

**FACTORS INFLUENCING THE EARLY
COMMUNICATION DEVELOPMENT
OF CHILDREN WITH CLEFT LIP AND
PALATE**

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ABSTRACT

TITLE: Factors influencing the early communication development of children with cleft lip and palate

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Key words: cleft lip and palate, communication development, early communication intervention, young children, assets, age-specific risk factors

Infants, toddlers and young children with cleft lip and palate (CLP) often present with multiple risk profiles due to the complex interaction between genotypical, phenotypical and environmental risk factors influencing their communication development at different ages. Current research recommends the need for a comprehensive early communication intervention (ECI) approach to the treatment of young children with CLP. The areas of strength and weakness in communication development and the factors influencing children with CLP at specific age-group intervals are under-emphasized. The aim of this study was to identify and describe the age-specific risk factors and assets which could influence the communication development of young children with CLP visiting a university-based ECI clinic, the Clinic for High-Risk Babies (CHRIB). Furthermore, the developmental areas of strength and weakness in the child with CLP at three specific age-group intervals, ranging from 1 month to 48 months were described. A retrospective, descriptive, between-subject developmental design with a correlation approach was employed. Purposive sampling was implemented as a non-randomized sampling method and 227 participants were included in the study. The data was extracted from the CHRIB database and analyzed by means of basic descriptive and advanced inferential statistical methods. Extensive data processing of all the potential factors that could have an influence on the early communication developmental areas of children with CLP was performed. A final analysis of the most important associations was performed in the SPSS. The findings revealed that expressive and receptive language and listening skills presented as the most vulnerable communication areas across all three age-groups. The cumulative effect of the risk factors was the greatest in the *[12;24) months age-group since this age group presented with the highest frequency of delayed communication development. The majority

of participants in all three age-groups presented with areas of strength, which include age-appropriate cognitive skills, pragmatic development, gestural development and gross motor development. Low birth weight presented as a persistent phenotypical risk factor which influenced the development of functions related to language use in the [1;12) and [12;24) months age groups, and gross motor development and receptive language in the [12;24) months age group. The envirotypical factors such as education and occupation of the mother, as well as the type of day care, indicated significant associations with listening skill development in the [1;12) months group and with the development of functions relating to language use in the [12;24) months age group. Parent-child interaction showed recurrent significant associations with receptive and expressive language across the three age groups. The findings indicated that young children with CLP have unique communication profiles at different age intervals and that these age-specific risk factors and assets should be recognized to ensure a comprehensive approach to ECI services to these young children and their families.

**The age group interval [12;24) indicates that participants aged 12 months were included in this interval (squared bracket), while participants aged 24 months were excluded from this interval (open bracket). The same notation and explanation is used for the remaining two age group intervals.*

OPSOMMING

TITEL:	Factors influencing the early communication development of children with cleft lip and palate
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Sleutelwoorde: gesplete lip en verhemelte; kommunikasie-ontwikkeling, vroeë kommunikasie-intervensie, jong kinders, batefaktore, ouderdoms-spesifieke risikofaktore

Babas, kleuters en jong kinders met gesplete lip en verhemelte (GLV) presenteer dikwels met 'n hoë risikoprofiel wat toeskryfbaar is aan die komplekse interaksie tussen genotipiese, fenotipiese en omgewingsrisikofaktore wat hul kommunikasie-ontwikkeling op verskillende ouderdomme beïnvloed. Huidige navorsing beklemtoon die behoefte aan 'n omvattende benadering in vroeë kommunikasie-intervensie (VKI) in die behandeling van jong kinders met GLV. Die areas van sterk en swak punte in kommunikasie-ontwikkeling en die faktore wat kinders met hierdie toestand op verskillende ouderdomsintervalle kan beïnvloed, is tans onderbeklemtoon. Die doel van hierdie studie is om die ouderdoms-spesifieke risiko- en batefaktore wat die kommunikasie-ontwikkeling van jong kinders met gesplete lip en verhemelte wat 'n universiteit-verbonde kliniek vir VKI, nl. die Kliniek vir hoërisikobabas (KHRIB) besoek, te identifiseer en te beskryf; en in besonder van sodanige kinders in ouderdomsgroepe met drie ouderdomsintervalle wat strek vanaf 1 maand tot 48 maande. 'n Retrospektiewe, beskrywende, tussen-subjek ontwikkelingsontwerp met 'n korrelasiebenadering is gevolg. Vir 'n nie-lukrake steekproefneming is doelmatige seleksie gebruik en 227 deelnemers is by die studie ingesluit. Die data is uit die KHRIB-databasis onttrek en met behulp van basiese beskrywende en gevorderde inferensiële statistiese metodes ontleed. Al die faktore wat potensieël 'n invloed op die areas van vroeë kommunikasie-ontwikkeling kon hê, is omvattend verwerk. 'n Finale analise van die mees belangrike verwantskappe is met behulp van die SPSS uitgevoer. Die bevindinge het getoon dat – oor al die ouderdomsgroepe heen – ekspressiewe en reseptiewe taal- en luistervaardighede die mees kwesbare areas was. Die kumulatiewe effek van die risikofaktore was die grootste in die ouderdomsgroep *[12;24) maande, aangesien agterstande in die taalontwikkeling van hierdie groep met die grootste frekwensie voorgekom het. Die meeste van

die deelnemers in al drie die ouderdomsgroepe het sterk areas in hulle ontwikkeling vertoon, insluitende ouderdomsgepaste kognitiewe vaardighede, pragmatiese ontwikkeling, gebare-ontwikkeling en growwe motoriese ontwikkeling. Lae geboortegewig het as 'n voortdurende fenotipiese risikofaktor in die ontwikkeling van taalverwante funksies in die ouderdomsgroepe [1;12) en [12;24) maande voorgekom en as persisterende fenotipiese risikofaktor van growwe motoriese ontwikkeling en reseptiewe taalvaardighede in die ouderdomsgroep [12;24). Omgewingstipiese faktore soos die opvoeding en die beroep van die moeder, asook die tipe dagsorg van die kind, het beduidende assosiasies met die ontwikkeling van taal-luistervaardighede in die ouderdomsgroep [12;24) maande aangedui. Ouer-kind-interaksie het herhalende assosiasies met reseptiewe en ekspressiewe taal oor die drie ouderdomsgroepe heen getoon. Die bevindinge dui daarop dat jong kinders met GLV unieke kommunikasieprofiel op verskillende ouderdomsintervalle toon en dat hierdie ouderdoms-spesifieke risiko- en batefaktore in ag geneem moet word om 'n omvattende benadering tot vroeë kommunikasie intervensie in dienslewering aan hierdie kinders en hul gesinne te bied.

**Die ouderdoms-interval [12;24) maande toon aan dat die 12 maand-oue deelnemers ingesluit is in die interval (vierkantige hakkie), maar dat die 24 maand-oue deelnemers uitgesluit is in die interval (ronde hakkie). Soortgelyke notasie en verduideliking is van toepassing vir die oorblywende twee ouderdomsgroepe.*

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CHAPTER 1

INTRODUCTION AND ORIENTATION

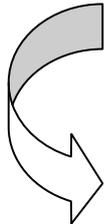
CHAPTER AIM: Chapter 1 aims at orientating the reader regarding the relevance of the study by presenting the rationale for the importance of developing a theoretical framework to understand the speech-language and hearing risk factors and assets in young children with cleft lip and -palate and their families. Furthermore, the chapter includes the problem statement and poses a research question. Key terms are clarified and an outlay of chapters is provided.

1.1 INTRODUCTION

Young children with cleft lip and -palate (CLP) are at risk for delay in speech acquisition and early language development (Kummer, 2008:155; Peterson-Falzone, Trost-Cardamone, Karnell & Hardin-Jones, 2006:4-5). This population often presents with a multiple risk profile, due to the complex interaction between biological and environmental factors which influence their speech development and language learning (Hardin-Jones & Chapman, 2008:89; Kritzinger, 2000:251; Savage, 1997:281). Research on the unique communication profiles of infants and toddlers with CLP indicated the need for a more extensive early communication intervention (ECI) perspective when describing the speech and language development of young children with CLP (Chapman, 2004; Chapman, Hardin-Jones, Schulte & Halter, 2001; Frederickson, Chapman & Hardin-Jones, 2005; Hardin-Jones & Chapman, 2008; Scherer & Kaiser, 2007; Scherer, Williams & Proctor-Williams, 2008). Three different, but interrelated theoretical perspectives are presented in this chapter to provide an integrated scientific approach to studying the factors influencing early communication development of children with CLP (See Figure 1).

1. REGULATION MODEL OF DEVELOPMENT (Sameroff & Fiese, 2000)

Genotype (DNA) (an individual's genetic make-up (Webster's New World Medical Dictionary, 2008))



Enviromtype
 (...a social organization that regulates the way human beings fit into society and operates through family and cultural socialization patterns (Sameroff & Fiese, 2000: 143))

Phenotype
 (An observed characteristic of an individual, which can be influenced by either inheritance or the environment (Webster's New World Medical Dictionary, 2008))

2. FACTORS INFLUENCING COMMUNICATION DEVELOPMENT OF CHILDREN WITH CLP (Kummer, 2008)

Phenotypic features:

- Anatomy and physiology of vocal tract
- Intelligence and brain structure
- Hearing
- Attention

Enviromtypic features

- Motivation
- Environmental Stimulation

3. ASSET-BASED APPROACH (Strauss, 2001)

INTEGRATED SCIENTIFIC APPROACH

Figure 1: A proposed, integrated theoretical framework for studying the factors influencing communication development in children with CLP

According to Figure 1 the regulation model of development, described by Sameroff and Fiese (2000:142), provides an explanation of causation for developmental delays in children by demonstrating the interplay between the child and his environment over time. The model facilitates the understanding of the simultaneous influence of various environmental and biological factors on multiple levels of the child's development. According to Sameroff and Fiese (2000:143) and Shprintzen (1997:4, 6), a child's behaviour results as a product of transactions between the genotype which refers to the specific genetic make-up of the child, the phenotype which refers to the physical and behavioural characteristics of the child and the environment which represents the child's external experiences. The regulation model offers insight into the sources of problems in child development and recognizes the influence of the specific child's developmental stage as well as the role of family and available support systems offered by prevention and intervention programmes. The developmental outcomes of the child are therefore determined by the dynamic interaction of an individual and his/her experiences. These interacting factors cannot be viewed independently from one another as a mutual relationship exists between the child's phenotype and his/her environment (Sameroff & Fiese, 2000:142).

In order to relate the regulation model of development (Samerhoff & Fiese, 2000) to children with CLP, specific prerequisites need to be acknowledged which could influence speech and language development of children with CLP over a period of time. According to Kummer (2008:155), normal language and cognitive development rely on the phenotype, which is the physical representation of the genotype, such as intelligence and brain structure, hearing ability, anatomy and physiology of the vocal tract and environmental prerequisites such as motivation and attention which are, in part, determined by the stimulation the child receives in the environment.

