used as a benchmark for estimating ASD prevalence worldwide. These findings are based on research amongst children aged 8 who live in the United States (Wingate et al., 2014). The latest ASD prevalence rates, based on findings from the 2010 reporting period, indicates that 1 in every 68 children (14.7 per 1000) have been diagnosed with ASD (Wingate et al., 2014). When comparing these estimated prevalence rates with previous studies by the ADDM it is evident that there has been a significant increase in ASD prevalence rates during the past decade (Wingate et al., 2012; Wingate et al., 2014).

Estimated prevalence rates published by the ADDM for 2008 was 11.4 per 1000, which is a significant increase when compared to 14.7 per 1000 as found in 2010 (Wingate et al., 2012; Wingate et al., 2014). An increase of 23% in prevalence rates can furthermore be observed between the period of 2006 and 2008 (9.0 per 1000) as well as a 78% increase from 2002 (6.4 per 1000) (Mulvihill et al., 2009; Wingate et al., 2012). Researchers speculate that this increase could likely be influenced by socioeconomic differences, diagnostic practices, regional and cultural differences, an increase in ASD awareness, or access to health care services (Wingate et al., 2012; Wingate et al., 2014). Regrettably, the ADDM cannot determine the impact of each of the above factors as the increase in prevalence rates is most likely a result of a combination of these factors (Centre for Disease Control and Prevention, 2014). Despite these factors, one cannot rule out the possibility of a true increase in ASD prevalence rates (Centre for Disease Control and Prevention, 2014).

There is a limited amount of statistics available for ASD prevalence rates in South Africa (Springer et al., 2013). Elsabbagh et al. (2012) did a review of population based estimates on the prevalence of ASD in Africa and did not find any studies related to this subject. Springer et al. (2013) aimed to investigate the prevalence rates of ASD in South Africa by analysing medical records according to the DSM-4 criteria for ASD for the period of 2008 to 2010 at the Tygerberg Hospital situated in the Western Cape. The findings suggest that approximately 270 000 South Africans may have ASD (Springer et al., 2013). These findings should however be used with caution as the estimation is based on findings from a specific sample which has been generalised to the whole of South Africa.

It is clear that there is still uncertainty with regards to the true prevalence rates of ASD in South Africa. Bozalek (2013) is of the opinion that ASD prevalence rates in South Africa will be similar to the rates of other countries. ASD in South Africa should therefore be viewed as a rising and urgent social and mental health concern which should be addressed on a screening, diagnostic, and intervention level.

2.4. ASD and gender

The ADDM furthermore investigated the gender discrepancies in the ASD prevalence rates. A consistent finding over the years is that boys are significantly more likely to be diagnosed with ASD than girls (Wingate et al., 2014). The most recent findings (based on the reporting period of 2010) suggest that 1 in every 42 boys and 1 in 189 girls will be diagnosed with ASD. That is a prevalence ratio of 4.5:1 (Wingate et al., 2014). This is in accordance with data from the 2008 reporting period which indicates a prevalence ratio of 4.6:1 (1 in 54 boys and 1 in 252 girls) (Wingate et al., 2012). Data from the 2006 reporting period points to a prevalence ratio of 4.5:1 (Rice, 2009). The findings of the three reporting periods (2006, 2008 and 2010) are constant with regards to gender, where boys range between 4.5-4.6 per 1 girl (Centre for Disease Control and Prevention, 2014).

Since the initial writings of Kanner and Asperger the male predominance in ASD have been visible (Rivet & Matson, 2011). Despite the early awareness of-, and consistent findings in ASD research regarding male predominance, there is a substantial lack of research on the topic (Horovitz, Matson, Turygin, & Beighley, 2012; Rivet & Matson, 2011; Sipes, Matson, Worley, & Kozlowski, 2011; Van Wijngaarden-Cremers, Groen, Deurzen, Oosterling, & Van der Gaag, 2013). Furthermore the majority of ASD related research that is available has been conducted with mainly male samples (Horovitz et al., 2012; Sipes et al., 2011). This is problematic as the differences in gender could provide researchers with more insights with regards to the presentation of core ASD symptoms as well as ways in which to improve screening questionnaires, diagnostic questionnaires, and treatments (Horovitz et al., 2012; Rivet & Matson, 2011). It should be noted that the study at hand is limited as it could not minimize gender differences by making use of a sample that was equally comprised out of boys and girls.

The research that has been done on the gender differences in ASD yields mixed results. There have been some agreement amongst researchers that the gender discrepancies in ASD are affected by the child's level of cognitive ability (Horovitz et al., 2012; Kirkovski, Enticott, & Fitzgerald, 2013; Sipes et al., 2011). The consensus is that girls with a higher level of cognitive ability (average to high intelligence) are greatly underrepresented in ASD prevalence rates and other ASD research (Sipes et al., 2011; Van Wijngaarden-Cremers et al., 2013). According to Fombonne (2005) and Kirkovski et al. (2013) the male to female ratio is less (approximately 2:1) when focussing on children on the lower functioning end of ASD (Sipes et al., 2011). It seems as the level of functioning increases – so does the gender distribution (Horovitz et al., 2012; Kirkovski et al., 2013; Sipes et al., 2011). It is furthermore possible that girls with higher levels of cognitive abilities are only diagnosed with ASD at a later age, therefore affecting the gender differences in prevalence rates (Giarelli et al., 2010). This could be due to the notion that girls are often under diagnosed due to possibly different presenting symptoms (Horovitz et al., 2012).

Research on the presentation of ASD in boys and girls have found some differences between genders, but these findings are not consistent throughout ASD research. Boys with ASD seem to be more likely to have impairments with regards to repetitive and stereotypic behaviours than girls (Bölte, Westerwald, Holtmann, Freitag, & Poustka, 2011; Hartley & Sikora, 2009; Sipes et al., 2011). Furthermore a study by May, Cornish, and Rinehart (2013) suggests that girls with ASD have lower rates of hyperactivity as compared to boys. Girls with ASD seem to present more often with affective symptoms as well as social and communication deficits (Hartley & Sikora, 2009; Holtmann, Bölte, & Poustka, 2007).Yet, other research studies have found no significant differences between boys and girls with ASD (Banach et al. 2009; Carter et al. 2007; Holtmann et al., 2007; Rivet & Matson, 2011). If there are notable differences with regards to ASD presentation, this could most likely contribute to the fact that girls are underdiagnosed, which could in turn have an impact on the prevalence rates of ASD (Horovitz et al., 2012; May et al., 2013).

There is a paucity of research with regards to ASD prevalence and gender differences in South Africa. The only statistics available are provided by Springer et al. (2013) suggesting that 77.6% of their sample were boys. However, as mentioned earlier, this was a small scale study in South Africa and the findings cannot be generalised to the country as a whole.

2.5. ASD screening and intervention

The current capability of addressing ASD in South Africa is unfortunately limited. South Africa is a multicultural and diverse society facing numerous problems and obstacles including a lack of suitable resources and infrastructure, HIV/AIDS pandemic, a lack of proper education, a struggling health care sector, poverty, large discrepancies in socio economic status as well as the high unemployment rate (Bozalek, 2013; Saloojee et al., 2007). The latter, in combination with limited funds and resources results in the fact that South African citizens' health and wellbeing are not properly addressed (Saloojee et al., 2007). Owing to these struggles ASD diagnostic and intervention services are limited at government health care facilities (Stephens, 2012). Furthermore, the limited amount of services available to the public is strained by large numbers of South Africans seeking assistance (Malcolm-Smith et al., 2013).

The majority of the standardised ASD screening and diagnostic assessments available in South Africa have been developed and validated for other countries such as Europe, America, Japan, China, and the Netherlands (Mattila et al., 2012; Posserud et al., 2008; Qingguo et al., 2011). A limited amount of these tests have been adapted or standardised for use in South Africa, additionally most of these test are not available in the various official South African languages (Bozalek, 2013; Malcolm-Smith et al., 2013; Stephens, 2012).

2.5.1. Early Intervention.

According to international research ASD is most likely to be diagnosed between 3.1 and 5.7 years of age (Honigfeld et al., 2011; Wingate et al., 2014). Furthermore international research indicates that children from low SES areas are only likely to be diagnosed at a later stage after they enter the school system (Bozalek, 2013; Honigfeld et al., 2011; Stephens, 2012). South Africa faces numerous socio economic constraints and it can therefore be expected that the age of diagnosis will also be higher for children living with ASD.

The reality of later diagnosis is troublesome as research indicates that early diagnosis and intervention could lead to improvements in the core developmental deficits of the disorder, reduce challenging behaviour, and improve the attainment of developmental milestones (Chakrabarti et al., 2005; Matson, et al., 2011; Moolman-Smook et al., 2008; Stephens, 2012). Research findings shows that intervention before age four, especially intensive behavioural interventions for a period of two years, results in improved intelligence quotient (IQ) and adaptive functioning (Eikeseth, Smith, Jahr, & Eldevik, 2007). The benefits of early intervention could possibly be contributed to the plasticity of children’s still developing brains (Dawson, 2008). It is therefore crucial to focus on the early screening and diagnosis of children in South Africa to improve the outcomes of those with ASD (Wright & Poulin-Dubois, 2012). The lack of resources and ASD screening tools in South Africa results in the possibility that numerous learners who may be suffering from ASD will not be diagnosed or receive the proper intervention.

Even though ASD is believed to be a biologically based disorder, there are no medical tests (blood tests or brain scans for example) available to diagnose it (Norbury & Sparks, 2013; Wingate et al., 2012). The current screening and diagnostic tools therefore rely on behavioural evaluations of the child (Norbury & Sparks, 2013). The majority of these tools are based on the diagnostic criteria of ASD and are available in a variety of formats such as checklists or comprehensive questionnaires that are filled out by parents, teachers, paediatricians, clinical psychologists, or educational psychologists, as well as behavioural observation sessions with trained psychologists such as clinical and educational psychologists.

It is important to note that there are two levels of screening available for ASD (Bozalek, 2013). The first level entails screening which is aimed at determining the possibility of a child having ASD (Bozalek, 2013). Individuals in the general population could be screened by the level one screening tool, which will then identify those individuals who are at risk for an ASD diagnosis (Norris & Lecavalier, 2010). Those identified as at risk during a level one screening test will be referred for further diagnostic assessments for ASD (Corsello et al., 2007). These diagnostic assessments can be referred to as level two screening tests. The scope of this dissertation will be level one screening.

To date, and to the authors knowledge, only the Social Communications Questionnaire (SCQ) and the Modified Checklist for Autism in Toddlers (M-CHAT) have been used, translated, and validated for use in South Africa (Bozalek, 2013; Stephens, 2012). Unfortunately it is difficult to adapt international screening tests for use in South Africa and they turn out to be too costly to use on a regular basis (Bozalek, 2013; Stephens, 2012). The M-CHAT is the only successful, low cost screening test that shows promise for use within the South African context as it is free, easy to administer, and does not require training (Stephens, 2012). The M-CHAT screens for ASD in children aged 2 to 4, which is problematic when looking at the possibility of later diagnosis of ASD in low SES countries such as South Africa (Stephens, 2012). Another problem that arises with already existing ASD screening measures is the fact that most of them are based on DSM-4 criteria (Esler & Ruble, 2015). Since the

DSM-5 criteria have been published there exist a possibility that these screening measures will have to be revised in order to reflect the DSM-5 criteria more accurately (Esler & Ruble, 2015).

Bozalek (2013) conducted a pilot study (N = 50) on the usability of the Social Communication Questionnaire (SCQ) in South Africa for children between the ages of 2.5 and 14 years. The study found that the use of the SCQ could be viable in South Africa (Bozalek, 2013). Initially the researcher inquired about possibly furthering this research on the SCQ, but it became evident that the financial costs involved for the use of this screening measure are too high for it to be effectively used in South Africa (Bozalek, 2013; Malcom-Smith et al., 2013). Even though the SCQ could be useful in predicting the possibility of an ASD diagnosis in South Africa, the costs involved outweighs the usability of the test. This is a further indication that there is a need for the development of an ASD screening questionnaire for use in South Africa which will be cost effective and easy to administer.

In the South African context, the lack of proper health care services and financial support is problematic as international research points to the fact that ASD will often be under identified, undiagnosed, or diagnosed at a later age in low SES Countries (Malcom-Smith et al., 2013). It is therefore of utmost importance to develop a screening questionnaire that will be able to screen school aged learners for ASD. Furthermore, due to the limited services that are available to the public, many learners from disadvantaged communities may not be referred for screening or assessment (Baird et al., 2006; Lord & Bishop, 2010; Schendel et al., 2012). South Africa therefore requires a screening questionnaire for ASD that is low in cost and easy to administer. This will furthermore enhance referral processes for further diagnosis and intervention as it will decrease the amount of learners being referred to the incorrect services, or failure to identify comorbidities influencing any treatment programme.

3. Questionnaire development

This chapter will provide a discussion on the theory that was used to guide the study at hand. Various theories of scale or questionnaire development exists, but De Vellis (2012) provides the most extensive and detailed account of questionnaire development according to the researcher and was therefore chosen for this study. This chapter will focus on six steps of questionnaire development as set out by De Vellis (2012) and it will be substituted with overlapping readings wherever possible. It is important to note that initially De Vellis (2012) provided nine steps for questionnaire development, but as this study only focuses on questionnaire design up until the pilot testing phase, the steps by De Vellis (2012) will be discussed up until the pilot testing step. The main aim of this study was to develop and pilot test the ASDSQ. It is therefore important to provide the reader with the relevant literature and frameworks regarding the procedures of designing questionnaires.

This chapter will first discuss ASD and its various features as latent variables. This will be followed by a discussion on the six steps of questionnaire construction as set out by De Vellis (2012). In this chapter, the theory set out by De Vellis (2012) will be integrated with the study at hand.

3.1. Latent variables: measuring the unobservable

According to De Vellis (2012), measurement can be seen as a fundamental activity in science. Through observations one can acquire knowledge regarding people, groups, or events. Yet, in order to make sense of these observations it is often required to quantify them through measurement. De Vellis (2012, p 11) describes measurement questionnaires as “measurement instruments that are collections of items combined into a composite score and intended to reveal levels of theoretical variables not readily observable by direct means “. Brace (2013) furthermore perceives a questionnaire to be a medium through which the researcher communicates to the participant.

The use of a questionnaire can be very beneficial to a researcher (Brace, 2013). It provides a standardized ‘interview’ for all research participants. In short, all respondents are asked the same questions in the same way. This is a fundamental factor of survey research. It enables researchers to aggregate and interpret questionnaire answers (Brace, 2013).

Therefore it can be said that questionnaires are developed to measure phenomena that are believed to exist due to one’s theoretical understanding of the world, yet we cannot assess it directly. An example used by De Vellis (2012) to describe this is depression. One may be led to believe that depression could be an explanation for the behaviour we observe in another individual. This is due to the fact that theories regarding depression suggest that this construct influences human behaviour and is otherwise not 'visible' to others (Skrondal & Rabe-Hesketh, 2007). Therefore it can be said that depression is not equivalent to the observed behaviour, but that it underlies it. It is thus possible to prove the existence of depression due to its behavioural consequences. In essence, depression can be seen as a latent variable.

It is true that in most cases researchers are more interested in variables as opposed to questionnaires or individual items (De Vellis, 2012). A researcher would for instance be more interested in the experiences of a person with depression compared to marked answers on a questionnaire. Yet, as mentioned earlier, one of the ways in which information can be gathered about an individual with depression's experiences is through a questionnaire. In this sense items on a questionnaire can rather be seen as a means to an end when it comes to variable assessment. Questionnaires can be seen as substitutes or representations for variables that can't be observed directly or are 'hidden' (Skrondal & Rabe-Hesketh, 2007). This can relate to the example of depression or in the case of this study ASD. This so called underlying variable that will be measured by a questionnaire is referred to as a latent variable.

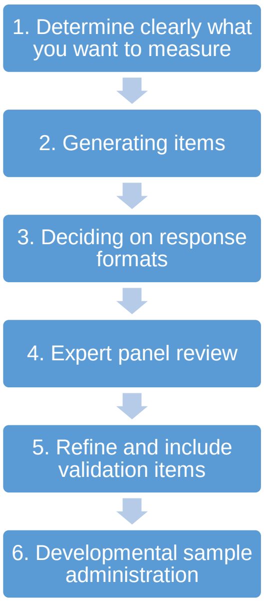
There are two main points to consider when referring to latent variables. Firstly, as discussed in the previous paragraph, this variable is not directly observable (Skrondal & Rabe-Hesketh, 2007). It can mostly be observed through human behaviour and can be inferred indirectly by linking it to other observable variables such as human behaviour (Skrondal & Rabe-Hesketh, 2007). With the ASDSQ in this study, the aim is to screen for the possibility of an ASD diagnosis, through asking questions about the child's behaviour. Secondly, the variable is not constant, it is adaptable. Therefore, certain aspects of the variable such as magnitude or strength will change according to time, place, contact with others, or any combination of the latter. In the case of this study, it can be said that ASD related behaviour can change as the child grows older or with interaction with therapists or teachers. While the latent variable can't be quantified or observed directly, it can take on a specific value under a set of specified conditions (De Vellis, 2012). With this study, the latent variable (ASD) was measured through unpacking the DSM-5 diagnostic criteria for ASD. The DSM-5 criteria can be seen as the specified conditions under which the latent variable (ASD) can take on a specific value.