Intelligence as a phenotypic feature depends on an intact neurological structure and normal functioning of the central nervous system which will determine the

child's ability to adequately perceive, comprehend and produce language. Children with CLP are at high risk for chronic middle ear effusion due to Eustachian tube dysfunction which often results in conductive hearing loss (Kummer, 2008:158). This phenotypic feature represents as loss in sensory perception and decreased listening abilities that could have a detrimental effect on the acquisition of speech and language skills. In terms of physical prerequisites that are important for normal speech production, clefts and craniofacial conditions may involve dental malocclusions and velopharyngeal dysfunction which could affect normal respiration, phonation, resonance, articulation and neurological function of the speech mechanism (Kummer, 2008:160).

In addition to the phenotypic features, the environment may include parents' tendency to anticipate needs and wants of children with CLP when using gestures, which could cause a decline in the child's desire to use verbal communication (Kummer, 2008:159). A heightened need to communicate will also foster the child's motivation to learn language and thus improve his expressive language. A child's inability to attend to the environment will affect language learning as he/she may not be able to perceive stimulation adequately and will struggle to focus on language-enriching activities such as listening to a story (Kummer, 2008:160). The effect of the child's external experiences on development, as described by Sameroff and Fiese's model (2000), can also be related to children with CLP. Kummer (2008) as well as Scherer and Kaiser (2007) recognize the role of environmental stimulation and meaningful life experiences to optimize language development. Children with CLP will develop language skills faster if exposed to a language-rich environment where they are sufficiently stimulated with meaningful life experiences (Kummer, 2008:157). Several surgical procedures and frequent hospitalizations may, however, limit opportunities for interaction, play and language learning in children with CLP.

Within the context of a developing South Africa, families of children with CLP face additional environmental challenges that may influence optimal communication outcomes. According to Ebersöhn and Eloff (2002:85), 61% of the 16.3 million children in South Africa live in poverty. Impoverished environments create conditions for an increased risk of vulnerability for a disability (Alant & Lloyd, 2005:80). Factors such as poor nutrition, lack of access to healthcare, increased exposure to violence and limited knowledge of how to prevent the sequelae of anomalies, such as CLP, are documented as environmental challenges for families (Alant & Lloyd, 2005:80). Similarly, anomalies such as CLP can also contribute to poverty due to high costs of surgery and lack of follow-up speech and language intervention in the family's first language (Alant & Lloyd, 2005:80). The developmental outcomes of the child with CLP may therefore be a result of the individual characteristics (biological factors) and his/her own experience as well as that of the family (environmental factors). Although the regulation model (Sameroff & Fiese, 2000) describes the biological and environmental factors influencing development, it fails to identify the specific manner in which these factors interact and does not recognize the contribution of assets that could influence communication development of the child with CLP.

According to Werner (2000:116) and Figure 1, protective factors (assets) serve as “moderators of risk and adversity that enhance developmentally appropriate outcomes”. Protective factors could be categorized as factors within the child such as motivation, advanced self-help skills and a protective self concept, factors within the family which may involve a small family size, supportive siblings and parents with an advanced level of education and factors within the community such as supportive networks, successful school experiences and support from competent mentors.

Strauss (2001:226) in Figure 1, proposed a different perspective on how clinicians might approach families of children with CLP. The asset-based approach attempts to shift the focus from the anomaly and limitations to health,

life success and protective factors in the population with CLP. Children with CLP have been noted to have a normal self-concept, but may experience social adjustment difficulties (Strauss, 2001:227). According to Strauss (2001:227), it is important to change the risk factors of social and family perceptions that are associated with CLP and suggested three steps for clinicians to achieve this vision. These steps include an optimistic and protective attitude during time of birth and diagnosis of the child, building discussions that focus on strengths and optimism and engaging in research to establish a scientific model in order to gain better understanding of protective factors and health in children with CLP. Strauss's approach (2001) proposes to change how children with CLP and their families are viewed in order to build on their strengths and support them to become valuable and contributing members of society. The value of discussing these three perspectives is to contribute to a holistic and integrated view of risks and assets for speech and language development in children with clefts.

1.2 PROBLEM STATEMENT AND RATIONALE

The regulation model developed by Sameroff and Fiese (2000) provides a clear understanding of the interaction of various factors on multiple genotypic, phenotypic and envirotypic levels of a child's development, while Kummer (2008) describes factors which could influence speech and language development with specific reference to children with CLP. Strauss' model (2001) identified the importance of an asset-based approach by recognizing the assets which are present in the child with CLP. A critical overview of these three perspectives implies that the young child with CLP cannot be viewed in isolation without considering the various biological and environmental risk factors and the assets influencing his/her communication development. However, the integration of these theoretical approaches still fails to adequately explain the complex interaction of assets and risk factors contributing to the communication developmental outcomes of children with CLP younger than four years. Additionally, it is still unknown whether specific factors are more salient at different stages of the child's communication development over time. In order to

describe the various dimensions of the different factors, a dynamic approach is of cardinal importance. ECI perspectives need to be adjusted to recognize and accommodate these newly identified and unique factors influencing a child with CLP and his/her family.

1.3 RESEARCH QUESTION

Based on the above discussion, the following research question is posed: *Are there age specific biological and environmental risk factors and assets which influence the communication development of a group of children with CLP younger than 4 years in a specific ECI setting?*

Speech-language therapists need to recognize and understand all the contributing factors as well as their complex interaction with communication development in order to treat young children with CLP effectively during the critical period of brain development (Kummer, 2008:155). The aim of this study is to identify and describe the biological and environmental risk factors and assets which may influence the communication development of young children with CLP using the datasets available in the Clinic for High-Risk Babies (CHRIB) database of the Department of Communication Pathology of the University of Pretoria.

The CHRIB database was developed in 1996 to establish a computer-based data system for ECI within a specific university-based context in South Africa (Kritzinger, 2000:186). The database has since served as a valuable instrument for capturing speech, language and hearing assessment data of young children who were evaluated at CHRIB. The database contained at the time of data extraction for the current study a total of 608 datasets of children with different developmental disorders. A total of 227 datasets consists of young children presenting with CLP. Since the CHRIB database is used for data collection, age-specific guidelines may improve ECI with specific reference to the CLP population at CHRIB and contribute to establish and maintain best practice in future. The study could also disclose limitations in the CHRIB database and

could suggest recommendations for practical improvements and easier access for future research purposes. Finally, the results may provide a richer perspective of protective and risk factors that could influence communication development of young children with CLP in South Africa.

1.4 EXPLANATION OF TERMINOLOGY USED IN THIS DISSERTATION

1.4.1 ‘Cleft lip and -palate (CLP)’

Cleft lip and -palate refer to structural deficits that occur very early in the embryo and are present at birth (Peterson-Falzone, Hardin-Jones & Karnell, 2001:1). Clefts may assume many forms, but are mainly associated with one minor or major malformation. A cleft of the lip and a cleft of the palate may occur separately or together. However, the focus of the study will be on children with cleft palate, and cleft lip and -palate, and not so much on children with an isolated cleft lip, as these children are usually not referred to CHRIB, unless the anomaly forms part of a larger syndrome. Children with CLP present with atypical and critical structural and functional differences of the normal velopharyngeal mechanism of speech production, which endanger the normal process of speech and language development (Bzoch, 2004:5).

1.4.2 ‘Early communication intervention (ECI)’

According to Rossetti (2001:169), ECI refers to communication-based services rendered to an infant or toddler and his/her family, from birth to three years, with a disability or who are at risk for developmental delay,

1.4.3 ‘Clinic for High-Risk Babies (CHRIB)’

CHRIB was established in 1990 in the Department of Communication Pathology, University of Pretoria. It has since served as an under- and post-graduate training facility in which formal assessments are conducted and intervention for young children with communication delay and disorders – and their families – are

provided (Kritzinger, 2000:32). The CHRIB database generates clinical data for ECI research.

1.5 ORGANISATION OF THE STUDY

Chapter 1: Introduction and orientation

Chapter 1 aims at orientating the reader by proposing a theoretical framework for the study of factors influencing early communication development of children with CLP. The regulation model of development (Sameroff & Fiese, 2000), its application on children with CLP (Kummer, 2008) and Strauss's perspective (2001) are discussed in order to provide an integrated scientific approach to the study of risks and assets in young children with CLP. The rationale, problem statement, research question and aim of the study are presented and key concepts are defined.

Chapter 2: Theoretical perspectives on factors influencing communication development of young children with CLP

Chapter 2 presents a critical discussion of available research findings that aims to provide a strong theoretical basis for the current study. Different theoretical perspectives are discussed by using the framework proposed in Chapter 1. It therefore provides an overview of literature relating to past and recent research that has been conducted to identify protective and risk factors which could influence speech and language development of young children with CLP. A review of research on pre-speech development stresses the unique characteristics of children with CLP and supports the rationale for a comprehensive ECI approach when treating children with CLP and their families.

Chapter 3: Method

This chapter describes the planning and execution of the study. The research aims and objectives as well as the research design selected for the study are described. Furthermore, this chapter also presents the ethical principles that were considered in the course of the research. A description of the participants,

material used and the data collection procedures follow. Finally, the procedures for data analysis and the reliability and validity of the study are discussed.

Chapter 4: Results and discussion

In order to demonstrate the multiple risk profile of the participants with CLP a rich description of the results of the study regarding the age-specific communication profiles and risks and assets in each specific group of young children with CLP are provided in this chapter. The nature of the relationship between these factors and communication development are also discussed. The results of the study reveal whether a developmental trend for young children with CLP can be established.

Chapter 5: Conclusions and recommendations

This chapter provides the final conclusions of the entire study. The clinical and theoretical implications of the study are discussed and recommendations for further research are indicated.

1.6 ABBREVIATIONS

The following abbreviations were used in the dissertation:

ACPA	The American Cleft Palate-Craniofacial Association
ASHA	American Speech-Language-Hearing Association
CBR	Community Based Rehabilitation
CLIENT ID	Identification number of client
CHRIB	Clinic for High Risk Babies
CLP	Cleft Lip and Palate
CSS	Central Statistical Services
DAS	Developmental Assessment Schema
DASI-II	Developmental Activities Screening Inventory
DNA	Deoxyribonucleic acid
ECI	Early Communication Intervention
EI	Early Intervention

FCDC	Facial Cleft Deformities Clinic
ICD-10	International Statistical Classification of Diseases and Health
MLU	Mean Length of Utterance
NICU	Neonatal Intensive Care Unit
SAS	Statistical Analysis System
SPSS	Statistical Package for the Social Sciences
UK	United Kingdom
USA	United States of America

1.7 USE OF ITALIC TYPE IN THE DISSERTATION

- Italic type was used to highlight an important word or phrase in the text.
- The titles of all published documents were typed in Italic.

1.8 CONCLUSION

Chapter 1 provided an integrated scientific framework of possible factors influencing communication development of young children with CLP based on models described by Sameroff and Fiese (2000), Kummer (2008) and Strauss (2001). This chapter serves as a point of departure for further discussions and research regarding the assets and risk factors that may have an effect on this population.