To summarise, the latent variable in this study (ASD) can be seen as the target of the screening questionnaire being developed (Millsap, 2016). The items in the ASDSQ are aimed at measuring ASD related behaviour. Yet, ASD, based on the DSM-5 diagnostic criteria, proves to be a complex variable to measure. The DSM-5 breaks ASD down into two distinct variables namely (a) social interaction and communication as well as (b) interests or behaviours that are repetitive and restrictive (American Psychiatric Association, 2013; Fuentes et al., 2012; Lai et al., 2014; Moolman-Smook et al., 2008). These two variables are further broken down into subsets of behaviour. In order for the ASDSQ developed in this study to be successful, it has to account for the various variables that ASD is divided into. This relates to Millsap (2016) where he explains that for latent variables with distinct features, aspects, or dimensions (such as ASD) should be measured individually. Therefore each aspect or variable that forms part of the larger latent variable should be measured individually. Consequently, a study can have various different latent variables that will be measured in a questionnaire. During the item development of this screening questionnaire, the various DSM-5 criteria were used as separate latent variables and questions were designed to measure each latent variable. This will be discussed in more detail in the methodology section of this dissertation.

3.2. Six steps of questionnaire development

De Vellis (2012), a leading researcher within the field of questionnaire development proposed nine steps which can be used as a guideline when developing a questionnaire. This study will be guided by the first six steps of the questionnaire development process (De Vellis, 2012). The figure below provides a summary of the six step process.

Figure 1: Six Steps of Questionnaire Development (De Vellis, 2012).



3.2.1. Determine clearly what you want to measure.

Contrary to popular belief, the process of designing a questionnaire does not start with the actual designing of a questionnaire (Brancato et al., 2006). Before a researcher can even think about possible questions, it is important to first define the conceptual basis, objectives, and variables of the questionnaire (Bradburn, Sudman, & Wansink 2004; Giesen, Meertens, Vis-Visschers, & Beukenhorst, 2012). Fowler (2002) maintains that a prerequisite for designing a good measurement instrument is first deciding what will be measured.

De Vellis (2012) states that although this step of conceptualisation may seem obvious, many researchers are under the impression that they have a well defined and clear idea of what they intend to measure, only to find out later that their ideas are vaguer than initially thought. This is unfortunate as this realisation frequently occurs after substantial effort have been spent on item generation and data collection. When the questionnaire development process have reached this level it could prove to be more costly and time consuming to change items, compared to ensuring a clear and well defined view of the measurement aim at the start of such an endeavour (De Vellis, 2012; Giesen et al., 2012).

Brace (2013), in accordance with Brancato et al. (2006), states that a poorly written questionnaire will either provide data that is incorrect or not required. It is therefore pivotal to ensure that a questionnaire is well developed. This is important as the questions formulated for the questionnaire will, through analysis, measure these aims as well as key concepts and variables.

Mostly, the aims or variables involved in a study will be complex (Giesen et al., 2012). Therefore it is important to detangle the concept of interest during this step of questionnaire development. De Vellis (2012) provides three points which a researcher can employ to ensure clarity of measurement aims. These three points include:

3.2.1.1. Theory as an aid to clarity.

In order to think clearly about the items to be measured by a questionnaire, De Vellis (2012) suggests that one needs to first think clearly about the variable that will be measured. This is especially true if the scale or questionnaire will be measuring a latent variable, as in the case of the ASDSQ under development for this study. A measure that can be taken to ensure clarity regarding the latent variable is to be well grounded in theories relating to the phenomenon under investigation (in this case ASD). Understanding the theories related to a latent variable will enable the researcher to gain an improved understanding of how human behaviour is influenced. The researcher can then use the changes or abnormalities caused by the latent variable to operationalize variables for the questionnaire. If no theories are present, the researcher can decide to use his or her own conceptual formulation of the latent variable prior to operalization. In short, theoretical concepts such as ASD, can be translated into measurable variables through operationalization (Brancato et al., 2006).

Theory can furthermore aid clarity by splitting up topic domains into subdomains. This can be seen with ASD. ASD can be divided into two main categories: (a) social interaction and communication as well as (b) interests or behaviours that are repetitive and restrictive (American Psychiatric Association, 2013; Fuentes et al., 2012; Lai et al., 2014; Moolman-Smook et al., 2008). These subdomains can be seen as separate dimensions or components (Brancato et al., 2006). The latter subdomains then provides a more detailed description of the meaning of the variable under investigation (Brancato et al., 2006). An in depth discussion on the subdomains will be provided in the methodology section.

The latter discussion highlights the importance of specifying, at the least, a tentative theoretical model that will guide the development of the scale or questionnaire. In this study the researcher used the DSM-5 criteria for ASD as a theoretical model on which questionnaire items were based.

3.2.1.2. Specificity as an aid to clarity.

A questionnaire can be constructed in a very general or specific manner. In other words, questionnaires can have a different focus. A questionnaire could intend to relate to extremely specific variables or behaviours, as in the case of this study (De Vellis, 2012) or it could intend to be a more global or general measure. Such a general measure is mostly one dimensional, where a questionnaire with a more specific focus can be seen as multidimensional. Each of these types can be useful, depending on the aim of the questionnaire (De Vellis, 2012).

The aim of the current study is very specific as it intends to screen the behaviour of children to establish whether they could be at risk for an ASD diagnosis. ASD can be seen as a multidimensional concept with a variety of symptoms ranging from deficits in social interaction to repetitive and stereotypical behaviour.

3.2.1.3. Being clear about what to include in a measure.

It is important for questionnaire developers to ask themselves whether the variable they intend to measure can be seen as distinct from other variables. As discussed in the previous section, a questionnaire can either be general or specific. The same idea applies to the variables being measured in a questionnaire. De Vellis (2012) uses the measurement of anxiety as an example here. A general measure of anxiety could include both social anxiety and test anxiety, where a more specific questionnaire will only focus on one of these, for example social anxiety. In such a case, the measurement questionnaire should exclude the possibility of all other subtypes of anxiety. Therefore questionnaire items that could be related to another subtype of anxiety should be avoided (De Vellis, 2012).

On the other hand, even though questionnaire items could seem quite similar, they could tap into different variables. In cases like this, albeit the aim of the questionnaire is to measure one specific phenomenon, the possibility exists that it could be sensitive to other phenomena too. For instance, when measuring depression, there are several somatic items that could be included in the questionnaire. Yet, some of these somatic items could tap into other behaviour such as hypochondriasis or other medical issues. Therefore, depending on the population being studied, the researcher could choose to include or exclude somatic items (for example on chronically ill populations).

As discussed in the previous chapter, there has been a dramatic shift in the diagnostic criteria for ASD from the DSM-4 to the DSM-5 (American Psychiatric Association, 2013; Lai et al., 2014). In the DSM-4 several distinct disorders existed. This included pervasive developmental disorder-not otherwise specified (PDD-NOS), autistic disorder, and childhood disintegrative disorder (American Psychiatric Association, 2013). Yet all of these ‘similar’ disorders were grouped together in the DSM-5 under the term ASD (American Psychiatric Association, 2013; Lai et al., 2014). Therefore, if this study focused on measuring autism as it was set out in the DSM-4 there would have been a strong possibility that the variables of this questionnaire would have been specific and that similar items could tap into different variables such as Asperger’s or PDD-NOS. Nonetheless, as the current study focuses on the DSM-5 criteria for ASD, the variables in the questionnaire can be seen as more general. Due to the inclusion of related disorders into the autism spectrum, few possibilities exist for the questionnaire items to tap into variables related to other disorders or conditions. The variables in the questionnaire can furthermore be seen as general, as it ASD can be seen as one specific phenomenon due to the DSM-5 ASD spectrum.

3.2.2. Generating Items.

After the aim of the questionnaire has been clearly expounded, the researcher can begin to construct the instrument by generating an item pool. The items in this pool will be candidates who will eventually be included in the questionnaire. De Vellis (2012) proposes six points a researcher should consider while generating an item pool.

3.2.2.1. Choose items that reflects the questionnaire’s purpose.

It is important to consider what exactly the questionnaire intends to measure in order to guide the development of items, as discussed in the previous step of conceptualisation (De Vellis, 2012). Items that form part of a homogenous questionnaire should reflect the latent variable that underlies them. In this sense, each item can be viewed as an individual test measuring the strength of the latent variable. It is therefore important that each item and its content should reflect the variable of interest. From a theoretical perspective it would be best to choose a set of items from the 'universe' of items that could possibly relate to the variable under investigation. Unfortunately, this 'universe' of items is only an ideal, but the idea of it should guide the researcher when choosing items (De Vellis, 2012).

3.2.2.2. Redundancy.

Within questionnaire development redundancy can be seen as both a positive and negative feature (De Vellis, 2012). Some experts encourage the use of redundancy in questionnaires as it will enhance the comprehension of the questionnaire (Alwin & Beattie, 2016; De Vellis, 2012; Tharenou, Donohue, & Cooper, 2007). This is especially true for the early developmental phases of questionnaire design (De Vellis, 2012). Even though redundant items may form part of the initial item pool they will most likely be excluded from the final questionnaire (Tharenou et al., 2007). During questionnaire development a researcher attempts to depict the latent variable under investigation by developing various sets of items that tap into it in different ways (De Vellis, 2012). There can thus be items that are seemingly overlapping and redundant in this initial phase (Tharenou et al., 2007). This summates the common content and aspects of the items ensuring that irrelevant content will be negated. The use of redundancy in this manner can ensure that the superior item of a group of redundant items can be incorporated into the next or final version of the questionnaire (Alwin & Beattie, 2016; De Vellis, 2012; Tharenou et al., 2007).

De Vellis (2012) furthermore notes that redundancy in a questionnaire can also have negative consequences. Redundant items can become superficial and due to similar wording, there is a chance that respondents can react similarly to these items. This could lead to an inflated appraisal of reliability. When developing a questionnaire it is important to keep in mind that there should be a balance when it comes to redundancy. Too much redundancy can cause problems with reliability while too little redundancy may not capture the latent variable fully (Alwin & Beattie, 2016; De Vellis, 2012).

3.2.2.3. Number of items.

There is no established convention for determining the number of items that should be included in the initial item pool. However, De Vellis (2012) has suggested that there should be three or four times as many items in the initial item pool than the number of items anticipated in the final questionnaire. Therefore, an eight item questionnaire might begin from an initial item pool of 32 (Tharenou et al., 2007). Korb (2012) provides a useful guideline, stating that each variable should typically have between four and ten questions in the initial pool.

3.2.2.4. Beginning the process of writing items.

At this stage the focus is not on quality, but rather on expressing an idea regarding the latent variable. De Vellis (2012) suggests writing fast and uncritically when initially writing items.

Once you have written an initial question, it is good to try and write other items that are similar, but with different wording. This enables the researcher to identify a variety of ways in which questions can be worded. Once a number of questions, about four per variable, has been written it is time to start looking at the questions critically (De Vellis, 2012). The following few sections regarding good and bad items as well as positively and negatively worded items will delineate specific points to consider while evaluating questions critically.

3.2.2.5. Characteristics of good and bad items.

De Vellis (2012) provides basic guidelines for constructing questionnaire items. Adhering to these guidelines will enable the researcher to avoid common errors in item construction which will in turn yield more accurate responses (Lee, 2006). The researcher will briefly discuss the most important guidelines as set out by De Vellis (2012).

- Avoid lengthy items: It is important to take into consideration the respondents' comprehension of the questionnaire item. A lengthy question may be less clear in meaning and more complex, making it more difficult for respondents to comprehend (Alwin & Beattie, 2016; De Vellis, 2012). Shorter questions have the advantage of being clearer and easier to comprehend and remember compared to longer questions (De Vellis, 2012; Giesen et al., 2012). Lee (2006) furthermore states that shorter questions usually produces higher response rates compared to longer questions. While short questions are preferred, one should guard against sacrificing the meaning of a question for the sake of brevity (De Vellis, 2012). In order for a respondent to comprehend a question it would sometimes be necessary to provide a longer explanation in the question (Giesen et al., 2012).
- Reading difficulty level: The researcher should take into consideration the reading levels of the intended target population (De Vellis, 2012). It is seen as good practice to ensure that simple words and phrases should be used when designing questionnaire items, regardless of the target population (De Vellis, 2012; Lee, 2006). Furthermore, researchers should avoid technical terms, professional jargon, abbreviations, and slang (Lee, 2006).
- Avoid multiple negatives: Multiple negatives in questionnaire items paves the way for respondent confusion and misinterpretation of questions, making it difficult to answer (De Vellis, 2012; Lee, 2006). Even in ordinary language, multiple negatives can be confusing and grammatically incorrect (Lee, 2006).
- Avoid double barrelled questions: It is pivotal that a question is related to only one topic (Lee, 2006). When a questionnaire item conveys more than one topic or idea, then endorsing the question would mean that both ideas in the question are endorsed and

this may not truly reflect the respondent's intentions. Best practice to deal with double barrelled questions are to break the ideas or topics of the question into separate questions so that there is one topic per question (De Vellis, 2012; Lee, 2006). According to Lee (2006) a general rule is to look for questions containing the word 'and'. These questions should be investigated to see whether they contain more than one topic or idea. If they do, these questions should be broken up into two or more questions.

- Be specific: According to Dillman (2014) researchers should avoid vague questions. Questions with a specific focus increases accuracy and has a higher probability for similar interpretation by various respondents. The vaguer the question, the larger the probability of different interpretations by different respondents (De Vellis, 2012; Lee, 2006).

3.2.2.6. Positively and negatively worded items.

Positively worded items can be seen as items that represent high levels of the latent variable. Negatively worded items, on the other hand, can be seen as items that directionally oppose the logic of the latent variable being measured and is also known as negation (De Vellis, 2012; Weijters & Baumgartner, 2012). There are three main types of negation which will be briefly discussed here (Salazar, 2015; Schriesheim, Eisenbach, & Hill, 1991). The first is a regular or direct negation, for example 'people are not friendly'. The second type is polar opposites. An example here would be 'people are unfriendly'. The final type is the negation of the polar opposite, for example 'people are not unfriendly'.

The practice of using a combination of positively and negatively worded items within the same questionnaire is implemented in order to avoid or reduce the presence of agreement, affirmation, and acquiescence bias (De Vellis, 2012; Salazar, 2015; Sauro & Lewis, 2011; Sonderen, Sanderman, & Coyne, 2013). The latter three types of bias are used interchangeably to explain the phenomenon where individuals tend to agree with statements in a questionnaire without much concern of their content due to indifference, laziness, or an automatic adaption of the response pattern (De Vellis, 2012; Salazar, 2015). This will result in the questionnaire failing to reflect the respondents' actual opinions or mental states (Sonderen et al., 2013). Another benefit of using positive and negative items interchangeably is that it provides a safeguard against what is known as serial extreme responders. Serial extreme responders can be seen as respondents whose responses are either all high or low ratings (Sauro & Lewis, 2011).

Even though the argument for the inclusion of both positive and negative items in questionnaires sounds appealing, there are several drawbacks to the inclusion of negatively worded items. Reversing the item polarity, especially in the case of a long questionnaire, may create confusion for respondents (De Vellis, 2012). A related problem is that responses may be inconsistent as the logic of certain responses does not match the response logic applied in other questions (Salazar, 2015). This could be due to the fact that respondents struggle to establish the difference between the responses for positively and negatively worded items. As a result this could contribute to an increase in nonresponses and negatively worded items having lower average scores (Salazar, 2015; Sauro & Lewis, 2011; Sonderen et al., 2013). Furthermore it lowers the internal reliability of the questionnaire and increases the likelihood of interpretation especially in the case of cross cultural use (Salazar, 2015; Sauro & Lewis, 2011). Finally, a study by Sauro and Lewis (2011) found that there was no evidence supporting advantages in using both positive and negatively worded questions in a questionnaire.

De Vellis (2012) is of the opinion that whether or not a combination of positively and negatively worded questions are used in a questionnaire, researchers should ensure that they follow general grammar rules to assist in avoiding unnecessary ambiguity in questionnaire items. In the current study the researcher decided to include both positively and negatively worded items in an attempt to reduce the presence of agreement, affirmation, and acquiescence bias as well as safeguard against serial extreme responders.

3.2.3. Deciding on response formats.

It is important for the researcher to decide on the measurement format during the step where items are generated. This is to ensure that the questions generated will work with the measurement format. One of the first things to consider during this step is whether to use open or closed ended questions, or a mixture of both. Closed ended questions can be seen as fixed or force response questions, while open ended questions are viewed as free response questions and unstructured (Lee, 2006; Stern, Smyth, & Mendez, 2012). The current study made use of closed ended questions which can take various forms such as rating questionnaires, multiple choice, true or false, and finally yes or no questions.

The binary yes or no format that was chosen for the ASDSQ provides respondents with the opportunity to select an answer from a fixed set of response items. Lee (2006) states that closed ended questions provides an improved uniformity of responses as well as easy administration, both of which contributes to the popularity of closed ended questions within questionnaires which are designed with the specific goal of analysis and evaluation. The main disadvantage of closed questions is that it takes longer to develop and that each question can have minimal variability (De Vellis, 2012; Lee, 2006). On the other hand it is easier to complete for respondents, it saves time, and the results are equally reliable to other multi category questionnaires (Dolnicar, Grün, & Leisch, 2011; Lee, 2006).

3.2.4. Expert panel review.

An expert panel consists of a group of individuals who are seen as knowledgeable on the subject matter under investigation (Artino, La Rochelle, Dezee, & Gehlbach, 2014; De Vellis, 2012; Olson, 2010). Expert panels are used during this stage of questionnaire development to investigate the content validity of the questionnaire (Artino et al., 2014; De Vellis, 2012). Content validity refers to the opinion of an expert with regards to whether the questionnaire as a whole, as well as the individual items, measures what it intends to measure (Larsson et al., 2015; Zamanzadeh et al., 2015). Making use of an expert panel could be extremely beneficial as it could improve the quality and representativeness of questionnaire items as well as identifying other potential problems with the questionnaire items (Artino et al., 2014; Olson, 2010).

The use of expert panels could be beneficial to a study in several ways. De Vellis (2012) is of the opinion that expert reviews can validate or invalidate the definition of the latent variable. This is done by asking the expert panel to review questionnaire items based on how relevant the items are in relation to the variables under measurement (Artino et al., 2014; De Vellis, 2012). A second advantage according to De Vellis (2012) is that the panel can provide feedback on the clarity and conciseness of questionnaire items. It is possible that the content of a questionnaire item may be relevant, but that the wording is problematic. This provides the researcher with the opportunity to change the problematic wording before pilot testing the questionnaire in the field. Clarity and conciseness of items are also related to item reliability, as unclear items could reflect factors that are extraneous to the variables being measured. Finally, an expert panel can indicate ways or new questions to tap into the latent variable that the researcher did not include in the initial questionnaire. The expert panel can then assist the researcher to better capture the latent variable, which in turn will amplify the content validity of the questionnaire (De Vellis, 2012).

Artino et al. (2014) emphasises the importance of choosing the right reviewers for the expert panel. To do this, criteria should be developed to determine who will qualify as an expert reviewer. The criteria should include experience and knowledge of the latent variable as well as willingness and availability of reviewers. Caution should furthermore be employed when making use of an expert panel. De Vellis (2012) highlights that even though the expert panel provides feedback, it is ultimately the decision of the researcher to accept or reject this feedback. It is important to remember that although the reviewers are experts on the latent variable, they may not understand the standards and theory involved in questionnaire development. De Vellis (2012) provides an example where one of his reviewers constantly recommends removing all similar items from the questionnaire. This relates to redundancy which was discussed earlier in this chapter. Redundancy is an important feature in enhancing the internal consistency of a questionnaire. It is therefore important to critically review expert panel findings before implementing them.

There are discussions in the literature about the amount of reviewers seen as adequate for reviewing a questionnaire (Artino et al., 2014). According to Friesen, Theodoros, and Russell (2015) five reviewers are seen adequate for assessing the content validity of a questionnaire, while an earlier article by Rubio, Berg-Weger, Tebb, Lee, and Rauch (2003) suggests that six to ten experts would be suitable, especially when employing quantitative techniques of content validation. Rubio et al. (2003) also notes that using a larger number of reviewers, up to 20, could be more beneficial as it produces a clearer consensus regarding the variable being measured and the quality of the questionnaire items. Olson (2010) simply states that multiple reviewers would be more beneficial compared to a single reviewer.

One of the most widely used methods of establishing content validity in questionnaire design is the content validity index (Larsson et al., 2015; Zamanzadeh et al., 2015). The content validity index is used to determine and quantify the content validity of questionnaire items (Larsson et al., 2015). Expert panel reviewers are asked to rate questionnaire items on a four point questionnaire where one is not relevant, two is somewhat relevant, three is quite relevant and four is highly relevant. The questionnaire items are rated on this four point questionnaire based on clarity and the relevancy to the variable being measured. Artino et al. (2014) suggests adding free text or qualitative responses for expert panel reviewers as it will enhance the quantitative review. Due to the exploratory nature of the ASD questionnaire in this study, the researcher decided to only make use of a qualitative review during this stage, instead of asking the expert panel to review the questionnaire items on a four point scale. The findings of this study indicated that the qualitative review provided sufficient feedback to indicate problems with question wording, clarity, and conciseness of the questionnaire. Feedback regarding whether the items measured the variables it was intended to measure were also provided.

3.2.5. Refinement and include validation items.

In this step of the questionnaire design the researcher will implement the findings from the expert panel review. De Vellis (2012) furthermore suggests including validation items in the questionnaire to control for flaws or problems such as social desirability. Social desirability is where a respondent will answer a question in a way that presents him or herself in a favourable way. There are various, ready to use, validation scales available such as a 10 item scale measuring social desirability by Strahan and Gerbasie (1972) which can be inserted into a questionnaire. The researcher decided against including such a scale in the questionnaire as one of the main aims of this study is to develop a short and easy to administer questionnaire measuring the probability of the presence of ASD. Furthermore, this is a screening questionnaire and not a diagnostic instrument. Therefore, if a child screens positive for the possibility of ASD with this questionnaire, they will be referred for further diagnostic testing before a diagnosis is made.

3.2.6. Developmental sample administration.

Testing the questionnaire on a developmental sample can be seen as the pilot testing phase. A pilot study can be defined as a small scale version of a full questionnaire study (Leon, Davis, & Kraemer, 2011; Thabane et al., 2010). The main purpose of a pilot study is to inspect the feasibility of the larger scale study (Leon et al., 2011). This phase of questionnaire development will involve giving the questionnaire a trial run using the target population of the main study (Czaja, Blair, & Blair, 2014). The pilot test aids the researcher in determining whether the questionnaire will work as intended. Pilot studies can furthermore be seen as explorative in nature (Leon et al., 2011). It has become common practice during this stage to ask respondents open ended questions after completion of the questionnaire. This will enable the researcher to gain insight into the types of problems and questions respondents identify as problematic and to make related changes to improve the overall questionnaire and methods of administration (Czaja et al., 2014; Leon et al., 2011). The data of a pilot test is not included in the larger study, this is due to the fact that various changes will be made to the questionnaire after the pilot test (De Vellis, 2012; Czaja et al., 2014; Thabane et al., 2010). The main purpose of this pilot study will be to examine the feasibility of the full questionnaire research project as well as to pretest and evaluate the ASDSQ (Calitz, 2005; Van Teijlingen & Hundley, 2001).

4. Methodology

4.1. Overview

This chapter aims to provide the reader with an in depth explanation of the methodology employed for this study. Firstly this chapter will explore the use of the multiphase mixed methods design which underpinned the study at hand. Due to the use of the latter design, the study will be divided into three phases. Secondly this chapter will provide a description of the research project phases which directed the flow and execution of the data gathering process. Thirdly the sampling method and process employed will be discussed. Fourthly this chapter will focus on the measurement questionnaires used in the study. A breakdown will be provided of how the constructs in the first version of the ASDSQ were selected and operationalized. This discussion will be followed by an overview of the M-CHAT questionnaire which will also be completed in this study in order to firstly ensure that the control group is not at risk for an ASD diagnosis and secondly verify that the individuals in the experimental group are indeed at risk of an ASD diagnosis.

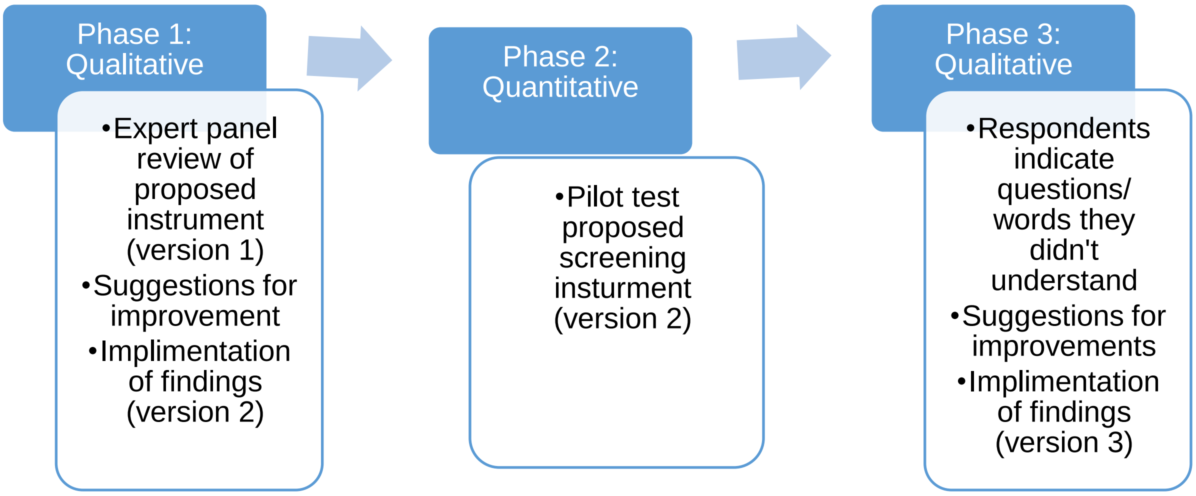
The focus will then be turned to the data collection procedures for each phase of the study. After this an overview will be given with regards to the data analysis methods for the quantitative and qualitative phases of this study. Finally the researcher will give a summary of the ethical considerations employed while undertaking the study.

4.2. Research design

The study made use of a multiphase mixed methods research design. Mixed methods uses a combination of qualitative and quantitative research methods in order to gain an improved understanding of the research problem and research questions (Caruth, 2013). The use of mixed method designs arose due to various limitations observed for the separate use of quantitative and qualitative research designs (Caruth, 2013). Multiphase mixed methods incorporates two general strategies that are used within mixed method research (Creswell, 2003). The first is a sequential procedure where the researcher aims to develop or elaborate on the findings obtained by one method by making use of another method. The second is a concurrent procedure where the researcher joins qualitative and quantitative data with the intention of presenting a thorough examination of the research problem (Creswell, 2003). A multiphase mixed methods design is typically used to develop, adapt, and evaluate specific programmes or tests. It allows the researcher to use qualitative and quantitative methods in any order at different stages of the research project (Creswell & Plano Clark, 2011). Based on this design the study implemented a multiphase design in three phases:

Figure 2: Breakdown of the Multistage Mixed Methods Design for this Study.

Figure 2: Breakdown of the Multistage Mixed Methods Design for this Study.



The use of a multistage mixed methods design has enabled the researcher to initially improve the screening questionnaire before the pilot test. It also allowed the researcher to furthermore improve the screening questionnaire which would then be used as part of the larger research project at the Itsoseng clinic.

4.3. Research project phases

4.3.1. Phase one: Qualitative.

The researcher developed an initial draft of the screening questionnaire (version one), based on the DSM-5 criteria for ASD, which contains 49 yes/no questions (refer to Appendix A). The initial draft was sent to an expert panel comprised out of two professionals working within the field of ASD for perusal. Due to the exploratory nature of this study, the researcher decided to make use of a small expert panel in order to get a basic feel of what changes could be brought to the questionnaire under development. The criteria for inclusion in the expert panel was that the expert had to have experience within the field of ASD for a minimum of five years. After perusal, the researcher conducted a semi structured interview with each of the expert panellists to find out what they think of the screening questionnaire and if there are any suggested changes (for example: removal of questions or rewording of questions). As stated in the literature review, the semi structured interviews provided the experts with the opportunity to provide thorough feedback on the questionnaire and possible changes. Phase one of the research enabled the researcher to identify possible flaws in the screening questionnaire and to identify and consequently adjust ambiguous or unclear items in the screening questionnaire

(Leon et al., 2011; Pincus et al., 2013). This adjusted the screening questionnaire (version two) that was used during the pilot phase.

4.3.2. Phase two: Quantitative.

Phase two involved the pilot of the proposed screening questionnaire (version two) on an experimental and control group. This pilot study will form part of a larger research project at the Itsoseng Clinic which forms part of the Department of Psychology at the University of Pretoria. A pilot study can be seen as a small scale version of a full scale study (Leon et al., 2011; Thabane et al., 2010). The main purpose of this pilot study was to examine the feasibility of the full scale research project (developing and standardising the ASDSQ) as well as to pretest and evaluate the ASDSQ (Calitz, 2005; Van Teijlingen & Hundley, 2001).

The experimental group consisted of eight parents or guardians of learners attending schools for ASD, ages 6 to 9, who have already been diagnosed with ASD by means of a gold standard ASD measure such as the Autism Diagnostic Observation Schedule (ADOS) or SCQ. The control group was comprised out of eight parents or guardians of learners in a mainstream school setting, who were aged between 6 and 9. The intention with the experimental group was to test whether the questionnaire under development successfully identified the presence of ASD in the learners when completed by the parents or guardians. Therefore, if all the scores of the experimental group are high, then the questionnaire succeeded in identifying ASD. The presence of ASD in the control group was furthermore checked by administering the M-CHAT to the sample. The control group was put in place to ensure that the questionnaire under development did not falsely identify learners who do not have an ASD diagnosis. The parents and guardians in the control group had children inn a mainstream school and that have never been diagnosed with ASD. Furthermore, the administration of the M-CHAT on the control group ensured that the children of the parents and guardians were not at risk for an ASD diagnosis.

4.3.3. Phase three: Qualitative.

Phase three of this research project entailed short semi structured interviews with each participant regarding their thoughts about the questionnaire after completion. Participants were asked to identify unclear or ambiguous questions and to suggest possible questions that could be added to the questionnaire. These findings were then implemented to create version three of the screening questionnaire. The current study entered its final stage after the third version of the screening questionnaire was created. The third version of the screening questionnaire will then be used as part of the larger project at the Itsoseng Clinic, where the aims are to further develop and hopefully standardize and establish norms for the screening questionnaire.

4.3.4. Overall research project.

Due to the possible errors which could have been detected by this study and the subsequent changes to the screening questionnaire and measurement procedures, the data of the proposed pilot study will not form part of the larger research project (Leon et al., 2011). The pilot study was beneficial in the development of this screening questionnaire for three main reasons. It enabled the researcher to identify possible flaws in the measurement procedures and screening questionnaire (Thabane et al., 2010). It pointed out errors for the operationalization of the variables being measured and the researcher was able to identify and consequently adjust ambiguous or unclear items in the screening questionnaire (Leon et al., 2011; Pincus et al., 2013). After the completion of this study, the screening questionnaire will be further developed during a larger study at the Itsoseng Clinic.

4.4. Sampling

The study at hand used a purposeful sampling method. Purposive sampling is a type of nonprobability sampling method where the researcher selects participants based on his or her own judgments as to which participants will be the most useful for the study at hand (Babbie, 2016) as well as the availability of participants. For phase one the researcher approached trained psychologists and teachers working within the field of ASD at the University of Pretoria and the remedial schools included in the study. The first two professionals willing to paricipate in the study were included. Phase two and three focused on the experimental and control groups. The experimental and control groups consisted of the parents or guardians of learners aged 6 to 9. These learners were previously diagnosed with ASD.

4.4.1. Experimental group.

The experimental group was comprised of eight parents and guardians of learners (6 male and 2 female) who have already been diagnosed with ASD, who were enrolled at a remedial school. The inclusion criteria was that the parents and guardians should have a child that meets the following:

- Between the ages of 6 and 9
- Must already have an ASD diagnosis, made by either a clinical psychologist or pediatrician
- Enrolled at a remedial school in Pretoria
- Learner should have been diagnosed within the last five years

The experimental group included parents and guardians of learners with diagnoses made using the DSM-4 such as Aspergers and PDD-NOS. Parents and guardians of learners with comorbid neurological conditions were excluded from the sample.

4.4.2. Control group.

The control group was comprised of eight parents and guardians of learners (6 male and 2 female) who were enrolled at a mainstream school in the Pretoria area. The inclusion criteria was that the parents and guardians should have a child that meets the following:

- Between the ages of 6 and 9
- Should not have an ASD diagnosis
- Enrolled at a mainstream school in Pretoria
- Should not have been diagnosed with any neurological conditions or developmental disorders

4.5. Measurement instruments

4.5.1. Demographic questionnaire.

The participants were given a demographic questionnaire to fill out at the beginning of the first test administration. The demographic questionnaire focused on the age of the child, whether the child has an ASD diagnosis (if part of the experimental group) as well as basic information regarding gender and race.

4.5.2. ASDSQ.

The ASDSQ was based on the DSM-5 criteria for ASD. The DSM-5 distinguished between two main categories of impairment, the first is social communication and interaction and the second is restricted, repetitive patterns of behaviour, interests or activities (American Psychiatric Association, 2013). Each of these categories were made up of sub items, which was measured with the ASDSQ. The two categories and sub items were the latent variables measured in this questionnaire. There was a total of seven variables measured by the screening questionnaire. The questionnaire consisted of 49 yes/no questions (seven questions per variable).