CHAPTER 2

THEORETICAL PERSPECTIVES AND RESEARCH FINDINGS ON FACTORS INFLUENCING THE COMMUNICATION DEVELOPMENT OF YOUNG CHILDREN WITH CLP

CHAPTER AIM: *The aim of this chapter is to provide a strong theoretical basis for the empirical study by applying and expanding the framework, of risks and assets in chapter 1, with current research findings on the communication development of young children with CLP and factors influencing communication outcomes in children with CLP. The studies are also critically evaluated for scientific merit. This chapter supports the rationale for an integrated scientific approach to ECI when treating young children with CLP and their families.*

2.1 INTRODUCTION

Infants born with CLP face many unique and challenging factors that could limit their potential for normal speech, language and hearing development (Bzoch, 2004:5; Peterson-Falzone et al., 2006:1). In Figure 1.1, a framework was proposed to demonstrate the dynamic interaction of biological (genotype and phenotype), environmental (the child and family's environment) and assets (asset-based approach) which could influence the normal acquisition of expressive and receptive language and auditory skills in the young population with CLP. Although the framework provides a solid theoretical basis for the study, it needs to be applied to describe current research findings on the unique influencing factors and communication characteristics which pertain to young children with CLP and their families. These specific factors and communication features should be considered by speech-language therapists and audiologists to provide

more comprehensive and anomaly-specific ECI services for children with CLP and their families.

2.2 AN OVERVIEW OF RESEARCH FINDINGS REGARDING FACTORS THAT INFLUENCE EARLY COMMUNICATION DEVELOPMENT OF CHILDREN WITH CLP

Prior to the publications of researchers such as Becker, Svensson and Källén (1998), Chapman (1991), Blakeley and Brockman (1995) and Long and Dalston (1982), there was a dearth of research on the early phonetic and communication development of infants with CLP and also on the assets and risk factors influencing their speech and language outcomes. The focus of early research studies primarily centred on determining the speech development of school aged children with CLP, the identification of the clinical issues related to the anomaly such as velopharyngeal dysfunction and establishing norms for the early vocalizations of typically developing infants (Chapman, 1991:172; Chapman 2004:235-236; Long & Dalston, 1982:57; Salas-Provance, Kuehn & Marsh, 2003: 24). However, assessment procedures for the evaluation of preverbal communication skills in infants with CLP were often inadequate and not well established (Long & Roger, 1982:57).

An overview of studies since 2001 which investigated the speech and language development of infants and toddlers with CLP (Chapman, 2004; Chapman et al., 2001; Frederickson et al., 2005; Hardin-Jones & Chapman, 2008; Hardin-Jones & Jones, 2004; Peterson-Falzone et al., 2006; Salas-Provance et al., 2003; Scherer & Kaiser, 2007; Scherer, Williams & Proctor-Williams, 2008), exposed a renewed interest in the pre-speech and language development of young children with CLP. These findings suggest that young children with CLP may have pre-linguistic deficits and may present with unique factors which could affect later speech intelligibility and language development.

The objectives, methods, results and implications of the studies on the earliest development of communication in children with CLP, are summarized in Table 2.1. The aim of Table 2.1 is to provide an overview of the different research findings in order to compare and critically evaluate the studies and apply and integrate the findings into an addition to the integrative framework of risks and assets influencing the early communication development of children with CLP (See Figure 1). The role of the literature review is to determine what research has been conducted on the topic at hand in order to offer new ideas, perspectives and approaches in the field of early communication functioning of children with CLP and, furthermore, to increase knowledge regarding different methods, research designs and current research trends (Leedy & Ormrod, 2005: 64). The inclusion of current research findings and theoretical perspectives in the integrative framework of risks and assets in Figure 1 could provide a more in-depth understanding of the protective and risk factors influencing communication development in young children with CLP and contribute to substantiate and to increase the validity of the framework. The fifteen studies presented in Table 2.1 are organized in chronological sequence and were selected based on research conducted within the past seven years, i.e. between 2003 and 2010. The common denominators between the studies were the speech and language development of young children with CLP and the factors influencing the communication functioning of the population with CLP.

TABLE 2.1: An overview of the literature on the speech and language development and factors influencing communication development of children with CLP in the age range from birth to three years

AUTHORS	OBJECTIVE	METHOD	RESULTS	CONCLUSION
1. Salas-Provance, Kuehn, & Marsh (2003)	<ul style="list-style-type: none"> To determine the phonetic repertoire and syllable characteristics of infants with CLP 	<p><u>Participants</u></p> <ul style="list-style-type: none"> 4 infants, aged 15 months, with repaired CLP who received surgery after 12 months of age 4 infants, aged 15 months, without CLP 3 of 4 infants with CLP had history of recurrent otitis media All non-cleft infants had normal hearing at time of testing <p><u>Research design</u></p> <ul style="list-style-type: none"> Experimental with control group <p><u>Procedure</u></p> <ul style="list-style-type: none"> Recordings of 100 vocalizations within an hour during parent-child interaction <p><u>Setting</u></p> <ul style="list-style-type: none"> United States of America (USA) 	<ul style="list-style-type: none"> Three of four cleft palate infants vocalized less than non-cleft peers Infants with cleft palate showed more limited phonetic repertoire than non-cleft peers with a high number of sonorants and low number of obstruents CV syllable was most dominant in cleft-palate babies, but they produced less phonetic diversity in syllables compared to non-cleft peers 	<ul style="list-style-type: none"> A limited phonetic repertoire increases the risk for expressive language delay in a child with cleft palate
AUTHORS	OBJECTIVE	METHOD	RESULTS	CONCLUSION
2. Chapman (2004)	<ul style="list-style-type: none"> To examine the relationship between pre-surgery speech measures and speech and language performance at 39 months of age To determine the relationship between post-surgery speech measures and speech and language performance at 39 months 	<p><u>Participants</u></p> <ul style="list-style-type: none"> 15 children with CLP from 6 months to 39 months of age <p><u>Procedure</u></p> <ul style="list-style-type: none"> Spontaneous speech samples were obtained at presurgery/9 months, postsurgery/13 months and again at 39 months of age <p><u>Research design</u></p> <ul style="list-style-type: none"> Multi-site longitudinal study <p><u>Setting</u></p> <ul style="list-style-type: none"> University of Utah, Salt Lake City, Utah (USA) 	<ul style="list-style-type: none"> Significant risk correlation between true canonical babbling ratio pre-surgery and mean length of utterance (MLU) at 39 months as well as size of true consonant inventory pre-surgery and both language outcomes at 39 months (MLU and number of different words) 	<ul style="list-style-type: none"> Variables which may influence speech and language outcomes in children with CLP include velopharyngeal function postsurgery, intervention and hearing status. The influence of variables such as gender, mother's education level, cleft type and type of surgery should be examined in a larger sample size

AUTHORS	OBJECTIVE	METHOD	RESULTS	CONCLUSION
3. Hardin-Jones & Jones (2004)	<ul style="list-style-type: none"> To examine the prevalence of preschoolers with cleft palate who require speech therapy, produce nasalized speech and show compensatory patterns To determine the relationship between cleft type and age of surgery 	<p><u>Participants</u></p> <ul style="list-style-type: none"> 212 preschoolers with repaired cleft palate aged 2 years 10 months to 5 years 6 months 6 of the 144 children had early intervention services or have been dismissed from therapy before 3 years of age <p><u>Procedure</u></p> <ul style="list-style-type: none"> Speech evaluation data was retrieved for each participant at their 3rd year examination Information regarding current and past history, as well as frequency of therapy were obtained Information regarding secondary surgical management was obtained <p><u>Setting</u></p> <ul style="list-style-type: none"> University of Wyoming (USA) 	<ul style="list-style-type: none"> 68% of participants who received speech therapy demonstrated significant nasalization or produced glottal/pharyngeal substitutions Glottal stops were produced by the majority of the children A significant relationship between cleft type and number of children referred for speech therapy and between cleft type and number of children with moderate to severe hyper nasality A significant relationship between age of palatal surgery and number of children with hyper-nasality 	<ul style="list-style-type: none"> The critical sensitive period for the development of speech motor skills is 4-6 months of age An optimal treatment regimen should include palate repair before 13 months of age. Despite advances in surgical care, the majority of pre-schoolers continue to demonstrate delay in speech sound development that require direct speech therapy The need for research documenting the efficacy of early intervention is emphasized
AUTHORS	OBJECTIVE	METHOD	RESULTS	CONCLUSION
4. Louw, Shibambu & Roemer (2005)	<ul style="list-style-type: none"> To explore cultural variations that exist in black families with children with CLP which influence their participation in the team approach To describe assets of families that may be used to empower them and enhance service delivery 	<p><u>Participants</u></p> <ul style="list-style-type: none"> 35 black families visiting the Facial Cleft Deformities Clinic, University of Pretoria Participants were generally from low-income families <p><u>Research design</u></p> <ul style="list-style-type: none"> Descriptive survey research design <p><u>Procedure</u></p> <ul style="list-style-type: none"> Questionnaire-by-interview procedure was utilized during routine visits to the clinic <p><u>Setting</u></p>	<ul style="list-style-type: none"> 89% of mothers had no prior knowledge of CLP 65% had average-to-clear understanding of CLP 37% still had limited knowledge of clefting after counselling 34% had support from partners and family members 11% had no support High rate of frustration and shame 	<ul style="list-style-type: none"> It is important to recognize family uniqueness, follow the asset-based approach, view cultural differences on a continuum and apply knowledge on contextually relevant research in order to empower families to support their children in attaining full potential in South African context

		<ul style="list-style-type: none"> • Pretoria, South Africa 	<ul style="list-style-type: none"> • Low education status (only 54% were literate) • 66% took more than 4 hours to travel to clinic • Illiteracy, poverty, traditional and spiritual belief regarding disability, beliefs about health and healing and family structure have effect on access to care 	
AUTHORS	OBJECTIVE	METHOD	RESULTS	CONCLUSION
5. Frederickson, Chapman & Hardin-Jones (2005)	<ul style="list-style-type: none"> • To replicate and extend a previous study examining the conversational skills of children with CLP 	<u>Participants</u> <ul style="list-style-type: none"> • 34 children (33-44 months) • 17 with CLP, 17 without CLP <u>Procedure</u> <ul style="list-style-type: none"> • Children were observed during 20 minute interactions with caregivers at home <u>Research design</u> <ul style="list-style-type: none"> • Longitudinal study <u>Setting</u> <ul style="list-style-type: none"> • Utah, USA 	<ul style="list-style-type: none"> • Children with CLP showed fewer assertive utterances, were less likely to respond adequately to comments by caregivers and produced more topic maintaining, but less topic extending utterances than peers. • A significant protective correlation existed between conversational assertiveness and speech production skills 	<ul style="list-style-type: none"> • Children with CLP are less conversationally assertive than non-cleft peers • The findings imply that poor speech may influence language performance of children with CLP
AUTHORS	OBJECTIVE	METHOD	RESULTS	CONCLUSION
6. Persson Lohmander & Elander (2005)	<ul style="list-style-type: none"> • To describe articulation and speech features related to velopharyngeal impairment in children born with an isolated cleft palate 	<u>Participants</u> <ul style="list-style-type: none"> • 26 children with isolated cleft palate, 17 controls • Two subgroups at 5 years: the velopharyngeal impairment group and the non-velopharyngeal impairment group <u>Procedure</u> <ul style="list-style-type: none"> • Blind assessment of speech at 3, 5, 7 and 10 years of age 	<ul style="list-style-type: none"> • The velopharyngeal group improved but continued to have moderate velopharyngeal impairment • Persistent velopharyngeal impairment and glottal misarticulation were mostly found in children with cleft palate as part of a syndrome or with 	<ul style="list-style-type: none"> • Improvement of velopharyngeal function seems related to surgery • The persistence of problems seems to be related to additional multiple malformations or syndromes