The first variable of social communication and interaction was measured by the following three constructs (as set out in the DSM-5): social emotional reciprocity, nonverbal communication, and relationship deficits (American Psychiatric Association, 2013). The second category of restricted, repetitive patterns of behaviour, interests, or activities was measured by the following four constructs: repetitive behaviours, sameness, fixated interests, and sensory input (American Psychiatric Association, 2013). The following section will provide an overview of the breakdown of the variables and definitions and how it was converted into questions for the screening questionnaire.

4.5.3. Operational definitions and screening questionnaire.

This section will focus on the definitions (according to the DSM-5) of each of the seven variables that is measured by the ASDSQ. This will be followed by a discussion on how these variables were operationalized in the first version of the screening questionnaire (presented in table form). Please refer to appendix A for the full version one of the ASDSQ.

4.5.3.1. Social-emotional reciprocity.

“Deficits in social-emotional reciprocity, ranging, for example, from abnormal social approach and failure of normal back-and-forth conversation; to reduced sharing of interests, emotions, or affect; to failure to initiate or respond to social interactions” (American Psychiatric Association, 2013, p. 171). Social-emotional reciprocity were measured by the following questions:

Table 1: Operational Definitions: Social-Emotional Reciprocity.

My child:

Dislikes crowds of people (like supermarkets, restaurants)	Listens when others talk to him/her
Uses strange words I don’t understand	Doesn’t make sense when he/she talks
Rarely calls my name when he/she wants my attention	Seldom brings things to me when he/she wants to show me something
Seldom starts conversations with other people	

4.5.3.2. Non-verbal communication.

Deficits in nonverbal communicative behaviours used for social interaction, ranging, for example, from poorly integrated verbal and nonverbal communication; to abnormalities in eye contact and body language or deficits in understanding and use of gestures; to a total lack of facial expressions and nonverbal communication (American Psychiatric Association, 2013, p. 171).

Non-verbal communication was measured by the following questions:

Table 2: Operational Definitions: Non-Verbal Communication.

My child:

Says the same things over and over	Doesn't look at people when he/she talks to them
Avoids eye contact when I call him/her	Doesn't understand basic gestures such as waving and thumbs up
Seldom points at something he/she wants	Lacks facial expressions
Has abnormal body language	

4.5.3.3. Relationship deficits.

"Deficits in developing, maintaining, and understand relationships, ranging, for example, from difficulties adjusting behaviour to suit various social contexts; to difficulties in sharing imaginative play or in making friends; to absence of interest in peers" (American Psychiatric Association, 2013, p. 171). Relationship deficits was measured by the following questions:

Table 3: Operational Definitions: Relationship Deficits.

My child:

Often does things that are not socially appropriate	Often says things that are blunt and seems rude
Doesn't like imaginative play (pretend to care for dolls, talking to toys)	Doesn't engage in pretend play with other children (playing house, teacher)
Struggles to make friends	Doesn't want to play with others
Dislikes playing games with other children	

4.5.3.4. Repetitive behaviours.

"Stereotyped or repetitive motor movements, use of objects, or speech (e.g., simple motor stereotypes, lining up toys or flipping objects, echolalia, idiosyncratic phrases)" (American Psychiatric Association, 2013, p. 171). Repetitive behaviours was measured by the following questions:

Table 4: Operational Definitions: Repetitive behaviours.

My child:

Has unusual movements that he/she does often	Puts toys in a specific order when playing
Likes to do the same things the whole time	Struggles to stop with a repetitive activity
Wants to do things a certain way	Plays with toys in the same way every time
Repeats things he/she hears over and over	

4.5.3.5. Sameness.

> Insistence on sameness, inflexible adherence to routines, or ritualized patterns of verbal or nonverbal behaviour (e.g., extreme distress at small changes, difficulties with transitions, rigid thinking patterns, greeting rituals, need to take same route or eat same food every day) (American Psychiatric Association, 2013, p. 171).

Sameness was measured by the following questions:

Table 5: Operational Definitions: Sameness.

My child:

Finds it difficult to cope with changes in routine	Doesn’t like it when I move and change things around the house
Struggles to go back and forth between different activities easily	Has specific rituals when he/she does certain things
Has strict routines that everyone should follow	Gets upset when we do not do things the way he/she wants
Does not play with toys appropriately	

4.5.3.6. Fixated interests.

“Highly restricted, fixated interests that are abnormal in intensity or focus (e.g., strong attachment to or preoccupation with unusual objects, excessively circumscribed or perseverative interests)” (American Psychiatric Association, 2013, p. 171). Fixated interests was measured by the following questions:

Table 6: Operational Definitions: Fixated Interests

My child:

Is obsessed with certain objects (for example toys, animals, household items)
Wants to play the same game over and over
Is only interested in playing with one or two specific toys
Can focus on one object for a long time
Can spend a lot of time playing with just one or two objects
Gets upset when he/she doesn't have his/her favourite object
Spends an abnormal amount of time playing with, or looking at one object

4.5.3.7. Sensory input.

"Hyper- or hypo-reactivity to sensory input or unusual interest in sensory aspects of the environment (e.g. apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with lights or movement)" (American Psychiatric Association, 2013, p. 171). Sensory input was measured by the following questions:

Table 7: Operational Definitions: Sensory Input.

My child:

Makes unusual finger movements near his/her eyes
Doesn't respond to pain (when he/she falls, bumps his/her head)
Doesn't like it when someone touches or holds him/her
Enjoys touching objects in a specific way
Is very sensitive to noise
Smells and licks unusual objects often
Flaps his/her hands or fingers a lot

4.5.4. Modified checklist for autism in toddlers (M-CHAT).

The M-CHAT was administered for both the experimental and control group. The M-CHAT is an ASD screening questionnaire that can be administered for children from the ages of 18 months to 48 months (Kara et al., 2013). It consists of 23 yes/no items which are filled out by the parent or guardian of the child (Stephens, 2012). The items in the M-CHAT focus on the observed behaviour of the child (early warning signs of ASD) and can indicate whether the child is at risk for a possible ASD diagnosis (Kara et al., 2013; Stephens, 2012). The M-CHAT includes items that point to the diagnostic criteria of ASD such as social interaction and repetitive behaviours. There are 19 items in the M-CHAT for which a 'yes' response is seen as normal (Kara et al., 2013). There are furthermore six crucial items (item 11, 18, 20 and 22) for which a 'yes' response will be seen as abnormal (Kara et al., 2013). A child will be considered at risk for ASD if they have two or more abnormal answers for the six critical items or if they have three abnormal answers for the entire 23 item M-CHAT (Kara et al., 2013).

It is important to note that the children screened in this study falls outside the age range for the M-CHAT. However, the M-CHAT was only used in this study to provide an additional identification of whether a child is at risk for ASD or not. The scores of the M-CHAT assisted the researcher in ensuring that the learners in the control group were not at risk for an ASD diagnosis and that the learners in the experimental group could be at least formally classified in this study as 'at risk' for autism. Please refer to appendix B for the M-CHAT.

4.6. Data collection procedure

4.6.1. Phase one.

The screening questionnaire was reviewed by an expert panel working within the field of ASD. The researcher contacted the professionals and asked whether they were willing to participate in the study. After indicating willingness to partake the researcher sent through the proposed screening questionnaire (version one) for them to peruse. After perusal, the researcher conducted semi structured interviews with both professionals in order to determine whether there were any changes or improvements that could be made before the pilot test. Please refer to appendix C for the interview guide.

4.6.2. Phase two and three.

The researcher contacted mainstream and remedial schools for learners with autism in Pretoria and asked staff at the school for permission to conduct the study at the school. A letter, provided by the researcher, was sent out by the school to the parents and guardians of the learners at the school. The letter asked the parents and guardians for their involvement in the study and provided information on the study and how to get involved.The researcher arranged a date and time with the participants (parents and guardians) to fill out the questionnaire. The questionnaire was filled out at the school which the child is attending and as mentioned earlier, the child did not have to be present for the data collection. At the beginning of the data collection procedure participants were informed about the aim of the study, the voluntary nature of the study, and the confidentiality measures which will be employed by the researcher. Participants were asked to fill out a basic demographic questionnaire about themselves and their child, followed by the proposed ASDSQ (version two). The researcher was present during the completion of the questionnaire and answered any questions the participants had. The presence of the researcher furthermore ensured that all of the questions in section A, B and C of the questionnaire were completed. After the completion of the questionnaire the researcher asked the participants to identify questions that they found difficult to understand or interpret, and to offer suggestions to improve the screening questionnaire. Please refer to appendix D for the interview guide

4.7. Data analysis

4.7.1. Quantitative data analysis.

The researcher used Statistical Package for the Social Sciences (SPSS version 23) to analyse the data. Descriptive statistics were employed to describe the characteristics of the sample and to explore whether it relates to the variables being measured (Gravetter & Forzano, 2009). Due to the small sample size and the exploratory nature of the study, the researcher made use of cross tabulations in order to investigate which questions should be removed from the third version of the questionnaire. The researcher again made use of cross tabulations in order to compare the results of the ASDSQ with the results of the M-CHAT in order to see whether the ASDSQ could successfully identify learners at risk for an ASD diagnosis.

4.7.2. Qualitative data analysis.

For the analysis of phase one and three the researcher made use of thematic analysis in order to identify possible questions that could be added to the questionnaire, questions that were difficult to understand or ambiguous and other suggestions from participants. Thematic analysis can be seen as a qualitative data analysis method which can be used to identify, analyse as well as report on patterns or themes within the data (Braun & Clarke, 2006). This method of analysis was seen as beneficial for this study due to its flexibility. It is a method that can be seen as independent of theory as well as epistemology and can therefore be applied across a wide range of epistemological and theoretical approaches (Holloway & Todres, 2003). Due to this theoretical freedom, this method of analysis was useful as it can provide an account of the data that is both rich and detailed (Braun & Clarke, 2006). Interview notes were made by the researcher in phase one and three of this research, which was then captured on MS word in table form. During the data interpretation process the researcher deducted themes from the data and coded the data according to the themes deducted from the interviews. The researcher coded the data by making use different colours available on MS Word.

4.8. Reliability and Validity

The ASDSQ aimed to measure a complex latent variable and once validated and normed, this screening questionnaire will require high levels of validity and reliability (Zamanzadeh et al., 2015). Reliability is concerned with the extent to which a variable influences a set of items, while validity focuses on whether the variable is the underlying cause of item covariation (De Vellis, 2012). This section will discuss the various types of validity and reliability related to scale development and how it was, or was not, employed in the study at hand.

4.8.1. Validity.

4.8.1.1. Content validity.

Content validity can be seen as a prerequisite for the other two types of validity (namely criterion related validity and construct validity) and that is why authors suggest that is should receive the most attention during questionnaire development (Zamanzadeh et al., 2015). According to De Vellis (2012), content validity focuses on item sampling adequacy. This can be seen as the degree to which the items in a questionnaire reflect the content domain as a whole. In the case of this study, the content domain is ASD. It is the simplest to evaluate content validity when there is a well-defined domain. Unfortunately, having a well-defined domain is not always possible, especially with regards to measuring beliefs, attitudes, observations, and behaviour. Therefore, researchers must put other measures in place to ensure content validity (De Vellis, 2012; Zamanzadeh et al., 2015). Before embarking on a discussion about measures to ensure content validity, the researcher will first discuss the role of face validity as a starting point for establishing content validity.

Face validity can be seen as a type of validity that forms part of content validity (Larson et al., 2015; Rattray & Jones, 2007; Zamanzadeh et al., 2015). Face validity is concerned with whether it seems that the questionnaire represents the content domain being researched (Larson et al., 2015; Rattray & Jones, 2007; Zamanzadeh et al., 2015). For example, do participants think that the instrument is sufficient for measuring the latent variable? In the case of this study, face validity was respectable. The most prominent theme resulting from the semi structured interviews in phase three was that the screening questionnaire was sufficient for measuring ASD. This will be discussed further in the results and discussion chapters. However, face validity is seen as an inferior scientific method (Larson et al., 2015; Zamanzadeh et al., 2015). Despite this, it provides a solid starting point for assessing the content validity of a questionnaire. Larson et al. (2015) states that without ascertained face validity, the questionnaire in question might not be relevant.

Now that it was established that the ASDSQ in this study had high face validity, the researcher will move on to discuss the measures that were taken to ensure content validity for the ASDSQ. As content validity is linked to the definition of the latent variable being measured it is important that the questionnaire items reflect the conceptual definition of the latent variable (De Vellis, 2012). The most common step to ensure content validity is making use of expert panel reviews before testing the questionnaire in the field (De Vellis, 2012; Larson et al., 2015; Zamanzadeh et al., 2015). This step is put into place as it provides the expert panel with the opportunity to assess whether the questionnaire items reflect the content domain. During the development of the ASDSQ, the researcher allowed an expert panel to review the questionnaire. Based on this review, the researcher can conclude that this instrument has acceptable content validity as the panel agreed that the questions reflected the content domain. As will be discussed in the results and discussion chapters, the only changes to questions were wording changes and the combining of similar questions. Therefore it is safe to say that the experts agreed that the items covered the content domain, resulting in decent content validity. Making use of more experts in the expert panel review could have ensured a higher content validity.

4.8.1.2. Criterion related validity.

Criterion related validity is based on the assumption that in order to assess questionnaire items, it is important to measure the extent to which it corresponds to another measure or gold standard (Rubin & Babbie, 2009). To asses a questionnaire one must select an external criterion (for example another questionnaire) which measures the same variable (De Vellis, 2012; Rubin & Babbie, 2009). There are two subtypes of this type of validity namely predictive validity and concurrent validity. Predictive validity refers to the ability of a questionnaire to predict a criterion occurring in the future (Rubin & Babbie, 2009). Concurrent validity, which is more applicable to the study at hand, refers to the degree to which a questionnaire corresponds to an external criterion (De Vellis, 2012; Rubin & Babbie, 2009). It is thus important to include an additional established questionnaire in the research design with a proved validity, so that it can be compared with the questionnaire under development (Rattray & Jones, 2007). As discussed previously, this study administered the M-CHAT along with the ASDSQ. The scores of the M-CHAT was compared with the scores of the ASDSQ. The findings of this study indicated that 87.3% of the children of the participants who were previously diagnosed with ASD were identified as at risk by the M-CHAT and scored significantly higher on the ASDSQ than the control group. Inversely, none of the children of the participants in the control group were identified as at risk for an ASD diagnosis by the M-CHAT and they also scored significantly lower on the ASDSQ than the participants in the experimental group. It can therefore be deducted that the ASDSQ developed in this study has high criterion related validity, with a specific focus on concurrent validity.

4.8.1.3. Construct validity.

In short, construct validity is concerned with the degree to which the questionnaire 'behaves' as expected, based on the theoretical relationship of the latent variable to other variables (De Vellis, 2012; Larson et al., 2015). One method of establishing construct validity is through factor analysis. However, the sample used in this study was too small to conduct a proper factor analysis with. De Winter, Dodou, and Wieringa (2009) stated that even to do an exploratory factor analysis, an absolute minimum sample of 50 (N=50) is required. Factor analysis in general is intended for large sample sizes. Overall, researchers are discouraged from using factor analysis or even exploratory factor analysis on samples that are too small as it does not conform to the norms related to factor analysis.

Even though it is possible to conduct a factor analysis on such a small sample, it is the opinion of the researcher that the results would have been skewed and of low quality. It is therefore recommended that in future studies on larger pilot samples, or larger scale validation samples should focus on establishing the construct validity of the ASDSQ, as it will yield better quality results.

4.8.2. Reliability.

The study at hand conducted no reliability calculations due to the small sample size. However, this section will give a brief overview of the four main types of reliability in questionnaire development as well as provide suggestions of which types of reliability should be included in further studies on this ASD questionnaire.

Reliability refers to the stability, internal consistency, and repeatability of a questionnaire (Rattray & Jones, 2007). There are four main types of reliability that should be taken into consideration in questionnaire development, test retest reliability, inter rater reliability, internal consistency, and split half reliability (De Vellis, 2012; Kimberlin & Winterstein, 2008; Rattray & Jones, 2007; Rosenfeld, Penrod, & Rosenfeld, 2011). Test retest reliability is estimated through administering the questionnaire on the same sample on two occasions. It is important to note that no treatment or other changes should be present during the two test administration occasions (De Vellis, 2012; Rosenfeld et al., 2011). The ASDSQ in the current study was only administered once; therefore test retest reliability cannot be calculated. However, future research on the ASDSQ should consider including test retest reliability into the research methodology.

Inter rater reliability refers to an agreement in the scores obtained amongst interviewers or raters. Researchers should note that inter rater reliability is not a property of a scale, but of the research team and the study at hand (Rosenfeld et al., 2011). Furthermore, this type of reliability is normally not estimated for self report measures. In this study the researcher was the only one administering the questionnaires, this in combination with the small sample is the reason why the inter rater reliability was not calculated for the study. The ASDSQ, once validated, is intended to be a self report measure and therefore future studies should not calculate inter rater reliability scores, unless the research design lends itself to it (for example with the use of interviewers or other ASD measures).

Internal consistency investigates whether questionnaire items measure the same domain (De Vellis, 2012). This is usually done by calculating the Cronbach alpha. The ASDSQ is however a dichotomous scale and Cronbach's alpha is used for scales with multiple likert scale questions (De Vellis, 2012; Kimberlin & Winterstein, 2008). Therefore, future studies should consider alternatively making use of Pearson's correlation coefficient or the Spearman Brown formula (Eisinga, Grotenhuis, & Pelzer, 2012). It is important that researchers who intend to further investigate the ASDSQ consider the type of reliability calculation they wish to use carefully in order to ensure that they use the correct reliability calculations for the internal consistency of the scale.

Split half reliability entails splitting the scale in half (various ways exist to do this such as a first half, last half split or odd even split) and comparing the scores of the two halves with one another (De Vellis, 2012). Once again the sample for the current study was too small to conduct a split half reliability analysis, but the researcher highly recommends future studies to include this in their analysis via the Spearman Brown formula (De Vellis, 2012).

Studies wishing to further investigate the ASDSQ through further pilot testing or validation should consider including test retest reliability as well as split half reliability in the research design and analysis.

4.9. Ethical considerations

The study made use of the ethical guidelines designed for psychological research on human subjects (Health and Professions Council of South Africa, 2008). Ethical clearance for this study was obtained from the ethics board at the University of Pretoria after which the researcher approached various schools and institutions working with children with ASD in Pretoria. The parents or guardians were contacted by the school by sending out a letter to find out whether they would be willing to partake in the study. The researcher personally contacted professionals working in the field of ASD to find out whether they will be willing to participate in the study. Each participant (for phase one, two, and three of the research) were asked to sign an informed consent form and the voluntary nature of the study was emphasised (Babbie, 2016). Participants were informed of the fact that they may withdraw from the study should they no longer want to be a part of it. Participants were furthermore assured that not participating in the study or withdrawing from the study will not have any negative consequences for them or their children (Gravetter & Forzano, 2009).

The researcher informed the participants that the information they provide in the study as well as their identity and that of their child are confidential (Babbie, 2014; Gravetter & Forzano, 2009). Unfortunately, due to the fact that the researcher was present during the completion of the screening questionnaire, the study couldn’t offer anonymity to the participants. However, to increase confidentiality, a number was assigned to each participant during the data analysis phase which appeared on the screening questionnaire. This number was then used during data capturing and analysis. Furthermore, participants’ informed consent forms, completed questionnaires and interview schedules were sealed in an unmarked white envelope and put in a box with other participants unmarked envelopes. This ensured that the researcher could not trace back a completed questionnaire to a specific participant. This was also explained to participants when discussing confidentiality. Assent forms were not used for this study as the children were not involved during the data gathering phase. It was the parents or guardians who completed the screening questionnaire about their experiences of their child’s behaviour.

5. Findings

As explained in the methodology section, this study employed a multiphase mixed methods design. Therefore the study consisted of three consecutive phases. Phase one had a qualitative focus where an expert panel was asked to review the first version of the ASDSQ through semi structured interviews. Phase two was quantitative in nature and entailed the pilot testing of the second version of the ASDSQ on a control and experimental group along with the administration of the M-CHAT. Phase three was qualitative in nature where semi structured interviews were conducted with participants after the completion of the ASDSQ.

In this chapter, the researcher will discuss the findings of each phase individually. The researcher will firstly provide an overview of the total sample as well as the control and experimental groups. The findings of the thematic analysis for phase one will then be discussed. The focus will then turn to the quantitative findings of phase three where cross tabulations were used to identity questions that were removed from the ASDSQ. Findings will furthermore be presented on how the results from the M-CHAT compared to the results of the ASD screening questionnaire. Finally this chapter will discuss the findings from the thematic analysis in phase three of this research.

5.1. Sample

The total sample consisted of 16 participants (N = 16). For the total sample 75% (N = 12) were male, while 25% (N = 4) were female. A total of 37.5 (N = 6) of the participants were black while 62.5% (N = 10) of the participants were white. The minimum age for children of the participants in the total sample was 6, while the maximum age was 9, with a mean age of 7.5.

The control group consisted of 8 participants (N = 8). For the total sample 75% (N = 6) were male, while 25% (N = 2) were female. A total of 12.5 (N = 1) of the participants were black while 87.5% (N = 7) of the participants were white. The minimum age for the children of the participants in the total sample was 6, while the maximum age was 9, with a mean age of 6.88.

The experimental group consisted of 8 participants (N = 8). For the total sample 75% (N = 6) were male, while 25% (N = 2) were female. A total of 62.5 (N = 5) of the participants were black while 37.5% (N = 3) of the participants were white. The minimum age for the children of the participants in the total sample was 6, while the maximum age was 9, with a mean age of 8.13.

5.2. Phase one findings

Phase one refers to the expert panel review where short semi-structured interviews with two professionals working in the field of ASD were conducted. During the interviews, detailed notes were made by the researcher which can be seen in appendix E. All of the suggestions made by both professionals were incorporated into version two of the ASDSQ. During this phase of the research the wording of questions were changed and questions were combined. The following sections will provide an overview of each of the latter. Please refer to appendix F to view version two of the ASDSQ. All of the changes below were incorporated into version two of the ASDSQ, which were given to participants in phase two to fill out.

5.2.1. Changes in wording.

Changes in wording were mainly suggested to make the questions easier to read and understand. This section will provide an overview of the changes made to Section A and Section B of version one of the ASDSQ in table form.

5.2.1.1. Section A.

In section A of the ASDSQ (version one) the wording of six questions were changed. Table 8 will provide an overview of these changes.

Table 8: Thematic Analysis for Phase 1 Section A.

Change Nr	**Original wording**	**Adapted wording**	**Motivation for change**
1	Question 2: Says the same things over and over	Repeats him/herself (says the same things over and over)	Use the original question as an example rather than a question. Change wording of question
2	Question 7: Uses strange words I don't understand	What he/she says doesn't make sense	Changing this question might make it easier to understand
3	Question 9: Doesn't like **imaginative** play (pretend to care for dolls, talks to toys)	Doesn't like **pretend** play (pretend to care for dolls, talks to toys)	**Pretend play** will be easier to understand compared to **imaginative play**.
4	Question 10: Doesn't make sense when he/she talks	What he/she says doesn't make sense	This change would make the question easier to understand
5	Question 16: **Seldom** brings things to me when he/she wants to show me something	**Rarely** brings things to me when he/she wants to show me something	The word **seldom** was used too many times in section A, and suggested it should be changed to **rarely** in this question.
6	Question 19: Seldom starts conversations with other people	Doesn't like to start conversations with other people	The word seldom was used too many times in the section and therefore reworded the question.

5.2.1.2. Section B.

In section B of the ASDSQ (version one) the wording of six questions were changed. Table 9 will provide an overview of these changes.

Table 9: Thematic Analysis for Phase 1 Section B.

Change Nr	**Original wording**	**Adapted wording**	**Motivation for change**
1	Question 22: Has **unusual** movements that he/she does often	Has **strange** movements that he/she does often	Replace the word **unusual** with **strange** in order to simplify the question as a whole
2	Question 26: Puts toys in a specific **order** when playing	Puts toys in a specific **way** when playing	Changing the word **order** to **way** might make it easier to understand
3	Question 27: Doesn't like it when I move and change things around the house	Doesn't like it when someone move and change things in his environment (at house or school)	Instead of asking about one environment (home) ask about several.
4	Question 30: Likes to do the same things the whole time	Always likes to do the same things	Shorter question that is easier to understand
5	Question 34: Struggles to stop with a repetitive activity	Struggles to stop with an activity that he/she likes	**Repetitive** may be difficult to understand, simplify the question
6	Question 37: Smells and licks unusual objects often	"Smells and licks objects often"	It does not necessarily have to be an **unusual** object, it can be any object. Removing the word **unusual** furthermore simplifies the question

5.2.2. Combining questions.

Several questions in the ASDSQ were combined as participants were of the opinion that certain questions were repetitive in nature, or addressed the same underlying construct. An overview in table form of the questions that were combined from version one of the ASDSQ for Section A and Section B will be provided below.

5.2.2.1. Section A.

In section A seven questions were combined to form three questions. Table 10 provides an overview of the questions combined.

Table 10: Combining Questions for Phase 1 Section A.

Change Nr	**Question to be combined (1)**	**Question to be combined (2)**	**Question to be combined (3)**	**Final combined question**
1	Question 5: Doesn't look at people when he/she talks to them	Question 8: Rarely makes eye contact when I call him/her	n/a	Rarely makes eye contact with other people
2	Question 3: Often does things that are not socially appropriate	Question 6: Often says things that are blunt and seems rude	n/a	Often says things that are blunt and seems rude
3	Question 12: Doesn't engage in pretend play with other children (playing house, teacher)	Question 18: Doesn't want to play with others	Question 21: Dislikes playing games with other children	Doesn't want to play with others

5.2.2.2. Section B.

Similar to Section A, ten questions were combined into three questions in Section B. Table 11 provides an overview of the questions combined

Table 11: Combining Questions for Phase 1 Section B.

Change Nr	Question to be combined (1)	Question to be combined (2)	Question to be combined (3)	Question to be combined (4)	Final combined question
1	Question 39: Has strict routines that everyone should follow	Question 43: Gets upset when we do not do things the way he/she wants	Question 38: Wants to do things a certain way	Question 31: Struggles to go back and forth between different activities easily	Has strict routines that everyone should follow
2	Question 40: Is only interested in playing with one or two specific toys	Question 28: Can spend a lot of time playing with just one or two objects	Question 48: Can focus on one object for a long time	Question 44: Spends an abnormal amount of time playing with, or looking at one object	Is only interested in playing with one or two specific toys
3	Question 25: Makes unusual finger movements near his/her eyes	Question 45: Flaps his/her hands or fingers a lot	n/a	n/a	Strange movements with hands or fingers

5.3. Phase three: Pilot test

The findings for this phase will be presented in two sections. The first will explore questions that were removed from version two of the ASDSQ, while the second will explore how the scores of ASDSQ compares with the scores of the M-CHAT.

5.3.1. Removal of questions.

The raw data for each question in the ASDSQ were analysed by making use of cross tabulations in SPSS. For each question the scores of the experimental and control group were compared by making use of cross tabulations. As ASDSQ aims to identify learners with a possibility of an ASD diagnosis, it is important that none of the control group participants answered ‘yes’ to questions that the experimental group answered ‘yes’ to. Therefore, the cross tabulations assisted the researcher in identifying such questions and thus removing them from the final version of the questionnaire.

In order to determine which questions should be removed from the ASD screening questionnaire, the researcher made use of 2x2 cross tabulations in SPSS. The researcher did not include a chi square analysis for this section as only non-paradigmatic tests will be used for this analysis due to the small sample size for this study. With a sample this small, a chi square analysis will render inaccurate results. Furthermore, due to the exploratory nature of this study, the researcher is only interested in removing questions where the answers of the control and experimental groups overlap. The reasoning is that if the experimental group showed a tendency of answering ‘yes’ to a question (presence of ASD behaviour), the control group should, by default, have no ‘yes’ answers to the question. Therefore, when the control groups shows a tendency for answering ‘yes’ to a question, and a control group participant also answered ‘yes’ to a question (indicating a presence of ASD behaviour), the question will be removed from the final version (version three) of the questionnaire. Due to the nature of this reasoning, cross tabulations, without the use of a chi square analysis, will be sufficient as it will provide the researcher with the information required regarding the amount of answers of the control and experimental groups per ‘yes’ and ‘no’ category.

Due to the large amount of questions (38), only those questions that will have to be removed from version three of the questionnaire will be discussed below.

5.3.1.1. Section A: Question 16.

This question states: “Doesn’t like to start conversations with other people”. A total of 62.5% (N = 5) of the experimental group participants answered ‘yes’ to this question. For the control group 12.5% (N = 1) of participants answered ‘yes’ to this question. The total ‘yes’ answers for this question was 37.5% (N = 6) for the entire sample. Due to the presence of a ‘yes’ answer from the control group, this question will be removed from version three of this questionnaire.

Table 12: Cross Tabulation Question A16.

			A16		
			No	Yes	Total
Control / Experimental	Non-ASD	Count	7	1	8
		% within Control / Experimental	87.5%	12.5%	100.0%
		% within A16	70.0%	16.7%	50.0%
		% of Total	43.8%	6.3%	50.0%
	ASD	Count	3	5	8
		% within Control / Experimental	37.5%	62.5%	100.0%
		% within A16	30.0%	83.3%	50.0%
		% of Total	18.8%	31.3%	50.0%
Total		Count	10	6	16
		% within Control / Experimental	62.5%	37.5%	100.0%
		% within A16	100.0%	100.0%	100.0%
		% of Total	62.5%	37.5%	100.0%

5.3.1.2. Section B: Question 19.

This question states: “Finds it difficult to cope with changes in routine”. A total of 75% (N = 6) of the experimental group participants answered ‘yes’ to this question. For the control group 12.5% (N = 1) of participants answered ‘yes’ to this question. The total ‘yes’ answers for this question was 43.8% (N = 7) for the entire sample. Due to the presence of a ‘yes’ answer from the control group, this question will be removed from version three of this questionnaire.

Table 13: Cross Tabulation Question B19.

			B19		
			No	Yes	Total
Control / Experimental	Non-ASD	Count	7	1	8
		% within Control / Experimental	87.5%	12.5%	100.0%
		% within B19	77.8%	14.3%	50.0%
		% of Total	43.8%	6.3%	50.0%
	ASD	Count	2	6	8
		% within Control / Experimental	25.0%	75.0%	100.0%
		% within B19	22.2%	85.7%	50.0%
		% of Total	12.5%	37.5%	50.0%
Total		Count	9	7	16
		% within Control / Experimental	56.3%	43.8%	100.0%
		% within B19	100.0%	100.0%	100.0%
		% of Total	56.3%	43.8%	100.0%

5.3.1.3. Section B: Question 21.

This question **s**tates: “Puts toys in a specific way when playing”. A total of 75% (N = 6) of the experimental group participants answered ‘yes’ to this question. For the control group 25% (N = 2) of participants answered ‘yes’ to this question. The total ‘yes’ answers for this question was 50% (N = 8) for the entire sample. Due to the presence of two ‘yes’ answers from the control group, this question will be removed from version three of this questionnaire.

Table 14: Cross Tabulation Question B21.

			B21		
			No	Yes	Total
Control / Experimental	Non-ASD	Count	6	2	8
		% within Control / Experimental	75.0%	25.0%	100.0%
		% within B21	75.0%	25.0%	50.0%
		% of Total	37.5%	12.5%	50.0%
	ASD	Count	2	6	8
		% within Control / Experimental	25.0%	75.0%	100.0%
		% within B21	25.0%	75.0%	50.0%
		% of Total	12.5%	37.5%	50.0%
Total		Count	8	8	16
		% within Control / Experimental	50.0%	50.0%	100.0%
		% within B21	100.0%	100.0%	100.0%
		% of Total	50.0%	50.0%	100.0%

5.3.1.4. Section B: Question 22.

This question states: “Doesn’t like it when someone move and change things in his/her environment (at house or school)”. A total of 87.5% (N = 7) of the experimental group participants answered ‘yes’ to this question. For the control group 25% (N = 2) of participants answered ‘yes’ to this question. The total ‘yes’ answers for this question was 56.3% (N = 9) for the entire sample. Due to the presence of two ‘yes’ answers from the control group, this question will be removed from version three of this questionnaire.

Table 15: Cross Tabulation Question B22.

			B22		
			No	Yes	Total
Control / Experimental	Non-ASD	Count	6	2	8
		% within Control / Experimental	75.0%	25.0%	100.0%
		% within B22	85.7%	22.2%	50.0%
		% of Total	37.5%	12.5%	50.0%
	ASD	Count	1	7	8
		% within Control / Experimental	12.5%	87.5%	100.0%
		% within B22	14.3%	77.8%	50.0%
		% of Total	6.3%	43.8%	50.0%
Total		Count	7	9	16
		% within Control / Experimental	43.8%	56.3%	100.0%
		% within B22	100.0%	100.0%	100.0%
		% of Total	43.8%	56.3%	100.0%

5.3.1.5. Section B: Question 23.

This question states: “Can spend a lot of time playing with just one or two objects”. A total of 100% (N = 8) of the experimental group participants answered ‘yes’ to this question. For the control group 50% (N = 4) of participants answered ‘yes’ to this question. The total ‘yes’ answers for this question was 75% (N = 12) for the entire sample. Due to the presence of four ‘yes’ answers from the control group, this question will be removed from version three of this questionnaire.

Table 16: Cross Tabulation Question B23.