		Setting Göteborg University, Sweden	multiple malformations	
AUTHORS	OBJECTIVE	METHOD	RESULTS	CONCLUSION
7. Prathanee, Dechongkit & Manochiopinig (2006)	<ul style="list-style-type: none"> To combine the principles of community-based rehabilitation (CBR), primary health care and institutional medical approaches for accessing and treating speech disorders in children with CLP in a remote area 	<u>Participants</u> <ul style="list-style-type: none"> Parents and speech-language therapists <u>Procedure</u> <ul style="list-style-type: none"> The study was conducted from particular workshops for development of a community-based model <u>Setting</u> <ul style="list-style-type: none"> Khon Kaen, Thailand 	<ul style="list-style-type: none"> Parents have limited knowledge of associated problems of CLP Most families are poor and cannot afford treatment Families feel that the child is stigmatized by society Healthcare units are inadequate to serve children with CLP due to a lack of specialists No effective referral system or network to coordinate services 	<ul style="list-style-type: none"> Many families have misconceptions regarding the cause of impairment and available treatment Most patients live in remote areas where speech therapy services are not available and cannot afford to travel Families are uninformed about CBR-approach Health care providers have little knowledge regarding speech therapy services that are available for children with CLP.
AUTHORS	OBJECTIVE	METHOD	RESULTS	CONCLUSION
8. Kramer, Baethge, Sinikovic, & Schliephake (2007)	<ul style="list-style-type: none"> To identify factors influencing the quality of life of families who have young children with CLP 	<u>Participants</u> <ul style="list-style-type: none"> 130 families with children with CLP aged between 6 and 24 months <u>Research design</u> <ul style="list-style-type: none"> Descriptive survey research design <u>Procedure</u> <ul style="list-style-type: none"> Parents were asked to complete a self-administered questionnaire at home <u>Setting</u> <ul style="list-style-type: none"> Hanover, Germany 	<ul style="list-style-type: none"> An intact family is the most important factor in protecting a child with CLP from factors influencing quality of life The influence of the CLP was the highest on families with children with isolated cleft lip, due to late surgery Although families with CLP had to tolerate the most intense medical treatment with regard to surgery, the effect on their quality of life 	<ul style="list-style-type: none"> The acknowledgement of specific influences of certain types of clefts, might allow for more tailored support and improvement of quality of life.

			<p>was lower in comparison with families with children with cleft lip and cleft palate, probably due to satisfaction with treatment and results of surgery</p> <ul style="list-style-type: none"> • Prenatal diagnosis did not reduce the general impact on affected families, but increased the social impact leading to increased social pressure on the family 	
AUTHORS	OBJECTIVE	METHOD	RESULTS	CONCLUSION
9. Zheng, Smith, Shi, Li, Wang, Li, Meng & Zheng, (2007)	<ul style="list-style-type: none"> • To present the tympanometric findings in patients with unrepaired CLP • To show the natural history and outcome of these cases 	<p><u>Participants</u></p> <ul style="list-style-type: none"> • 552 patients with unrepaired CLP (115 were over 10 years of age) <p><u>Procedure</u></p> <ul style="list-style-type: none"> • Routine otoscopic examination, pure tone audiometric and tympanometric evaluations were performed <p><u>Setting</u></p> <ul style="list-style-type: none"> • Sichuan University, Chengdu, People's Republic of China 	<ul style="list-style-type: none"> • Of 552 patients, pure tone audiometric results of 294 patients could not be performed because they were too young • Age-related decrease in the frequency of hearing impairment and abnormal tympanometry • During the crucial language learning stage (2-4 years of age) the frequency of hearing impairment is as high as 80% and the frequency of abnormal tympanometry is 65% • Patients with submucous cleft palate had lower frequency of hearing impairments and abnormal tympanometric results 	<ul style="list-style-type: none"> • Palate repair and surgical intervention as well as tube insertion should be carried out promptly

AUTHORS	OBJECTIVE	METHOD	RESULTS	CONCLUSION
10. Priester & Goorhuis-Brouwer (2007)	<ul style="list-style-type: none"> To determine the effect of early palate closure on speech and language development in children with cleft palate 	<p><u>Participants</u></p> <ul style="list-style-type: none"> 43 toddlers with CLP and 32 without CLP <p><u>Research design</u></p> <ul style="list-style-type: none"> Comparative study <p><u>Procedure</u></p> <ul style="list-style-type: none"> Analyzed with standardized tests for language comprehension and production, articulation and hyper-nasality <p><u>Setting</u></p> <ul style="list-style-type: none"> Netherlands 	<ul style="list-style-type: none"> No significant differences for language comprehension, production and articulation, despite the high percentage of conductive hearing loss in 55% children Significant differences for hyper nasality In both groups articulation problems raise to higher percentage than language production problems 	<ul style="list-style-type: none"> Early surgical treatment is effective for language development and articulation Conductive hearing loss and hyper nasality remain a serious problem Because of increased articulation problems in all children, standards for articulation development are perhaps too strict for children with CLP between 2:0 to 2:6 years. The standards for articulation development and testing may be inappropriate since it is unknown which consonants are produce by 90% of children before 7 years of age
AUTHORS	OBJECTIVE	METHOD	RESULTS	CONCLUSION
11. Chapman, Hardin-Jones, Goldstein, Halter, Havlik, & Schulte (2007)	<ul style="list-style-type: none"> To examine the effect of age and lexical status at the time of primary palatal surgery on the speech outcome of preschoolers with CLP 	<p><u>Participants</u></p> <ul style="list-style-type: none"> 40 children (aged 33-42 months) with non-syndromic CLP 20 children (Group 1) were lexically less advanced and younger (mean age=11 months) and 20 children (Group 2) were lexically more advanced and older (mean age=15 months) when palatal surgery was performed <p><u>Research design</u></p> <ul style="list-style-type: none"> Longitudinal study <p><u>Procedure</u></p>	<ul style="list-style-type: none"> Children in group 1 showed larger consonant inventories and more accurate production of nasals and liquids compared to Group 2 Group 1 exhibited better articulation and less hyper-nasality than children in Group 2 	<ul style="list-style-type: none"> Children who were less lexically advanced and younger at the time of palatal surgery exhibited better articulation and resonance outcomes at 3 years of age

		<ul style="list-style-type: none"> Data collection was performed at children's homes. At 33 months session a spontaneous speech sample in conjunction with the Goldman Fristoe Test of Articulation was administered At the 39 month session two other measures (PLS-3 and BSID) were added to the testing At end of all the sessions, information on middle ear status was obtained from the parents Finally tympanometry was performed <p><u>Setting</u></p> <ul style="list-style-type: none"> Salt Lake City, Utah 		
AUTHORS	OBJECTIVE	METHOD	RESULTS	CONCLUSION
12. Smedegaard, Marxen, Moes, Glassou & Sciensan (2008)	<ul style="list-style-type: none"> To determine if the duration of postpartum hospitalization, duration of breast-milk feeding and growth during the first year of life in infants with CLP are comparable to that of infants without clefts 	<p><u>Participants</u></p> <ul style="list-style-type: none"> 115 infants born with CLP between 2003 and 2004 <p><u>Research design</u></p> <ul style="list-style-type: none"> Prospective data collection <p><u>Procedure</u></p> <ul style="list-style-type: none"> The health visitors/nurses collected data using a registration chart about the duration of postpartum hospitalization and tube feeding, duration of breast-milk feeding weight and length and number of home visits The information was obtained from the National Board of Health, 2006 and consisted of all infants born in 2004 Data regarding tube feeding was discussed qualitatively Weight and length at birth was obtained from nurses' notes and from parents 	<ul style="list-style-type: none"> Median duration for postpartum hospitalization was 4 days The mean duration for infants with CLP was 6.5 days 17% of infants were tube fed during postpartum hospitalization, but main reasons for tube-feeding were other abnormalities 92% received breast milk and median duration for breast feeding was 15 weeks Significant differences in length of children with and without CLP. Infants with CLP were taller than their peers without CLP 	<ul style="list-style-type: none"> For infants born in Denmark, the length of hospitalization is comparable to those infants without CLP Tube feeding is used in 1/5 of patients with CLP Infants with CLP receive breast milk, but for a shorter period than infants without CLP Weight and length measures are consistent with Danish growth reference values Real-time data are needed in regards to growth and duration of breast milk feeding

AUTHORS	OBJECTIVE	METHOD	RESULTS	CONCLUSION
		<u>Setting</u> <ul style="list-style-type: none"> Herning, Denmark 		<ul style="list-style-type: none"> Multi-centre studies are required
13. Hardin-Jones & Chapman (2008)	<ul style="list-style-type: none"> To examine the impact of early intervention in speech and lexical measures of toddlers with CLP 	<u>Participants</u> <ul style="list-style-type: none"> 2 group control study 40 toddlers aged 27 months 30 with repaired CLP 10 without cleft palate 33 males and 7 females 10 had not been referred, 20 had been referred 10 of the referred 20 received therapy, 10 did not All of the children demonstrated normal receptive language functioning. <u>Research design</u> <ul style="list-style-type: none"> Post-test only control group design <u>Procedure</u> <ul style="list-style-type: none"> Audio and video recordings were taken of participants while interacting with caregivers in their homes at 17 months and 27 months of age Parents were asked to complete the Mac Arthur Communicative Developmental Inventory at each session <u>Setting</u> <ul style="list-style-type: none"> Utah, USA 	<ul style="list-style-type: none"> Significant differences between number of different consonants in inventory and percentage of oral stop consonants at 17 months of age No significant differences between the non-cleft and not referred groups, also no differences between the therapy and no therapy groups The only significant difference was that the therapy group produced more glides than the non-therapy group 	<ul style="list-style-type: none"> Early speech sound development may seem significantly impaired before surgery, but catch-up growth following surgery Early intervention is warranted if oral stops do not emerge within 2-3 months following palatal surgery The presence of stop consonants following surgery is a strong predictor of later success for children with cleft lip and palate Lack of significant differences between therapy and no therapy groups at 27 months. Both groups had similar phonetic and lexical profile at 17 months Significant differences may have been detected if group sizes were bigger
14. Scherer, Williams & Proctor-Williams (2008)	<ul style="list-style-type: none"> To describe the early vocalization skills of CLP 	<u>Participants</u> <ul style="list-style-type: none"> Group A: 13 children without CLP, 	<ul style="list-style-type: none"> Differences in the two groups in both receptive and 	<ul style="list-style-type: none"> CLP children have persistent vocabulary and