			B23		
			No	Yes	Total
Control / Experimental	Non-ASD	Count	4	4	8
		% within Control / Experimental	50.0%	50.0%	100.0%
		% within B23	100.0%	33.3%	50.0%
		% of Total	25.0%	25.0%	50.0%
	ASD	Count	0	8	8
		% within Control / Experimental	0.0%	100.0%	100.0%
		% within B23	0.0%	66.7%	50.0%
		% of Total	0.0%	50.0%	50.0%
Total		Count	4	12	16
		% within Control / Experimental	25.0%	75.0%	100.0%
		% within B23	100.0%	100.0%	100.0%
		% of Total	25.0%	75.0%	100.0%

***5.3.1.6. Section B: Question* 26.**

This question states: “Wants to play the same game over and over”. A total of 87.5% (N = 7) of the experimental group participants answered ‘yes’ to this question. For the control group 12.5% (N = 1) of participants answered ‘yes’ to this question. The total ‘yes’ answers for this question was 50% (N = 8) for the entire sample. Due to the presence of a ‘yes’ answer from the control group, this question will be removed from version three of this questionnaire.

Table 17: Cross Tabulation Question B26.

			B26		
			No	Yes	Total
Control / Experimental	Non-ASD	Count	7	1	8
		% within Control / Experimental	87.5%	12.5%	100.0%
		% within B26	87.5%	12.5%	50.0%
		% of Total	43.8%	6.3%	50.0%
	ASD	Count	1	7	8
		% within Control / Experimental	12.5%	87.5%	100.0%
		% within B26	12.5%	87.5%	50.0%
		% of Total	6.3%	43.8%	50.0%
Total		Count	8	8	16
		% within Control / Experimental	50.0%	50.0%	100.0%
		% within B26	100.0%	100.0%	100.0%
		% of Total	50.0%	50.0%	100.0%

5.3.1.7. Section B: Question 28.

This question states: “Struggles to stop with an activity that he/she likes”. A total of 87.5% (N = 7) of the experimental group participants answered ‘yes’ to this question. For the control group 12.5% (N = 1) of participants answered ‘yes’ to this question. The total ‘yes’ answers for this question was 50% (N = 8) for the entire sample. Due to the presence of a ‘yes’ answer from the control group, this question will be removed from version three of this questionnaire.

Table 18: Cross Tabulation Question B28.

			B28		
			No	Yes	Total
Control / Experimental	Non-ASD	Count	7	1	8
		% within Control / Experimental	87.5%	12.5%	100.0%
		% within B28	87.5%	12.5%	50.0%
		% of Total	43.8%	6.3%	50.0%
	ASD	Count	1	7	8
		% within Control / Experimental	12.5%	87.5%	100.0%
		% within B28	12.5%	87.5%	50.0%
		% of Total	6.3%	43.8%	50.0%
Total		Count	8	8	16
		% within Control / Experimental	50.0%	50.0%	100.0%
		% within B28	100.0%	100.0%	100.0%
		% of Total	50.0%	50.0%	100.0%

5.3.1.8. Section B: Question 29.

This question states: “Has specific rituals when he/she does certain things”. A total of 87.5% (N = 7) of the experimental group participants answered ‘yes’ to this question. For the control group 37.5% (N = 3) of participants answered ‘yes’ to this question. The total ‘yes’ answers for this question was 62.5% (N = 10) for the entire sample. Due to the presence of three ‘yes’ answers from the control group, this question will be removed from version three of this questionnaire.

Table 19: Cross Tabulation Question B29.

			B29		
			No	Yes	Total
Control / Experimental	Non-ASD	Count	5	3	8
		% within Control / Experimental	62.5%	37.5%	100.0%
		% within B29	83.3%	30.0%	50.0%
		% of Total	31.3%	18.8%	50.0%
	ASD	Count	1	7	8
		% within Control / Experimental	12.5%	87.5%	100.0%
		% within B29	16.7%	70.0%	50.0%
		% of Total	6.3%	43.8%	50.0%
Total		Count	6	10	16
		% within Control / Experimental	37.5%	62.5%	100.0%
		% within B29	100.0%	100.0%	100.0%
		% of Total	37.5%	62.5%	100.0%

5.3.1.9. Section B: Question 30.

This question states: “Gets upset when he/she doesn’t have his/her favourite object”. A total of 75% (N = 6) of the experimental group participants answered ‘yes’ to this question. For the control group 37.5% (N = 3) of participants answered ‘yes’ to this question. The total ‘yes’ answers for this question was 43.8% (N = 7) for the entire sample. Due to the presence of three ‘yes’ answers from the control group, this question will be removed from version three of this questionnaire.

Table 20: Cross Tabulation Question B30.

			B30		
			No	Yes	Total
Control / Experimental	Non-ASD	Count	7	1	8
		% within Control / Experimental	87.5%	12.5%	100.0%
		% within B30	77.8%	14.3%	50.0%
		% of Total	43.8%	6.3%	50.0%
	ASD	Count	2	6	8
		% within Control / Experimental	25.0%	75.0%	100.0%
		% within B30	22.2%	85.7%	50.0%
		% of Total	12.5%	37.5%	50.0%
Total		Count	9	7	16
		% within Control / Experimental	56.3%	43.8%	100.0%
		% within B30	100.0%	100.0%	100.0%
		% of Total	56.3%	43.8%	100.0%

5.3.1.10. Section B: Question 32.

This question states: “Has strict routines that everyone should follow”. A total of 62.5% (N = 5) of the experimental group participants answered ‘yes’ to this question. For the control group 12.5% (N = 1) of participants answered ‘yes’ to this question. The total ‘yes’ answers for this question was 37.5% (N = 6) for the entire sample. Due to the presence of a ‘yes’ answer from the control group, this question will be removed from version three of this questionnaire.

Table 21: Cross Tabulation Question B32.

			B32		
			No	Yes	Total
Control / Experimental	Non-ASD	Count	7	1	8
		% within Control / Experimental	87.5%	12.5%	100.0%
		% within B32	70.0%	16.7%	50.0%
		% of Total	43.8%	6.3%	50.0%
	ASD	Count	3	5	8
		% within Control / Experimental	37.5%	62.5%	100.0%
		% within B32	30.0%	83.3%	50.0%
		% of Total	18.8%	31.3%	50.0%
Total		Count	10	6	16
		% within Control / Experimental	62.5%	37.5%	100.0%
		% within B32	100.0%	100.0%	100.0%
		% of Total	62.5%	37.5%	100.0%

It is evident from the findings above that through this analysis a total of 10 questions were removed from the third version of the ASD screening questionnaire. Only one question was removed from section A which represents impaired social interaction and communication. A total of nine questions were removed from section B which represents interests or behaviours that are repetitive and restrictive.

5.3.2. Comparison of M-CHAT and ASDSQ scores.

The lowest score on this ASD screening questionnaire for the experimental sample was 16 out of 38. This lowest score of 16 will, for the purposes of this study, be used as the cut off score. As the experimental sample contained learners with an ASD diagnosis, the researchers deemed it safe to use the lowest score (16) as a preliminary cut off score. Therefore, if a participant scored 16 or above for this questionnaire, they were classified as at risk for an ASD diagnosis. If a participant scored 15 or less on this questionnaire, they were classified as not at risk for an ASD diagnosis. For the purposes of statistical analysis, participants were divided into two groups namely having children ‘at risk for ASD’ and ‘not at risk for ASD’.

The same was done for the M-CHAT scores. If a participant, based on the M-CHAT results, had to be referred for follow up interviews (to further explore the possibility of an ASD diagnosis in the child) they were classified as ‘at risk for ASD’ in this study. If a participants M-CHAT scores did not require a follow up interview, they were classified as ‘not at risk for ASD’.

Due to the exploratory nature of this study, only descriptive statistics were used. For this analysis the researcher again made use of cross tabulations. The results for the cross tabulations indicate that for the control group the M-CHAT identified no participants as having children ‘at risk for an ASD’ diagnosis. The same applied for the ASDSQ in this study. For both the M-CHAT and the ASDSQ 100% (N = 8) of the control group were identified as having children ‘not at risk for an ASD’ diagnosis. The ASD screening questionnaire under investigation identified 100% (N = 8) of the experimental group as having children ‘at risk for an ASD’ diagnosis. However, one participant (12.5%) of the experimental group was identified as having a child ‘not at risk for an ASD’ diagnosis though the M-CHAT. The M-CHAT did further identify 87.3% (N = 7) of the experimental group as having children ‘at risk for ASD’.

Table 22: Cross Tabulation M-CHAT.

			Referred MCHAT		
			Not at risk for ASD	At risk for ASD	Total
Control / Experimental	Control	Count	8	0	8
		% within Control / Experimental	100.0%	0.0%	100.0%
		% within Referred MCHAT	88.9%	0.0%	50.0%
		% of Total	50.0%	0.0%	50.0%
	Experimental	Count	1	7	8
		% within Control / Experimental	12.5%	87.5%	100.0%
		% within Referred MCHAT	11.1%	100.0%	50.0%
		% of Total	6.3%	43.8%	50.0%
Total		Count	9	7	16
		% within Control / Experimental	56.3%	43.8%	100.0%
		% within Referred MCHAT	100.0%	100.0%	100.0%
		% of Total	56.3%	43.8%	100.0%

			ASD Screening Questionnaire		
			Not at risk for ASD	At risk for ASD	Total
Control / Experimental	Control	Count	8	0	8
		% within Control / Experimental	100.0%	0.0%	100.0%
		% within ASD Screening Questionnaire	100.0%	0.0%	50.0%
		% of Total	50.0%	0.0%	50.0%
	Experimental	Count	0	8	8
		% within Control / Experimental	0.0%	100.0%	100.0%
		% ASD Screening Questionnaire	0.0%	100.0%	50.0%
		% of Total	0.0%	50.0%	50.0%
Total		Count	8	8	16
		% within Control / Experimental	50.0%	50.0%	100.0%
		% ASD Screening Questionnaire	100.0%	100.0%	100.0%
		% of Total	50.0%	50.0%	100.0%

Table 23: Cross Tabulation ASDSQ.

5.4. Phase three: Thematic analysis

As mentioned in the methodology section, phase three refers to the short semi structured interviews held with participants after the completion of the questionnaire (version two). As the interviews were less than five minutes in duration, they were not recorded, but detailed notes were made by the researcher on the interview schedule. Please refer to appendix G for an electronic copy of the answers provided by participants for all three questions in the interview guide. Due to the limited amount of answers provided, as well as the fact that all three questions aimed at gathering information on how the screening device could be improved, all three questions were analysed simultaneously. During the thematic analysis of this phase, three main themes emerged. The first and most prominent theme was that no changes to the screening device are recommended by participants. The second theme that emerged was related to several questions with negative wording (questions starting with the word ‘doesn’t’).

Thirdly there were questions that were difficult to understand and confusing to the participants. Table 24 below provides an overview of the outcomes of the thematic analysis for phase three of this study.

Table 24: Thematic Analysis of Theme

Theme	Criteria for inclusion	Selected data from interviews
1) No changes required	All references pertaining to: a positive experience of the screening device no changes required screening device clear screening device sufficient	- “All questions are clear” - “Nothing” - “Simple words used” - “This instrument is sufficient” - “Instrument detailed enough for task at hand” - “Covers most of the general and basic stuff” - “No”
2) Negatively worded questions	All references pertaining to: questions starting with “doesn’t” negative worded questions with no clear outcome	- “Part A Q7. Answer ‘no’ – means likes pretend play?... Part A Q9. Answer ‘no’ – means does understand. Confused by what yes or no will mean” - “Change wording on some questions. Can be confusing to answer ‘yes’ or ‘no’ to questions like ‘doesn’t like to’. If answer ‘yes’ does it mean he does or doesn’t like to do it?. Rather just have ‘likes pretend play’.” - “Question 7 is unclear”
3) Confusing questions	All references pertaining to: Confusing or unclear questions (NOT starting with “doesn’t”)	- “Part A Q8. Answer no – means make sense” - “Part A question 11 and 13 is confusing. Is it ‘does she not bring it as much’ or ‘yes she brings it often’”

As the responses from the first theme indicated that the ASDSQ required no changes, the researcher is of the opinion that this theme cannot be discussed any further as no changes can be made to version two of the ASDSQ. However, the researcher will now turn to a detailed discussion on how questions were changed in theme two and three.

5.4.1. Changes resulting from theme two.

Theme two placed emphasis on questions starting with the word ‘doesn’t’. Participants felt confused by this terminology as they were unsure what exactly their answers would indicate. One participant described the situation:

“Change wording on some questions. Can be confusing to answer ‘yes’ or ‘no’ to questions like ‘doesn’t like to....’. If answer ‘yes’ does it mean he does or doesn’t like to do it? Rather just have ‘likes pretend play’.”

The initial idea for the ASDSQ was to ensure that every ‘yes’ answer could be correlated with the presence of ASD behaviour. Therefore some of the questions were worded in order to obtain a ‘yes’ answer. Unfortunately this proved to create confusion for participants. The researcher therefore decided it would be best to change all of the questions in version two of the ASDSQ starting with the word ‘doesn’t’. The implication here is that the scoring of the ASDSQ will have to change. Instead of merely adding the amount of ‘yes’ responses, the ASDSQ should provide specific instructions for scoring the responses, especially in the cases where a ‘no’ response is correlated with the presence of ASD behaviour.

Table 25 provides an overview of the nine questions that were changed due to the findings of theme two.

Table 25: Changes in Wording of Theme 2

Change Nr	Original wording	Adapted wording	Response to be scored (Y/N)
1	Question 4: Doesn't listen when others talks to him/her	Listens when others talks to him/her	No
2	Question 7: Doesn't like pretend play (pretend to care for dolls, talks to toys)	Likes pretend play	No
3	Question 9: Doesn't understand basic gestures such as waving and thumbs up	Understands basic gestures such as waving and thumbs up	No
4	Question 15: Doesn't want to play with others	Likes to play with others	No
5	Question 16: Doesn't like to start conversations with other people	Likes to start conversations with other people	No
6	Question 22: Doesn't like it when someone move and change things in his environment (at house or school)	Gets upset when someone moves and changes things in his/her environment (at house or school)	Yes
7	Question 27: Doesn't respond to pain (when he/she falls, bumps his/her head)	Responds to pain (when he/she falls, bumps head)	No
8	Question 33: Doesn't like it when someone touches or holds him/her	Gets upset when someone touches or holds him/her	Yes
9	Question 37: Does not play with toys the way he/she should	Plays with toys in a normal way	No

5.4.2. Changes resulting from theme three.

Several other questions were marked as confusing or unclear by participants in this theme. Therefore the researcher deemed it important to change the wording of the items. The table below will provide the reader with an overview of the changes made. A total of three questions were changed to according to the findings of theme three.

Table 26: Changes in Wording of Theme three.

Change Nr	Original wording	Adapted wording	Response to be scored (Y/N)
1	Question 8: What he/she says doesn't make sense	Makes sense when he/she talks	No
2	Question 11: Seldom points at something he/she wants	Points at something when he/she wants it	No
3	Question 13: Rarely brings things to me when he/she wants to show me something	Brings things to me when he/she wants to show me something	No

A total of 12 changes were made to this version of the ASDSQ due to the emerging issues in theme two and three. Please refer to appendix H for the complete version three of the ASDSQ.

5.5. Conclusion

This study made use of a multiphase mixed methods research design and consisted of three data collection and analysis phases. The first phase was qualitative in nature where an expert panel was asked to review the first version of the ASDSQ through semi structured interviews. The second phase was quantitative in nature where the second version of the ASDSQ was piloted on a control and experimental group along with the administration of the M-CHAT. The third phase was qualitative where semi structured interviews were conducted with participants after the completion of the ASDSQ. The findings from phase two and three were implemented and resulted in version three of this questionnaire which can be seen as the final version for this study.

In phase one the wording of six questions in section A of the ASDSQ were changed, while the wording of another six questions were changed in section B. Furthermore a total of seven questions were combined in section A, while a total of ten questions were combined in section B. Thus the ASDSQ moved from a total of 49 questions in version one to a total of 38 questions in version two.

In phase two the researcher made use of cross tabulations to remove the following 10 questions from the questionnaire: A16, B19, B21, B22, B23, B26, B28, B30 and B32. After the completion of this phase, the ASDSQ moved from a total of 38 questions in version two, to a total of 28 question is version three. The researcher furthermore compared the results of the M-CHAT to the results of the ASDSQ for both the control and experimental groups. Findings indicated that the ASD screening questionnaire identified all of the participants in the experimental group as having children 'at risk for an ASD' diagnosis, while the M-CHAT identified 87.3% of the experimental group as having children 'at risk for an ASD' diagnosis. Furthermore both the ASD screening questionnaire and the M-CHAT identified all of the control group participants as having children 'not at risk for an ASD' diagnosis.

In phase three of this study the researcher changed the negative wording of nine items in version two of the ASD screening questionnaire. These changes furthermore entailed that the researcher had to change the scoring of the ASDSQ. There will now be seven questions in version three of the questionnaire that has reverse scoring. Thus, for seven questions the answer 'no' will indicate the presence of ASD behaviour, while the remainder of the questions will require a 'yes' answer to indicate the presence of ASD behaviour. Finally the wording of three questions was changed as findings indicated that participants found the original wording confusing.

The findings of phase two and three were incorporated into the third version of the ASD screening questionnaire which will be the final version for this study. The findings of this study will be discussed in more detail in the next chapter.

6. Discussion and Conclusion

The discussion chapter will follow the format in which the results were presented. The findings will therefore be discussed for phase one, two and three of this study. After this the researcher will discuss the overall findings of the study. Finally, the researcher will discuss the limitations of this study and make recommendations for future studies on the ASDSQ.

The ASDSQ developed in this study was guided by six steps of questionnaire development as set out by De Vellis (2012). The first three steps - determine clearly what you want to measure, generating items, and deciding on response formats – were discussed in the methodology chapter. During the discussion of the findings, the researcher will indicate how the other three steps provided by De Vellis (2012) were incorporated into the study.

6.1. Phase one: Expert panel review

The fourth step of questionnaire development linked with the first and second objectives of this study which was to (a) evaluate the first draft of the ASDSQ by making use of an expert panel and based on the results (b) created a second version of the questionnaire (De Vellis, 2012). Two main themes emerged from the semi structured interviews with expert panel members. The first was basic changes in the wording, which was anticipated by the researcher. The changes in wording were done with the aim to make the ASDSQ easier to understand and complete for future participants. This finding is important as the ASDSQ was developed with the aim of using it within the South African population. As noted in previous chapters, South Africa can overall be classified as a low SES country and there is a need for ASD screening instruments which will be easy to understand and administer (Bozalek, 2013; Honigfeld et al., 2011; Stephens, 2012). Changing words to improve clarity also makes the reading difficulty level of the questionnaire easier, which according to De Vellis (2012) in the item generation step, is a characteristic of good items and an overall questionnaire. This will ensure that the ASDSQ under development will be applicable to the population it was designed for.

The second theme that emerged was related to combining similar questions. Each of the seven latent variables were initially measured through seven questions. Questions that required additional explanations to be clear or were seen as excessively repetitive were combined. The researcher was cautious during this process, as advised by De Vellis (2012), during the second step of generating items. De Vellis (2012) explained that redundancy can have both a positive and negative impact on a questionnaire. On the one side making use of redundant items will enable the superior items to make it through to the final version of the questionnaire. On the other hand, redundancy may cause items to become superficial in nature, resulting in respondents reacting similar to all questions which creates a false sense of the reliability of a questionnaire. The findings were in consensus with the previous statements, as the items with too much redundancy were combined, while each latent variable was left with at least three items in the second version of the questionnaire. Combining items furthermore ensured that the ASDSQ was shorter and therefore easier to administer to the South African sample.

The changing of words as well as combination of questions did result in the fact that a few questions were shorter than initially written. Shorter questions will be advantageous to this questionnaire as they are clearer, easier to comprehend, and remember as compared to longer questions (Alwin & Beattie, 2016; De Vellis, 2012).

The incorporation of the findings for phase one related to the fourth aim of this study which was to identify ambiguous and difficult to understand items as well as suggestions for additional items and improvements for current items. Finally, the use of an expert panel increased the overall content validity of the ASDSQ.

6.2. Phase two: Pilot test

The third objective of this study, as well as the final step of questionnaire development as discussed in this study, relates to pilot testing the second version of the questionnaire (De Vellis, 2012). The pilot study is exploratory in nature and it enables the researcher to see whether the questionnaire will work as intended (Leon et al., 2011). The second version of the ASDSQ was administered on a control and experimental group, alongside the M-CHAT, in order to see whether it was able to successfully identify the presence of ASD behaviour. By making use of cross tabulations the researcher found that the ASDSQ successfully differentiated between the control and experimental groups. For the purpose of analysis for the study at hand, the researcher used the lowest score obtained in the experimental sample (16) as a preliminary cut off score. This was done so that the scores of the M-CHAT could be compared to the scores of the ASDSQ. Findings indicated that both the M-CHAT and the ASDSQ were able to differentiate between the control and experimental group. This finding relates to the second last objective of this study which was to identify whether the ASDSQ would be able to successfully predict the presence of ASD behaviour.

However, there was one respondent in the experimental group that was not identified as having a child ‘at risk for an ASD’ diagnosis by the M-CHAT, but that was identified as having a child ‘at risk for an ASD’ diagnosis by the ASDSQ. As discussed in the literature review, the M-CHAT was developed to be administered for children aged two to four, while the sample for the pilot test was aged between six and nine (Stephens, 2012). This could possibly be the reason why this participant was not identified by the M-CHAT. Comparing the results of the ASDSQ to an external criterion such as the M-CHAT improved the overall criterion related validity, with a specific focus on concurrent validity of this study.

Initially the researcher wanted to do an item analysis in order to identify questions that had to be removed from the second version of the questionnaire, but due to the sample size and the exploratory nature of this study, the researcher decided to conduct cross tabulations. This analysis allowed the researcher to gain further insight into questions that could possibly be removed from the study. After the analysis, the researcher removed a total of 10 items from the second version of the ASDSQ. Removing unnecessary items was essential to this study as the aim was to develop a screening questionnaire that would be easy to administer and this included ensuring that the questionnaire was not too long. In the second step of questionnaire development De Vellis (2012) describes the process of initially including more items in the initial version of the questionnaire. This allows the researcher to, through the questionnaire development process, remove items that do not successfully measure the latent variable or that are removed due to other reasons.

6.3. Phase three: Semi structured interviews

Phase three of the research, as with phase one, aimed to address the fourth objective of the study which was to identify ambiguous and difficult to understand items as well as suggestions for additional items and improvements for current items. After the pilot test semi structured interviews were conducted with participants in order to find out which questions could be improved. According to Czaja et al. (2014) and Leon et al. (2011) it has become common practice to ask respondents open ended questions after the completion of the questionnaire. It enables the researcher to gain an improved understanding of the types of problems respondents identified during the completion of the questionnaire. Based on these findings the researcher was able to make changes and improve the overall questionnaire.

The researcher conducted a thematic analysis during the third phase of the research and three themes emerged. The first was that no changes were required to the ASDSQ. The second prominent and potentially problematic finding was that respondents found the negatively worded questions in the ASDSQ difficult to understand. Initially the researcher decided to include both positively and negatively worded items in the questionnaire for two reasons. First as an attempt to reduce the presence of agreement, affirmation and acquiescence bias in the study. Secondly to ensure that all of the ‘yes’ responses in the questionnaire represented the presence of ASD behaviour, while all of the ‘no’ responses represented the absence of ASD related behaviour. However, the findings indicated that making use of a combination of positively and negatively worded items were not beneficial during the administration of the ASDSQ. This is in relation to findings from De Vellis (2012) and Salazar (2015) who reports that a combination of positively and negatively worded items could create confusion amongst participants. Respondents might have struggled to establish the difference between the responses and what each answer implies. This change will furthermore assist with safeguarding against serial responders (Sauro & Lewis, 2011).

Therefore the researcher decided to reword all negatively worded items in the second version of the ASDSQ. This however resulted in an unintended change in the scoring of the ASDSQ. In order to ensure that all of the questions were positively worded in the third version of the ASDSQ, seven items had to be reverse scored (question: 4, 7, 9, 15, 16, 27, and 37). This means that for these seven items, a ‘no’ response would indicate the presence of ASD behaviour, while a ‘yes’ response will indicate the absence of ASD behaviour. The third version of the ASDSQ and the scoring instructions can be found in appendix I. Due to the impact of this theme during phase three, the researcher found it interesting that the problem of negatively worded items did not surface during the expert panel reviews as well. This could possibly be due to the inclusion of only two reviewers in the expert panel.

Rewording items in order to exclude all negatively worded items could have future benefits for the ASDSQ with regards to increased internal reliability as well as increasing the likelihood of interpretation in the case of cross cultural use (Salazar, 2015; Sauro & Lewis, 2011). The latter will be especially beneficial to the ASDSQ due to the fact that its target population (South Africa) is culturally diverse and it would increase the possibility and ease of later translating the validated version of the ASDSQ into several of the official languages spoken in South Africa.

The third finding that emerged from the thematic analysis in phase three was that respondents found certain questions, which were negatively worded, confusing. The wording of three questions was subsequently changed.

The changes from the second and third phase of this research were incorporated into the third version of the ASDSQ, therefore meeting the final objective of creating an improved third version of the ASDSQ based on the findings of these research phases.

6.4. Overall findings

The researcher succeeded in meeting all of the objectives set out at the beginning of this study. The ASDSQ was revised by an expert panel and improvements were made to the second version of the questionnaire based on the findings. The second version of the ASDSQ was administered to a pilot sample, along with the M-CHAT and semi structured interviews.

When the findings of the ASDSQ were compared to the M-CHAT and based on the composition of the control and experimental groups, it became evident that the ASDSQ was able to successfully predict the presence of an ASD diagnosis. Finally, the findings of the expert panel, in combination with the findings from the semi structured interviews in phase three allowed the researcher to identify ambiguous and difficult to understand items as well as improve the current items for both version two and three of the ASDSQ. One surprising outcome in the findings was that no additional items were suggested for inclusion into the questionnaire. Neither the expert panel, nor the semi structured interviews with participants in phase three, resulted in new questions that could be included in any of the versions of the ASDSQ.

As stated in the literature review, South Africa is in dire need of an ASD screening questionnaire which can be designed, validated, and normed for the South African population. As noted in the literature review, the M-CHAT is available for use in South Africa, but is limited to children aged 2 to 4 (Bozalek, 2013; Stephens, 2012). Due to the realities of later diagnosis in South Africa, a screening instrument is needed that can be used on school aged learners to identify the possibility of an ASD diagnosis (Malcolm-Smith et al., 2013; Stephens, 2012). This screening questionnaire should furthermore be easy to administer and cost effective. This study provided the first crucial steps of developing the ASDSQ which could address the above mentioned gaps. In questionnaire development, it is pivotal to ensure that questionnaires goes through the correct developmental procedures in order to increase the future success and usability of a questionnaire (De Vellis, 2012). This study ensured that the ASDSQ followed such steps, up until the pilot testing phase, as set out by De Vellis (2012).

With further development, the ASDSQ could become an established level one screening questionnaire for ASD in South Africa. Due to the fact that it will be easy to administer (self report) and cost effective, it can be used to identify learners who are at risk for an ASD diagnosis. This could possibly decrease the age of diagnosis, as well as the time it takes to obtain an ASD diagnosis within the South African context. Earlier diagnosis and intervention will in turn improve the overall functioning of those diagnosed with ASD in South Africa (Chakrabarti et al., 2005; Matson, Rieske, & Tureck, 2011; Moolman-Smook et al., 2008; Stephens, 2012). As mentioned earlier, the removal of the negative worded items could furthermore open up possibilities of translating a future version of the ASDSQ into various South African languages, making it more accessible

6.5. Limitations and recommendations

This study had several limitations. The first, and most prominent, is that the ASDSQ is not validated or normed for use in South Africa as of yet. However, a solid foundation has been provided in this dissertation on which future research can build. Future research can use the third version of the ASDSQ and administer it to a sample large enough for validation. It is important to remember that it would be best to combine such a study with a gold standard ASD diagnostic measure such as the ADOS. Therefore, if a participant is identified as having a child being 'at risk of an ASD' diagnosis by the ASDSQ, then the ADOS, or other gold standard measure, should be administered in order to validate the ASD diagnosis. Another related limitation of this study is that no cut off score was established for the ASDSQ. For the purpose of analysis, the lowest score of the experimental group was used (16) as a cut off score. This should however not be seen as the official cut off score for the ASDSQ. Rather future research aimed at validating and norming the ASDSQ should also aim to establish a cut off score. Future studies should furthermore aim to establish the sensitivity and specificity of the ASDSQ.

A second pivotal limitation of this study is that no reliability analysis was done due to the small sample size. Future studies investigating the standardisation and validation of the ASDSQ should include measures to ensure reliability such as test retest reliability, split half reliability, and internal consistency into the research design. As stated in the methodology chapter, the internal consistency of a questionnaire is usually established by calculating the Cronbach alpha. However, the ASDSQ is a dichotomous questionnaire and the use of Cronbach's alpha is not advised (De Vellis, 2012; Kimberlin & Winterstein, 2008). Future studies should thus consider making use of the Spearman Brown formula or Pearson's correlation coefficient to establish the internal consistency of the ASDSQ (Eisinga et al., 2012). However, the researcher would advise future researchers to do various literature searches in order to establish which reliability calculation would be the best option to calculate the internal consistency of the ASDSQ.

A third limitation is that this study could not establish the construct validity of the ASDSQ due to small sample size. The researcher recommends that future research aimed at standardising, validating and norming the ASDSQ should conduct a factor analysis in order to determine the construct validity of the questionnaire.

Fourthly, future studies should look into the possibility of including more female learners in their sample. The current study only managed to include a total of four (N = 4) female learners in the total sample (N = 16). Even though males are 4.5 times more likely to be diagnosed with ASD than females (Centre for Disease Control and Prevention, 2014), the majority of research on ASD has been conducted with predominantly male samples (Bell, Foster, & Mash 2005). An increase of female learners in future research samples could provide researchers with more insight regarding the differences in the presentation of ASD symptoms between males and females. It could furthermore enable the researcher to improve screening and diagnostic measures for ASD so that both males and females can equally benefit from them (Horovitz et al., 2012; Rivet & Matson, 2011).

The discussion chapter provided the reader with an overview of the research findings of this study and how it address the overall objectives of the study. The researcher proceeded to discuss the findings and implications for each phase of this study followed by an explanation of the limitations and recommendations for future studies on the ASDSQ.

6.6. Conclusion

This study focussed on developing and pilot testing the ASDSQ. The development of the ASDSQ was based on six steps of questionnaire development proposed by De Vellis (2012). The study followed a multiphase mixed methods design that consisted out of three phases. During phase one the first version of the ASDSQ was reviewed by an expert panel, and subsequent changes was made to the questionnaire resulting in version two of the ASDSQ. The ASDSQ version two was administered, along with the M-CHAT, to a pilot sample consisting of learners diagnosed with ASD and learners without an ASD diagnosis. In accordance to the results, changes were made to the ASDSQ version 2.The final product of this study, the ASDSQ version three, is now ready for further research.

Hopefully, with further development, the ASDSQ will be able to address the issue of under diagnosis and late diagnosis of ASD in South Africa, especially with regards to learners aged 6 to 9. The ASDSQ is low in cost, easy to administer, and simple to score. Therefore it will be suitable for use in the South African context where resources are limited and strained. As the ASDSQ is completed by the parents or guardians of the learner, it offers the advantage of being usable in various contexts such as schools, clinics, and hospitals. A wide variety of professionals will also be able to use the ASDSQ including – but not limited to - counsellors, school psychologists, social workers, occupational therapists, speech and language therapists, clinical psychologists, doctors, educational psychologists, and nurses.

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Appendix A: ASDSQ Version 1

Part A

My child			
1.	Dislikes crowds of people (like supermarkets, restaurants)	Yes	No
2.	Says the same things over and over	Yes	No
3.	Often does things that are not socially appropriate	Yes	No
4.	Doesn’t listen when others talk to him/her	Yes	No
5.	Doesn’t look at people when he/she talks to them	Yes	No
6.	Often says things that are blunt and seems rude	Yes	No
7.	Uses strange words I don’t understand	Yes	No
8.	Avoids eye contact when I call him/her	Yes	No
9.	Doesn’t like imaginative play (pretend to care for dolls, talks to toys)	Yes	No
10.	Doesn’t make sense when he/she talks	Yes	No
11.	Doesn’t understand basic gestures such as waving and thumbs up	Yes	No
12.	Doesn’t engage in pretend play with other children (playing house, teacher)	Yes	No
13.	Rarely calls my name when he/she wants my attention	Yes	No
14.	Seldom points at something he/she wants	Yes	No
15.	Struggles to make friends	Yes	No
16.	Seldom brings things to me when he/she wants to show me something	Yes	No

17.	Lacks facial expressions	Yes	No
18.	Doesn’t want to play with others	Yes	No
19.	Seldom starts conversations with other people	Yes	No
20.	Has abnormal body language	Yes	No
21.	Dislikes playing games with other children	Yes	No

Part B

My child			
22.	Has unusual movements that he/she does often	Yes	No
23.	Finds it difficult to cope with changes in routine	Yes	No
24.	Is obsessed with certain objects (for example toys, animals, household items)	Yes	No
25.	Makes unusual finger movements near his/her eyes	Yes	No
26.	Puts toys in a specific order when playing	Yes	No
27.	Doesn’t like it when I move and change things around the house	Yes	No
28.	Can spend a lot of time playing with just one or two objects	Yes	No
29.	Is very sensitive to noise	Yes	No
30.	Likes to do the same things the whole time	Yes	No
31.	Struggles to go back and forth between different activities easily	Yes	No
32.	Wants to play the same game over and over	Yes	No
33.	Doesn’t respond to pain (when he/she falls, bumps his/her head)	Yes	No
34.	Struggles to stop with a repetitive activity	Yes	No

35.	Has specific rituals when he/she does certain things	Yes	No
36.	Gets upset when he/she doesn't have his/her favourite object	Yes	No
37.	Smells and licks unusual objects often	Yes	No
38.	Wants to do things a certain way	Yes	No
39.	Has strict routines that everyone should follow	Yes	No
40.	Is only interested in playing with one or two specific toys	Yes	No
41.	Doesn't like it when someone touches or holds him/her	Yes	No
42.	Plays with toys in the same way every time	Yes	No
43.	Gets upset when we do not do things they way he/she wants	Yes	No
44.	Spends an abnormal amount of time playing with, or looking at one object	Yes	No
45.	Flaps his/her hands or fingers a lot	Yes	No
46.	Repeats things he/she hears over and over	Yes	No
47.	Does not play with toys appropriately	Yes	No
48.	Can focus on one object for a long time	Yes	No
49.	Enjoys touching objects in a specific way	Yes	No

Appendix B: M-CHAT

Please fill out the following about how your child usually is. Please try to answer every question. If the behaviour is rare (e.g., you've seen it once or twice), please answer as if the child does not do it.