	<p>children at 6 and 12 months of age</p> <ul style="list-style-type: none"> To compare the results at 6 and 12 months to later speech and vocabulary development at 30 months 	<p>typically developing</p> <ul style="list-style-type: none"> Group B: 13 children with CLP matched for gender, age and socio-economic status <p><u>Research design</u></p> <ul style="list-style-type: none"> Longitudinal retrospective study, matched control group design <p><u>Procedure</u></p> <ul style="list-style-type: none"> Children were videotaped for 30 minutes at 6, 12 and 30 months of age while interacting with primary caregivers using a standard set of toys. Entire sample was phonetically transcribed <p><u>Setting</u></p> <ul style="list-style-type: none"> Johnson City, USA 	<p>expressive language development at 12 and 30 months of age</p> <ul style="list-style-type: none"> Differences in the frequency of babbling and mean babbling level at 12 months and speech sound accuracy and vocabulary production at 30 months Significant correlation between babbling frequency at 6 months and consonant inventory size (reduced stop consonants, more glottal stops and glottal fricatives), vocabulary at 30 months for CLP children 	<p>vocalization deficits beyond palate closure</p> <ul style="list-style-type: none"> Measures of babbling frequency, mean babbling level and consonant inventories provide clinically effective means of identifying these early deficits Measures may also provide a tool for monitoring the effects of an early intervention programme that promote facilitation of sound and vocabulary development
AUTHORS	OBJECTIVE	METHOD	RESULTS	CONCLUSION
15. Baker, Owens, Stern & Willmot (2008)	<ul style="list-style-type: none"> To examine the role of parents' coping strategies and social support on the family, levels of adjustment and psychological distress To investigate whether the child's age, type of cleft or other reported medical conditions influenced these outcomes 	<p><u>Participants</u></p> <ul style="list-style-type: none"> 103 parents of children with CLP recruited from families attending a multidisciplinary CLP clinic <p><u>Research design</u></p> <ul style="list-style-type: none"> Cross-sectional survey study <p><u>Procedure</u></p> <ul style="list-style-type: none"> Parents were required to complete questionnaires in the order in which they received them <p><u>Setting</u></p> <ul style="list-style-type: none"> Sheffield, UK 	<ul style="list-style-type: none"> In spite of many influencing factors on the family, risk factors were not as highly reported Parents indicated high levels of protective adjustment as a result of their child's condition The parents also reported higher levels of social support and mostly used approach rather than avoidance coping strategies Having a younger child with CLP was associated with an increased risk influence on the family 	<ul style="list-style-type: none"> The findings may have implications for planning and delivering family-centred services Family-centred services include practical support and facilitation of effective coping strategies These services must be targeted at families during the first few years of the child's life and should promote an asset-based approach to ECI for children with CLP

2.3 SUMMARY OF THE FINDINGS IN TABLE 2.1

The 15 studies depicted in Table 2.1 provided an overview of children with CLP within a wide age- spectrum ranging between 6 months and 10 years of age. The studies are firstly critically evaluated to determine the credibility of the studies, and then the findings are discussed in-depth.

2.4 CRITICAL EVALUATION OF THE RESEARCH DESIGNS OF THE STUDIES PRESENTED IN TABLE 2.1

In order to provide a scientifically sound organizational scheme or framework for the planned empirical study, it is critical to evaluate the research selected in Table 2.1 to identify limitations in the methodology, incorrect statistical analysis and unjustifiable conclusions. In addition, the studies which provide the highest evidence of factors contributing to the communication development of young children with CLP, needed to be determined to ensure scientific credibility. According to Dollaghan (2004 in Johnson 2006), the quality of research evidence could be judged for at least three criteria namely validity, importance (clinical and practical significance of the study) and precision. The validity of the studies in Table 2.1 refers to the extent to which the studies display proof of the use of appropriate scientific methods to minimize bias in the research findings (Johnson, 2006). Each of the 15 studies were critically evaluated and ranked according to the four levels of evidence in Table 2.2.

Table 2.2: Levels of evidence for research studies in Table 2.1 design ranked according to quality and credibility from highest/most credible (1a) to lowest/least credible (IV) adapted from the Scottish Intercollegiate Guideline Network (Johnson, 2006)

LEVEL	DESCRIPTION	APPLICABLE STUDIES IN TABLE 2.1
I a	Well-designed meta-analysis of > 1 randomized controlled trail	No studies found
I b	Well-designed randomized controlled study	No studies found
II a	Well-designed controlled study without randomization	1. Salas-Provance et al. (2003) 6. Persson et al. (2005) 11. Chapman et al. (2007) 13. Hardin-Jones &

		Chapman (2008)
II b	Well-designed quasi-experimental study	No studies found
III	Well-designed correlation studies, i.e., correlation and case studies	2. Chapman (2003) 3. Hardin-Jones & Jones (2004) 5. Frederickson, Chapman & Hardin-Jones (2005) 8. Kramer, Baethge, Sinikovic, & Schliephake (2007) 10. Priester & Goorhuis-Brouwer (2007) 12. Smedegaard et al. (2008) 14. Scherer et al. (2008)
IV	Expert committee report, consensus conference, clinical experience of respected authorities	4. Louw et al. (2005)
	Descriptive study	7. Prathanee et al.(2006) 9. Zheng et al. (2007) 15. Baker et al. (2008)

According to Table 2.2 the majority of the studies presented in Table 2.1 could be ranked as third level well-designed correlation studies. No studies on the early speech and language development of children with CLP could be found that represent the highest level of scientific evidence, i.e. involving randomised control trials. Since four of the studies are on the second highest level of credibility, it could be concluded that the scientific methods were selected to minimize confounding results in the research findings. All the studies cited in Table 2.1 show relevance regarding the objectives of this empirical study, since the researchers investigated both assets and risk factors influencing early communication development of children with CLP and their families.

The importance and reliability of the studies are also illustrated by the statistical significance of the research findings and the accuracy with which the results were calculated. According to Table 2.1, the majority of the studies were conducted in Utah (USA) and only one local study could be found. The dearth of research in a developing country such as South Africa prompted the inclusion of two foreign studies (Zheng et al., 2007; Prathanee et al., 2006) which were also conducted in developing countries. Although these two studies were, due to their descriptive nature, not highly ranked in terms of credibility (Table 2.2), their inclusion was justified by the setting which supports the relevance and application of the research findings to a developing country such as South Africa. Although seven of the 15 studies in

Table 2.1 had sample sizes exceeding 100 participants, and were therefore generalizable, none of the studies implemented a database as research source. Data-based research containing large sample sizes of young children with CLP may therefore contribute to the knowledge about factors influencing the communication development of the population.

Upon closer analysis of the studies summarised in Table 2.1, the studies were grouped according to the communication developmental areas and the certain factors, which may influence the communication development of the participants, which were investigated in each study. The studies will be discussed according to Table 2.3.

Table 2.3: Classification of research findings according to early communication functioning and influencing factors described in Table 2.1

Factor	Study
1. Speech, language and hearing development in young children with CLP	<ul style="list-style-type: none"> • Scherer et al. (2008) • Salas-Provance et al. (2003) • Persson et al. (2005) • Hardin-Jones & Chapman (2008) • Zheng et al. (2007) • Frederickson et al. (2005) • Hardin-Jones & Jones (2004)
2. Environmental and family factors influencing speech and language development	<ul style="list-style-type: none"> • Baker et al. (2008) • Kramer et al. (2007) • Prathanee et al. (2006) • Smedegaard et al. (2008)
3. Effect of CLP surgery on speech and language outcomes	<ul style="list-style-type: none"> • Chapman (2003) • Chapman et al. (2007) • Priester & Goorhuis-Brouwer (2007)

2.5 DISCUSSION OF RESEARCH FINDINGS ON FACTORS THAT INFLUENCE THE COMMUNICATION FUNCTIONING OF YOUNG CHILDREN WITH CLP

2.5.1 Speech, language and hearing development of young children with CLP

According to Table 2.3, seven of the fifteen cited studies examined the vocalization skills, pre-speech development and hearing skills of infants and toddlers with CLP (Frederickson et al., 2005; Hardin-Jones & Jones, 2004; Hardin-Jones & Chapman, 2008; Persson et al., 2005; Scherer et al., 2008; Salas-Provance et al., 2003; Zheng et al., 2007).

According to the findings of Salas-Provance et al. (2003) in Table 2.1, infants and toddlers with CLP showed a limited phonetic repertoire compared to their non-cleft peers. However, due to the small sample size of only four participants, the findings could not be generalized to the population with CLP. The authors also conceded that a larger sample size was needed to clarify the relationship between pre-speech vocalization skills and later speech and language development in young children with CLP (Salas-Provance et al., 2003:36).

In order to find a possible relationship between pre-speech vocalization and later speech and language development the findings of Chapman (2003) and Frederickson et al. (2005) described several factors which could influence speech, language and pragmatic development in children with CLP younger than 44 months (see Table 2.1.) The factors which were found to have an effect on later speech and language development outcomes of toddlers with CLP included cleft type, hearing status, gender, the mother's level of education and the type of surgery. The findings also indicated a significant relationship between articulation performance and conversational assertiveness (Frederickson et al., 2005:184), suggesting that children with poor articulation produce fewer assertive utterances. The findings suggested that poor conversational assertiveness should be acknowledged as a risk

factor influencing the social skills and communication development of children with CLP.

The implications of these three studies (Salas-Provance et al., 2003; Chapman, 2004; Frederickson et al., 2005) on the early communication and hearing development of children with CLP are twofold: Firstly, Salas-Provance et al. (2003), Chapman (2003) and Frederickson et al. (2005) clearly described the communication characteristics of young children with CLP and identified the possible contributing factors to adverse communication development. However, it is not yet clear which assets and risk factors interact with pre-speech vocalization skills at specific age-intervals and how these factors influence later speech and language outcomes of children with CLP. Secondly, in addition to speech and language delay in children with CLP, new information regarding communication difficulties is described. For the first time pragmatic disorders, relating to difficulties to respond to a conversational partner, taking the listener's background into account or repairing conversation breakdowns, are described (Frederickson et al., 2005:185). These factors must be included in the ECI curriculum to meet the age-specific speech production and language needs of young children with CLP and to establish a more focused ECI approach.

2.5.2 Effect of early palatal surgery, ECI and otologic management on speech and language outcomes of children with CLP

During the same time period as the previous studies, Hardin-Jones and Jones (2004) examined the manner in which unique factors in young children presenting with CLP influence speech and language development. According to Table 2.1 a significant relationship exists between age of palatal surgery and number of children with hyper-nasality. The findings showed that when the age of surgery increased, the percentage of children with hyper-nasal speech also increased. Similar findings were obtained from studies conducted by Priester and Goorhuis-Brouwer (2007), Persson et al. (2005), and Chapman et al. (2007). These three studies investigated the effect of early palatal surgery on the speech outcome of infants and preschoolers with cleft palate. According to Table 2.1, Persson et al.(2005);, Chapman et al.

(2007) and Priester and Goorhuis-Brouwer (2007) established that palatal surgery could serve as a protective or risk factor influencing later speech outcomes in young children with CLP. Timely surgery may thus lead to more advanced speech and language outcomes in children with CLP.

In addition to an early surgery protocol, the effect of ECI and hearing management on speech and language development was also found in literature. Hardin-Jones and Chapman (2008), Scherer et al. (2008) and Zheng et al. (2007) explored the speech and language development of two different groups of infants and toddlers with CLP (See Table 2.1) who received ECI and early otologic management. According to Table 2.1, their findings increased the clinical reliability of the importance of early speech and language management of children with CLP, as similar conclusions were obtained from the three separate studies. Furthermore, new knowledge emerged regarding the assets influencing communication outcomes of children with CLP. The protective effect of speech and language therapy and hearing management post-surgery appeared to be significant.