1. Does your child enjoy being swung, bounced on your knee, etc.?	Yes	No
2. Does your child take an interest in other children?	Yes	No
3. Does your child like climbing on things, such as up stairs?	Yes	No
4. Does your child enjoy playing peek-a-boo/hide-and-seek?	Yes	No
5. Does your child ever pretend, for example, to talk on the phone or take care of a doll or pretend other things?	Yes	No
6. Does your child ever use his/her index finger to point, to ask for something	Yes	No
7. Does your child ever use his/her index finger to point, to indicate interest in something?	Yes	No
8. Can your child play properly with small toys (e.g. cars or blocks) without just mouthing, fiddling, or dropping them?	Yes	No
9. Does your child ever bring objects over to you (parent) to show you something?	Yes	No
10. Does your child look you in the eye for more than a second or two?	Yes	No
11. Does your child ever seem oversensitive to noise? (e.g., plugging ears)	Yes	No
12. Does your child smile in response to your face or your smile?	Yes	No
13. Does your child imitate you? (e.g., you make a face-will your child imitate it?)	Yes	No
14. Does your child respond to his/her name when you call?	Yes	No

15. If you point at a toy across the room, does your child look at it?	Yes	No
16. Does your child walk?	Yes	No
17. Does your child look at things you are looking at?	Yes	No
18. Does your child make unusual finger movements near his/her face?	Yes	No
19. Does your child try to attract your attention to his/her own activity?	Yes	No
20. Have you ever wondered if your child is deaf?	Yes	No
21. Does your child understand what people say?	Yes	No
22. Does your child sometimes stare at nothing or wander with no purpose?	Yes	No
23. Does your child look at your face to check your reaction when faced with something unfamiliar?	Yes	No

Appendix C: Interview Guide Trained Professionals (Phase 1)

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Itsoseng Clinic

Department of Psychology

University of Pretoria

ASDSQ

Interview guide: Trained professionals working within the field of ASD

1. Are there any questions in the screening instrument that you feel are not clear or seems ambiguous? Please elaborate
2. Did you pick up any issues with regards to the wording of the questions? Please explain
3. Are there any questions that you think should be removed from the screening instrument? Please elaborate
4. In your opinion, are there questions that should be added to the screening instrument? Please explain
5. What else would you change to improve this screening device?

Appendix D: Interview Guide Parents and Guardians (Phase 3)

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Itsoseng Clinic

Department of Psychology

University of Pretoria

ASDSQ

Interview guide: Participants of pilot study

1. Where there any questions in this questionnaire that you did not understand or found unclear? Please elaborate
2. Did you notice any words which were unclear or confusing? Please explain
3. What do you think we can do to improve this screening instrument?

Appendix E: Phase 1 interview notes

Expert panellist one:

1. Question 2: Use the original question as an example
2. Question 3 and 6: Taps into same idea. Combine both ideas into "Often says things that are blunt and seems rude"
3. Question 5 and 8: Similar. Rather just use "Rarely makes eye contact with other people". It combines both ideas.
4. Question 7: Make question easier to understand by changing wording to "What he/she says doesn't make sense"
5. Question 9: 'Imaginative play' a possibly difficult term. Use another word
6. Question 10: Change wording to "What he/she says doesn't make sense" to make it easier to understand
7. Question 22: Replace 'unusual' with 'strange'. Will simplify whole question
8. Question 25 and 45: Instead of asking two questions just say "Strange movements with hands or finger".
9. Question 26: Change 'order' to 'way'. Will make question easier to understand
10. Question 27: This question asks about only one environment. Include school to make it about more than one environment. "Doesn't like it when someone move and change things in his environment (at house or school)"
11. Question 30: "Always likes to do the same things". Will make question shorter and easier to understand
12. Question 37: It can be any object, not just unusual
13. Question 43 and 38: Very similar. Look at possibly combining these

Expert panellist two:

1. Question 2: Change wording to repeats him/herself
2. Question 3: 'Socially inappropriate' is a difficult term. Use something else, or change question
3. Question 9: Use 'pretend play' instead of 'imaginary play'. I will be easier to understand
4. Question 12, 18 and 21: Too many difficult questions for this construct. Use "Doesn't want to play with others" to represent this construct
5. Question 16: The word 'seldom' is used too often in the questionnaire. Use 'rarely' in this question
6. Question 19: Again – 'seldom' used too often. Rather "Doesn't like to start conversations with other people"
7. Question 28, 40, 44 and 48: Same idea for all items. Some of them could be confusing, as 'normal' children can also have favourite objects or toys. Too many questions about this could confuse parents. Just use one question for this "Is only interested in playing with one or two specific toys"

8. Question 31, 38, 39 and 43: Again, too many difficult questions that could be confusing. Combine them to “Has strict routines that everyone should follow”. Will make it easier to read and understand
9. Question 34: The word ‘repetitive’ may be difficult to understand. Chang wording “Struggles to stop with an activity that he/she likes”. Will simplify the question
10. Question 37: Remove ‘unusual’. Will simplify question and make easier to understand

Appendix F: ASDSQ version 2

Biographic Information

1. What age is your child?						
2. Child's gender	Female	Male				
3. To which race group does your child belong to	Black	White	Coloured	Indian	Asian	Other
4. Have your child ever been diagnosed with Autism Spectrum Disorder	Yes	No				
5. If yes, what year was your child diagnosed						
6. Who diagnosed your child?						

Please turn over page

Part A

My Child:		
1. Dislikes crowds of people (like supermarkets, restaurants)	**Yes**	**No**
2. Repeats him/herself (says the same things over and over)	**Yes**	**No**
3. Often does things that others find offensive	**Yes**	**No**
4. Doesn’t listen when others talks to him/her	**Yes**	**No**
5. Rarely makes eye contact with other people	**Yes**	**No**
6. Often says things that are blunt and seems rude	**Yes**	**No**
7. Doesn’t like pretend play (pretend to care for dolls, talks to toys)	**Yes**	**No**
8. What he/she says doesn’t make sense	**Yes**	**No**
9. Doesn’t understand basic gestures such as waving and thumbs up	**Yes**	**No**
10. Rarely calls my name when he/she wants my attention	**Yes**	**No**
11. Seldom points at something he/she wants	**Yes**	**No**
12. Struggles to make friends	**Yes**	**No**
13. Rarely brings things to me when he/she wants to show me something	**Yes**	**No**
14. Lacks facial expressions	**Yes**	**No**
15. Doesn’t want to play with others	**Yes**	**No**
16. Doesn’t like to start conversations with other people	**Yes**	**No**

17. Has abnormal body language	**Yes**	**No**

Part A Total: _______________

Part B

My Child:		
18. Has strange movements that he/she does often	**Yes**	**No**
19. Finds it difficult to cope with changes in routine	**Yes**	**No**
20. Is obsessed with certain objects (for example toys, animals, household items)	**Yes**	**No**
21. Puts toys in a specific way when playing	**Yes**	**No**
22. Doesn’t like it when someone move and change things in his environment (at house or school)	**Yes**	**No**
23. Can spend a lot of time playing with just one or two objects	**Yes**	**No**
24. Is very sensitive to noise	**Yes**	**No**
25. Always likes to do the same things	**Yes**	**No**
26. Wants to play the same game over and over	**Yes**	**No**
27. Doesn’t respond to pain (when he/she falls, bumps his/her head)	**Yes**	**No**
28. Struggles to stop with an activity that he/she likes	**Yes**	**No**
29. Has specific rituals when he/she does certain things	**Yes**	**No**

30. Gets upset when he/she doesn't have his/her favourite object	**Yes**	**No**
31. Smells and licks objects often	**Yes**	**No**
32. Has strict routines that everyone should follow	**Yes**	**No**
33. Doesn't like it when someone touches or holds him/her	**Yes**	**No**
34. Plays with toys in the same way every time	**Yes**	**No**
35. Strange movements with hands or fingers	**Yes**	**No**
36. Repeats things he/she hears over and over	**Yes**	**No**
37. Does not play with toys the way he/she should	**Yes**	**No**
38. Enjoys touching things in a specific way	**Yes**	**No**

Part B Total: ______________ **Grand Total:** ____________________

Appendix G: Answers provided by participants for all three questions in the interview guide

Question 1

Control group

Participant nr	Answer
1	All questions are clear
2	Nothing
8	Part A Q 11 and 13 were confusing
6	Nothing
5	No
4	No
3	Questions clear
7	Not sure how often is often. Is it once a day, once a week?

Experimental group

Participant nr	Answer
16	Part A Q7. Answer no – means likes pretend play? Part A Q8. Answer no – means make sense Part A Q9. Answer no – means does understand Confused by what yes or no will mean
15	~~Some of the questions can't be answered 'y' or 'n'. Because some of the signs have improved or disappeared as child grew older or with therapy~~
14	No
13	No
12	No
11	No
9	No
10	No

Question 2

Control group

Participant nr	Answer
1	All questions are clear
2	Question 7 is unclear
8	Part A question 11 and 13 is confusing. Is it 'does she not bring it as much' or 'yes she brings it often'
6	No
5	No
4	No
3	Simple words used
7	No, very clear

Experimental

Participant nr	Answer
16	No
15	No
14	No
13	No
12	Change wording on some questions. Can be confusing to answer ‘y’ or ‘n’ to questions like ‘doesn’t like to’. If answer ‘y’ does it mean he does or doesn’t like to do it?. Rather just have ‘likes pretend play’.
11	No
9	No
10	No

Question 3

Control group

Participant nr	Answer
1	This instrument is sufficient
2	Provide a more interactive list with open questions, not just yes and no
8	No, everything discussed in previous 2 questions
6	~~Specify age range upfront. Uncertain of this, was it just for her child’s age (6) or for other ages as well (3 for example)~~
5	~~If have more kids – fill out one for each, or can she fill out everyone on one form~~
4	No
3	Instrument detailed enough for task at hand
7	Would this questionnaire be just for parents, or for teachers and caregivers too? Parents may sometimes not notice aspects of child’s behaviour, or think it is normal.

Experimental

Participant nr	Answer
16	No
15	~~Give more options to answer than ‘y’, ‘no’. To accommodate children with ASD whose signs have improved~~
14	Covers most of the general and basic stuff
13	No
11	No
12	No
9	No
10	No

Appendix H: ASDSQ version 3

Instructions:

Please fill out the information below

Biographic Information

7. What age is your child?						
8. Child's gender	Female	Male				
9. To which race group does your child belong to	Black	White	Coloured	Indian	Asian	Other
10. Have your child ever been diagnosed with Autism Spectrum Disorder	Yes	No				
11. If yes, what year was your child diagnosed						
12. Who diagnosed your child?						

Please turn over page

Instructions:

Please answer YES or NO to the following questions.

Part A

My Child:		
39. Dislikes crowds of people (like supermarkets, restaurants)	**Yes**	**No**
40. Repeats him/herself (says the same things over and over)	**Yes**	**No**
41. Often does things that others find offensive	**Yes**	**No**
42. Listens when others talks to him/her	**Yes**	**No**
43. Rarely makes eye contact with other people	**Yes**	**No**
44. Often says things that are blunt and seems rude	**Yes**	**No**
45. Likes pretend play	**Yes**	**No**
46. Makes sense when he/she talks	**Yes**	**No**
47. Understands basic gestures such as waving and thumbs up	**Yes**	**No**
48. Rarely calls my name when he/she wants my attention	**Yes**	**No**
49. Points at something when he/she wants it	**Yes**	**No**
50. Struggles to make friends	**Yes**	**No**
51. Brings things to me when he/she wants to show me something	**Yes**	**No**
52. Lacks facial expressions	**Yes**	**No**
53. Likes to play with others	**Yes**	**No**
54. Likes to start conversations with other people	**Yes**	**No**

55. Has abnormal body language	**Yes**	**No**

Part B

My Child:		
56. Has strange movements that he/she does often	**Yes**	**No**
57. Finds it difficult to cope with changes in routine	**Yes**	**No**
58. Is obsessed with certain objects (for example toys, animals, household items)	**Yes**	**No**
59. Puts toys in a specific way when playing	**Yes**	**No**
60. Gets upset when someone moves and changes things in his/her environment (at house or school)	**Yes**	**No**
61. Can spend a lot of time playing with just one or two objects	**Yes**	**No**
62. Is very sensitive to noise	**Yes**	**No**
63. Always likes to do the same things	**Yes**	**No**
64. Wants to play the same game over and over	**Yes**	**No**
65. Responds to pain (when he/she falls, bumps head)	**Yes**	**No**
66. Struggles to stop with an activity that he/she likes	**Yes**	**No**
67. Has specific rituals when he/she does certain things	**Yes**	**No**
68. Gets upset when he/she doesn’t have his/her favourite object	**Yes**	**No**
69. Smells and licks objects often	**Yes**	**No**

70. Has strict routines that everyone should follow	**Yes**	**No**
71. Gets upset when someone touches or holds him/her	**Yes**	**No**
72. Plays with toys in the same way every time	**Yes**	**No**
73. Strange movements with hands or fingers	**Yes**	**No**
74. Repeats things he/she hears over and over	**Yes**	**No**
75. Plays with toys in a normal way	**Yes**	**No**
76. Enjoys touching things in a specific way	**Yes**	**No**

Appendix I: ASDSQ version 3 scoring

Part A

Question	Scoring	Score
1. Dislikes crowds of people (like supermarkets, restaurants)	**Yes = 1** **No = 0**	
2. Repeats him/herself (says the same things over and over)	**Yes = 1** **No = 0**	
3. Often does things that others find offensive	**Yes = 1** **No = 0**	
4. Listens when others talks to him/her	**No = 1** **Yes = 0**	
5. Rarely makes eye contact with other people	**Yes = 1** **No = 0**	
6. Often says things that are blunt and seems rude	**Yes = 1** **No = 0**	
7. Likes pretend play	**No = 1** **Yes = 0**	
8. Makes sense when he/she talks	**No = 1** **No = 0**	
9. Understands basic gestures such as waving and thumbs up	**No = 1** **Yes = 0**	
10. Rarely calls my name when he/she wants my attention	**Yes = 1** **No = 0**	

11. Points at something when he/she wants it	**No = 1** **Yes = 0**	
12. Struggles to make friends	**Yes = 1** **No = 0**	
13. Brings things to me when he/she wants to show me something	**No = 1** **Yes = 0**	
14. Lacks facial expressions	**Yes = 1** **No = 0**	
15. Likes to play with others	**No = 1** **Yes = 0**	
16. Likes to start conversations with other people	**No = 1** **Yes = 0**	
17. Has abnormal body language	**Yes = 1** **No = 0**	

Part A Total: _______________

Part B

Question	**Scoring**	**Score**
18. Has strange movements that he/she does often	**Yes = 1** **No = 0**	
19. Finds it difficult to cope with changes in routine	**Yes = 1** **No = 0**	

20. Is obsessed with certain objects (for example toys, animals, household items)	**Yes = 1** **No = 0**	
21. Puts toys in a specific way when playing	**Yes = 1** **No = 0**	
22. Gets upset when someone moves and changes things in his/her environment (at house or school)	**Yes = 1** **No = 0**	
23. Can spend a lot of time playing with just one or two objects	**Yes = 1** **No = 0**	
24. Is very sensitive to noise	**Yes = 1** **No = 0**	
25. Always likes to do the same things	**Yes = 1** **No = 0**	
26. Wants to play the same game over and over	**Yes = 1** **No = 0**	
27. Responds to pain (when he/she falls, bumps head)	**No = 1** **Yes = 0**	
28. Struggles to stop with an activity that he/she likes	**Yes = 1** **No = 0**	
29. Has specific rituals when he/she does certain things	**Yes = 1** **No = 0**	
30. Gets upset when he/she doesn’t have his/her favourite object	**Yes = 1** **No = 0**	
31. Smells and licks objects often	**Yes = 1** **No = 0**	

32. Has strict routines that everyone should follow	**Yes = 1** **No = 0**	
33. Gets upset when someone touches or holds him/her	**Yes = 1** **No = 0**	
34. Plays with toys in the same way every time	**Yes = 1** **No = 0**	
35. Strange movements with hands or fingers	**Yes = 1** **No = 0**	
36. Repeats things he/she hears over and over	**Yes = 1** **No = 0**	
37. Plays with toys in a normal way	**No = 1** **Yes = 0**	
38. Enjoys touching things in a specific way	**Yes = 1** **No = 0**	

Part B Total: _______________

Grand Total: ______________________