A critical view of the studies in Table 2.2 (Chapman et al., 2007; Frederickson et al., 2004; Hardin-Jones & Chapman, 2008; Persson et al., 2005; Priester & Goorhuis-Brouwer, 2007; Salas-Provence et al., 2003; Scherer et al., 2008; Scherer & Kaiser, 2007) revealed that there is a renewed interest in the unique speech and language characteristics of CLP children younger than three years and also in the risks and assets influencing their communication development. These findings justify a comprehensive approach to ECI services for young children with CLP. The research findings may also serve as a basis for a more in-depth study to gain further knowledge of the age specific contributing factors affecting the young population with CLP. An enriched knowledge base on age-specific factors could improve the efficacy of service delivery and contribute to best practice in ECI for young children with CLP. However, in order to establish a reliable knowledge base on early management of children with CLP, the evolution of ECI for young children with CLP must be reviewed and recognized.

2.6 EVOLUTION OF ECI FOR CHILDREN WITH CLP

Guralnick (1997) defined the goal for early intervention as identifying high risk concerns, strengthening family resources and maximizing the care-giving environment to ensure optimal progress in the child's development. However, Savage (1997:71) suggested that, in the past, not all ECI programmes for infants and young children with CLP were sufficient to accommodate and address the specific factors influencing their early communication development. The author stressed that identification of factors that place the infant with CLP at risk of a developmental delay, should form an integral part of an EC assessment and intervention programme to optimize treatment outcomes.

ECI for young children with CLP gradually evolved as researchers studied different surgical techniques, assessment and treatment protocols of communication, feeding disorders related to CLP and speech therapy approaches (Berkowitz, 2006; Bzoch, 2004; Kuehn & Henne, 2003; Peterson-Falzone et al., 2006; Scherer & Kaiser, 2007). Medical care of young children born with CLP also showed considerable improvement with the focus on bringing the child 'up to speed' with his/her non-cleft peers (Peterson-Falzone et al., 2006:9). The rapid development of ECI as a specific theoretical and clinical field also influenced the evolution of a comprehensive early intervention approach to infants and young children with CLP and their families (Kritzinger, 2000).

Although team management of children with CLP has always been promoted (Bütow, n.d.) the importance and implementation of parent-centred intervention is currently receiving renewed attention.

2.7 FAMILY-CENTRED ECI FOR CHILDREN WITH CLP

In order to create more goal-directed and effective communication-based services, Rossetti (2001:46) suggested that ECI need to be family-centred to improve the long-term developmental outcomes of the child with disabilities. According to Landry, Swank and Smith (2006:638) (Table 2.1) responsive parenting has long been considered to be important in the promotion of a

broad range of developing infant skills, including social, emotional, cognitive and language outcomes. Since few studies examined the efficacy of ECI for families and young children with CLP, Scherer and Kaiser (2007:358) (Table 2.1) recently investigated the outcomes of parental involvement in applying naturalistic intervention models to address the speech and language delay of children with CLP younger than three years. The delay could include a limited vocabulary, restricted sound inventories, reduced speech accuracy and slow onset and progression of expressive language development (Bzoch, 2004:6; Scherer & Kaiser, 2007:357; Vallino, Zuker & Napoli, 2008:485). These findings revealed that the use of parent-implemented models, such as naturalistic intervention models, improve the child's true consonant inventory, increase speech intelligibility and reduce the use of compensatory patterns, leading to expanded vocabulary productions. This study stressed the need of parental involvement in ECI in young children with CLP and indicated that parents could play an essential role in their child's developmental outcomes.

The involvement of parental skills in ECI is also reflected in guidelines published by the American Speech-Language-Hearing Association (ASHA) (2008:2), which describe the roles and responsibilities of speech-language therapists in early speech, language and hearing intervention. However, it is important to recognize that these ECI guidelines are not directed to speech-language therapists treating a specific group of infants such as those with CLP, but to the entire spectrum of families and children requiring ECI. Four guiding principles are stipulated which form the basis of provision of effective ECI to children aged 0-3 years. These guiding principles specify that services should be a) family-centred and culturally responsive, b) developmentally supportive and promote children's participation in their natural environments, c) comprehensive, coordinated and team-based and d) based on the highest quality internal and external evidence that is available. According to ASHA (2008:10), it is of paramount importance to align ECI services with the family's beliefs, values, preferences and principles and to consider the unique culture and situational status of each family. Family-centred intervention includes shared decision-making on referrals, need for and type of assessment and intervention approaches and development of goals for intervention (ASHA

2008:10). However, the question is raised whether all children with CLP and their families could benefit from these guidelines and how to align these guidelines with the needs of children with CLP and their families.

The implementation of ECI guidelines for young children with CLP often presents a challenge, especially in developing countries where some speech-language therapists are uninformed about basic cultural aspects, and risks and assets influencing communication development of infants with CLP and its management (Kuehn & Henne, 2003:103). However, factors described in the ASHA (2008) guidelines such as beliefs about child rearing practices, roles of authorities, perspectives on disabilities and different styles of communication could also influence how the family of a child with CLP will perceive and participate in the intervention process. It is thus important to gather information regarding factors in a developing country which could influence the child with CLP and the family's interaction and communication since it could determine the success of family-centred ECI (ASHA, 2008:11). Although there's a dearth of literature on ECI management of children with CLP in developing countries, the integrated framework of risks and assets presented in Chapter 1 Figure 1.1 is applied to evaluate, organize and synthesize the different research findings in order to reveal the limitations in knowledge regarding CLP (Leedy & Ormrod, 2005:2; 77).

2.8 ENVIRONMENTAL CHALLENGES OF EARLY CLP MANAGEMENT IN THE SOUTH AFRICAN CONTEXT

Developing countries such as South Africa may present with many unique challenges which must be considered when planning ECI for children with CLP and their families. Environmental challenges could be viewed as the environment in the integrated framework describing the effect of external experiences on the communication development of the child with CLP (Sameroff & Fiese, 2000). The environmental challenges described in this section include cultural differences, the psychological effect of the CLP on the family, financial implications, the effect of multiple hospitalizations and, finally, prenatal factors influencing the young child with CLP.

The local study of Louw et al. (2005:47) (Table 2.1) explored the cultural variations which exist in black families that influence their participation in a team approach and to describe the assets of the families that may be used to empower them and enhance service delivery. Similar results were found in two other studies conducted by Gopinath and Muda (2005:256) and Jacobs (2002:80) which reported that parents of children with CLP may have lower education levels than parents with children without clefts, which restrict them in accessing important information about the anomaly. The implications of the study included that families must be empowered by adjusting the method of information sharing in order to aid better understanding of the anomaly and eliminate language barriers. Families should also feel that they are regarded as important members of the cleft palate team and encouraged to voice their questions, concerns and priorities. The results of the study indicated that ECI for children with CLP in South Africa should aim to include all families and provide culturally appropriate services to all (Louw et al., 2005).

In addition to the provision of culturally appropriate services, speech-language therapists should also be able to identify environmental stress factors in the family of a child with CLP. According to Baker et al. (2008:229) (Table 2.1), the focus of psychological research in the past was on the effect of CLP on the individual, rather than the family. Additional life stressors which the family may experience as a result of having a child with CLP, such as feelings of incompetence, marital conflict and increased levels of stress, could influence the availability of emotional, social and financial resources as well as the general well-being of the family (Baker et al., 2008:229).

An increase in stress and poor adjustment may occur when there is an imbalance between demands and coping resources which causes a shift in family roles, goals, values and priorities in daily functioning (Baker et al., 2008:230). At the time of birth, parents of children with CLP may experience initial attachment difficulties due to feelings of shock, depression, guilt and anxiety of having a child with CLP, which acts as an environmental stressor on the family (Bzoch, 2004:161; Peterson-Falzone, Hardin-Jones & Karnell, 2001:334; Rossetti, 2001:61; Strauss, 2001:228). Mother-child interaction

may present a challenge, since the mother could struggle with breastfeeding and could be separated from her child at birth. Parents may feel incompetent to manage and support their child's prolonged feeding difficulties and may experience difficulties in dealing with multiple diagnostic evaluations, surgery and hospitalizations (Peterson-Falzone et al., 2001:335). Limited financial resources for surgical to repair the CLP, medical expenses and follow-up speech-language therapy may also serve as an environmental stressor on families (Peterson- Falzone et al., 2001:334).

Since children with CLP are often exposed to multiple hospitalizations, the child is removed from the comfort of his/her home environment and familiar family routines (Smedegaard et al., 2008). Consequently, disruptions in family care-giving patterns and parent-child communication interaction may occur (Rossetti, 2001:63). Limited parent-child interaction often results in inadequate language stimulation and may have a detrimental effect on the communication development of the child with CLP.

Prenatal environmental factors such as maternal alcohol use and smoking, teenage pregnancy, use of anticonvulsant medications and maternal nutritional status were also identified as high risk environmental factors for causing the anomaly of CLP and limiting opportunities for language stimulation after birth (Grewal et al., 2008: 519; Peterson- Falzone et al., 2001:2). These risk factors could inhibit optimal parent-child interaction leading to decreased communication opportunities and a delay in speech and language development in the young child with CLP.

2.9 ASSETS IN YOUNG CHILDREN WITH CLP

Despite risk factors influencing a child with CLP and his/her family, Baker et al. (2008) (Table 2.1) identified a range of protective outcomes that parents with children with CLP experienced which could serve as assets. Assets could support adjustment in the family to enhance developmentally appropriate outcomes in the child with CLP (Werner, 2000:116) According to Baker et al. (2008) in Table 2.1, parents were mostly approach-oriented since they looked for support, solved problems and analyzed the situation in a

logical manner instead of avoidance-oriented, such as cognitive avoidance, emotional discharge and passive acceptance coping strategies. Similar findings were found in past research which identified the key factors in the family to be levels of social support and effective coping strategies (Baker et al., 2008). In addition the influence of the child's age, cleft type and other reported medical conditions were also explored. Since the findings indicated that no significant relationship existed between the child's age, type of cleft or medical problems and coping strategies or levels of support, it provided evidence that parents may experience positive outcomes from having a child with CLP. These research findings has implications for the development of a family-centred approach that is focused on the psychosocial needs of parents, their children with CLP and the extended family. However, the study included possible sample bias since parents with more protective coping strategies and attitudes were more likely to complete the questionnaire than parents with higher levels of distress (Baker et al., 2008: 235). It was also not possible to analyze fathers' and mothers' responses separately, thus the results were mostly based on the mothers' responses, while the response to a stressor may be different for fathers (Baker et al., 2008: 236).

In summary, the importance of identifying environmental stressors in a family with a child with CLP and implementing an asset-based approach in ECI is acknowledged. The family must be viewed in a holistic manner and speech-language therapists should consider the multiple biological and environmental risk factors and assets which could influence the developmental outcome of a child with CLP as genotype. Speech-language therapists should, in collaboration with a clinical psychologist, aim to manipulate contributing factors by teaching appropriate coping strategies and providing the necessary informational as well as emotional support.

2.10 PRESENTATION OF THE INTEGRATIVE THEORETICAL FRAMEWORK OF RISKS AND ASSETS RELATING TO YOUNG CHILDREN WITH CLP AND THEIR FAMILIES

Many factors and issues emerged from the research presented in Table 2.1. The relevant literature were collected, organized and analyzed in order to demonstrate the complex interaction of the genotypical, phenotypical and envirotypical factors on the young CLP child's development and on his/her family. The discussion of research findings in Chapter 2 provided comprehensive information on the various factors and communication characteristics of young children with CLP which are included in the proposed framework presented in Figure 2.1.

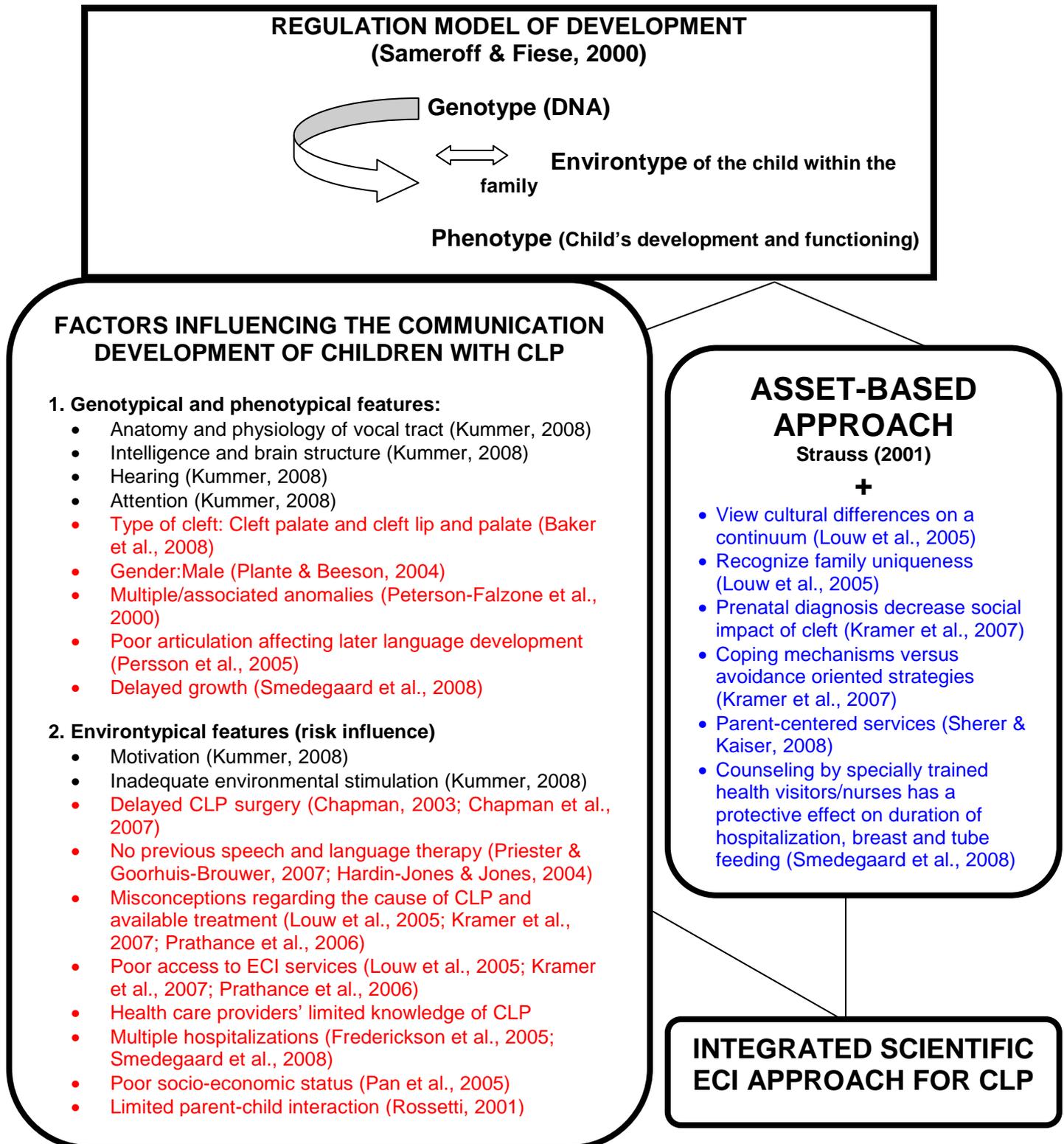


Figure 2.1: An integrated theoretical framework to reveal research findings on the early communication functioning of the child with CLP and the family

Legends for Figure 2.1:

Literature in original framework in Figure 1.1

Additional genotypical, phenotypical and environtypical factors identified from the literature review in chapter 2

Additional assets identified in the literature review in chapter 2

In addition to the illustrated genotype in Figure 1.1, the type of cleft (Baker et al., 2008), gender, the presence of multiple and associated anomalies and a breakdown in articulation skills (Persson et al., 2005) were added to Figure 2.1, since these factors could potentially affect later language development. Regarding the envirotype, it is important to include the timing of surgery (Priester & Goorhuis-Brouwer, 2007) and previous speech-language therapy (Hardin-Jones & Jones, 2004), as both were indicated to have a significant effect on later speech and language development. The findings imply that speech-language therapists should recommend earlier surgery and emphasize the importance of early communication intervention. Additionally, the effect of misconceptions regarding the cause of CLP, available treatment, healthcare providers' knowledge of CLP as well as access to ECI services and socio-economic status need to be acknowledged (Kramer et al., 2007; Louw et al., 2005; Prathance et al., 2006). The risk influence of multiple hospitalizations on the child's communication development and the detrimental effect of limited parent-child interaction (Frederickson et al., 2005; Smedegaard et al., 2008) were also described in the literature overview and thus added to Figure 2.1.

However, speech-language therapists could ameliorate the risk factors by following an asset-based approach to ECI. In addition to the asset-based approach described by Strauss (2001) and illustrated in the proposed model in Chapter 1, several aspects were recognized in the literature which may serve as assets in a young child with CLP and were supplemented in Figure 2.1. According to Louw et al. (2005) it is important to view cultural differences on a continuum and to recognize family uniqueness. Prenatal diagnosis of a cleft was also identified to increase the protective social impact of cleft as well as the use of coping mechanisms instead of avoidance oriented strategies that were emphasized by Kramer et al. (2007).

2.11 CONCLUSION

All research findings applied to the context where the studies were conducted and therefore results may not be applicable or valid for another context. Further research is therefore needed to identify possible age-specific factors

unique to the context of a specific clinic such as CHRIB at the University of Pretoria. This empirical research study could demonstrate how the integrated framework of risks and assets may be contextualized.

2.12 SUMMARY

Chapter 2 explored different theoretical perspectives and provided an in-depth overview of literature on the protective and risk factors which influence the young child with CLP and his/her family. The unique communication characteristics of young children with CLP were also identified and described. In addition, the significant role of family-centered ECI was highlighted and the challenges faced by professionals as well as families with children with CLP, within the South African context, were discussed. Finally, new knowledge arose from the comprehensive literature overview and was added to the proposed integrated framework of risks and assets, first presented in chapter 1 and now further developed in chapter 2, in order to expand the scientific approach to ECI for young children with CLP and their families.

CHAPTER 3

METHODOLOGY

CHAPTER AIM: The aim of the chapter is to describe and specify the planning and the implementation of the study in order to establish possible age-specific factors which could influence communication development in a group of young children with CLP.

3.1 INTRODUCTION

The research process is a systematic, collaborative human activity which involves the collection, analysis and interpretation of information in order to increase knowledge of a phenomenon of interest (De Vos, 2005:41; Leedy & Ormrod, 2005:2). This insight into new and unknown knowledge is supported by a scientific method which serves as the basis for research methodology. The scientific method includes the following processes: 1) to identify a research problem; 2) to state a hypothesis that relates to the research problem; 3) to gather data relevant to the hypothesis; and 4) to analyze and interpret the data accordingly (Leedy & Ormrod, 2005:33). The importance of a well-designed research methodology is critical in evaluating the quality of the research and the relevance thereof to establish particular research outcomes (Leedy & Ormrod, 2005:34).

3.2 AIMS OF THE STUDY

3.2.1 Main aim

To identify and describe age-specific risk factors and assets influencing communication development of children with cleft lip and palate (CLP) younger than four years within a particular early communication intervention (ECI) context.

3.2.2 Objectives

1. To describe the level of communication development in the areas of listening skills, cognitive skills, receptive and expressive language

skills, pragmatic skills, gestural communication skills, play skills, skill in language use and gross motor skills of children, 1 month to 48 months with CLP, at three specific age group intervals.

2. To identify and determine the nature of the association between the risk factors and assets (independent variables), and areas of communication development (dependent variables) at the *[1;12) months', [12;24) months' and [24;48) months' age group intervals.
3. To identify the factors which have the greatest influence on communication development at specific age group intervals in order to determine an overall developmental trend in the children with CLP aged between 1 month and 48 months.

The objectives of the research study which will be discussed according to the three age group intervals are outlined in Figure 3.1.

**The age group interval [1;12) indicates that participants aged 1 month were included in this interval (squared bracket), while participants aged 12 months are excluded from this interval (open bracket). The same notation and explanation is used for the remaining two age group intervals.*

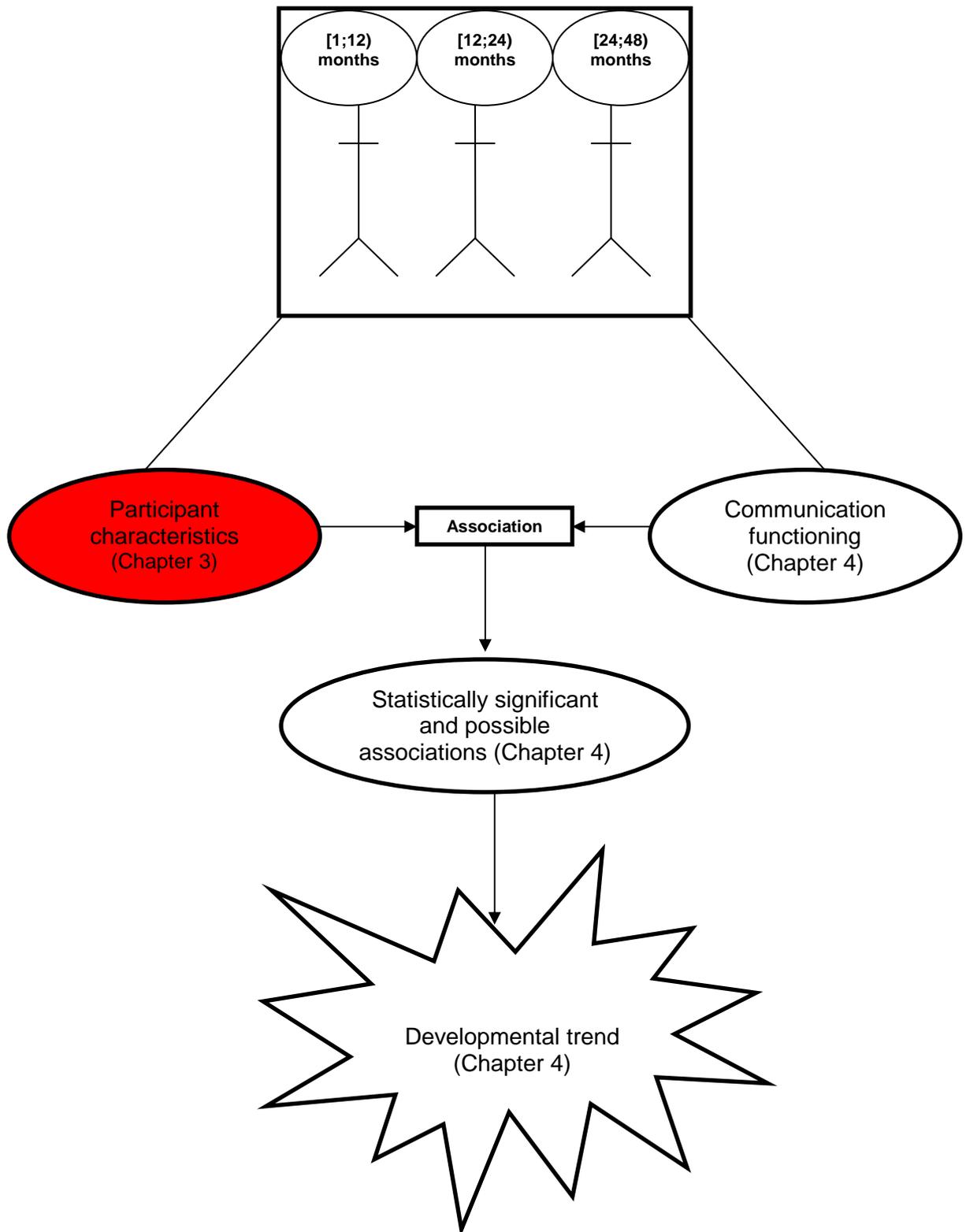


Figure 3.1: Outline of objective which will be discussed in chapter 3 (highlighted in red) and chapter 4

3.3 RESEARCH DESIGN

The research design was in essence descriptive in nature. In order to establish possible relationships between protective and risk factors influencing communication development of children with CLP a retrospective, descriptive, between-subjects developmental research design, with a correlational approach, was employed (Leedy & Ormrod, 2005:179; Maxwell & Satake, 2006:214, Rugg, 2007:74). The retrospective, descriptive research design was selected in order to examine and describe the relationships, age group differences and developmental trends in young children with CLP, using pre-existing datasets in a clinic-specific database (Leedy & Ormrod, 2005:179; Maxwell & Satake, 2006:214). Since the study was based on pre-existing data, the research process was cost- and time-efficient (Maxwell & Satake, 2006:215). The disadvantage of descriptive research was that the findings were prone to bias since a specific group of children with CLP from a particular ECI context was selected (Leedy & Ormrod, 2005:208). Bias was limited as the data were consistently and comprehensively collected by the same experienced team of ECI clinicians and captured by one clinician within the period 1996 to 2009 (Kritzinger, 2000:165, 190).

The correlational research design was selected to determine whether a relationship existed between the observed biological, environmental risk and assets (independent or explanatory variables) and selected communication development areas (dependent variables) (Leedy & Ormrod, 2005:181). A positive relationship between the dependent and independent variables could indicate that the two variables are related (Field, 2005:686). While the correlational approach was implemented caution was taken not to assume that one factor must in some way influence another, since no purposeful effort was performed to manipulate the factors as in a true experimental design (Leedy & Ormrod, 2005:182; Maxwell & Satake, 2006:35). Although cause and effect cannot be established the extent and degree to which the two variables were intercorrelated could still provide valuable information when compared to research conducted on the topic (Leedy & Ormrod, 2005:182).

Since the three age groups did not comprise of the same group of participants which were observed over time, a between-subjects developmental design was used to describe the development of three different groups of participants at three age group intervals at a specific point in time (Brink, 2002:9; Maxwell & Satake, 2006:221; Rugg, 2007:74). The presence of pre-existing factors, in the three age groups interfered with the establishment of similarity in the groups which resulted in sample bias. These pre-existing factors included that the participants in the [1;12) and [12;24) months age groups were mainly referred from the FCDC as part of the treatment protocol at the clinic, while the participants in the [24;48) visited CHRIB based on parental concern regarding their child's development. Sample bias was limited since inferential statistics were performed per age group and therefore no statistical analysis was conducted across all the age groups.

3.4 RESEARCH ETHICS

Researchers have a responsibility towards their participants, the greater community presenting with CLP and their families, colleagues, other professionals and the general society to respect their well-being by conducting research in an honourable and truthful manner (Maxwell & Satake, 2006:67). According to Leedy and Ormrod (2005:101) it is important to consider the ethical implications whenever human beings are the focus of a study. For the purpose of the study only the datasets of the clients in the Clinic for High Risk Babies (CHRIB) database were used. The research project was approved by the Research Proposal and Ethics Committee of the Faculty of Humanities (See Appendix I) and careful consideration was given to the following ethical principles.

3.4.1 Informed consent

Informed consent was already addressed since written permission of parents for the use of assessment data in research was obtained prior to every assessment conducted at CHRIB (Kritzinger, 2000:166; Leedy & Ormrod, 2005:101). From the onset of data collection for the CHRIB database in 1996 families were informed with a letter regarding the use of CHRIB data for research purposes since the clinic was affiliated to an academic training and

research department. All clients provided consent during that time. Since 2007, in accordance with revised ethical guidelines from the Research Proposal and Ethics Committee of the Faculty of Humanities, parents have also been requested to give written informed consent for their data to be entered into the CHRIB database. Consent was therefore obtained from all participants whose data have been used for the current study.

3.4.2 Right to privacy

The participants' right to privacy was respected by assigning an identification code to each dataset thereby ensuring confidentiality of identifying information of the participants and their families (Leedy & Ormrod, 2005:102). Caution was taken when storing back-up copies of the results. The data were electronically stored on a memory stick as well as on an accredited website for data storage which both require an encrypted password to allow access to the data. In compliance with regulations endorsed by the University of Pretoria the data in the CHRIB database are also to be stored securely in the Department of Communication Pathology for future research and referencing purposes.

3.4.3 Respect for professional colleagues

Since the researcher had an ethical responsibility to show respect towards study leaders, professional colleagues and society careful consideration was taken to report accurately and truthfully on the results of the study (Maxwell & Satake, 2006:67). The researcher also assigned rightful credit to other professionals' guidance and contributions by referencing where it was due (Leedy & Ormrod, 2005:102; Struwig & Stead, 2001:70).

3.4.4 Permission to use the database

The CHRIB database is the exclusive property of the Department of Communication Pathology and written permission to use the database for the purpose of this study was obtained from the head of the Department (See Appendix II).

3.4.5 Research Bias

Since the CHRIB database was created by the supervisor (Kritzinger, 2000) the ethical implications of research bias had to be considered. In order to increase the reliability of the results of the study it was essential to gain supervision from an experienced ECI clinician who had an exclusive, in-depth knowledge and understanding of the functioning of the database and showed familiarity with its content. Although the supervisor provided the researcher with the raw data on the CHRIB database system, research bias was addressed since the supervisor had no involvement in the process of statistical data analysis. Two independent experts, who respectively specialized in information technology and statistics, were consulted. The information technology specialist was employed to provide support with the process of extracting the data from the database. The statistical description and inference of the data were independently conducted by the researcher, supported by the expertise of an experienced statistician.

3.5 PARTICIPANTS

3.5.1 Participant selection criteria

In order to address the main aim of the study, i.e. to identify and describe factors influencing the communication development of children with CLP within a specific ECI context, the following selection criteria applied:

- The data consisted of datasets in the CHRIB database that related to young children who were diagnosed with a CLP as well as their families.
- All the different cleft types were included in the study.
- The datasets included children ranging in age from 1 month to 48 months, since the CHRIB database system mainly consists of a caseload of children ranging from birth to four years.
- Although some of the participants with CLP received multiple annual assessments, the datasets used in the study pertained mainly to initial assessments conducted at CHRIB.

- Datasets included children irrespective of gender, population group and language to increase the possibility of generalization of the results to the general population with CLP in South Africa.

3.5.2 Sampling method

Purposive sampling was implemented as a non-randomized sampling method in the study (Maxwell & Satake, 2006:97; De Vos, 2005:202). This sampling method, described by De Vos, (2005:202), is relevant to the current study since a particular group of children with CLP and their families from a specific ECI clinic were selected based on unique features pertaining to multiple factors that could influence their communication development. The families were originally referred to CHRIB by the local facial cleft deformities clinic. The disadvantage of this sampling method is that it could result in an unrepresentative sample since it was biased to those families who were referred to CHRIB and were able to afford transport if they were not living in Pretoria. Therefore caution should be taken to generalize the results of the study to a wider population with CLP in South Africa.

3.5.3 Sample size

All the complete datasets in the CHRIB database that met the specified selection criteria were utilized. The total sample size consisted of 227 datasets of children with CLP and their families, which comprises 41% of the total database of 559 datasets at the time of data extraction. The data in the CHRIB database were collected over a period of 13 years and the research sample was selected in July 2009. No datasets were discarded in the study.

3.6 MATERIAL

Since the CHRIB database was already established with datasets that were already collected and recorded in electronic format, no material was utilized in the present study. Due to the retrospective nature of the study data were extracted from the CHRIB database and analyzed by means of computerized statistical programmes as explained later in the current chapter under 3.8.

The CHRIB database was developed in 1996 as a doctoral research project to establish a computer-based data system for ECI in South Africa (Kritzinger, 2000). The database has since been utilized to keep updated entries of assessment results that were obtained from March 1996 to date (annual statistics of CHRIB included in the Annual Reports of the Department of Communication Pathology, 1996-2009). During the period, from March 1996 to February 2009, 559 children ranging from birth to six years, presenting with various communication problems, were assessed and their data captured in the CHRIB database (personal communication with Kritzinger in 2009).

According to Kritzinger (2000:181) the contents of the CHRIB database were originally based on the main features of the CHRIB Case-history form (Kritzinger & Louw, 2000) and the CHRIB Assessment Protocol (Kritzinger & Louw, 2002) - see Appendix VI c and d. The CHRIB case-history form (Kritzinger & Louw, 2000) includes five sections with open-ended questions requiring short, descriptive responses, closed questions and dichotomous questions requiring “YES/NO” answers from the parents (Kritzinger, 2000:170).

Section 1 consists of personal information about the child and the family, section 2 contains factual questions regarding the pregnancy and birth history in order to determine factors influencing the particular child over time. Section 3 relates to the child’s postnatal medical history and section 4 obtains information regarding the child’s developmental history. The last four questions provides the family with the opportunity to express concerns about their child’s speech and language development and hearing abilities, to describe their expectations of the assessment and to describe their own efforts to support their child with CLP (Kritzinger, 2000:172).

The CHRIB Assessment Protocol (Kritzinger & Louw, 2002) was developed in order to expose the child to a variety of communicative opportunities by implementing developmental scales, utilizing developmental criteria and using one norm-referenced measurement. The data obtained from of the CHRIB Assessment Protocol describing 12 developmental areas can be translated

into intervention goals and guidelines to establish an individualized ECI programme. The following assessment instruments are included in the updated version of the CHRIB Assessment Protocol (KMP 482 Study Guide, 2011)-see Appendix VI a.

Table 3.1: EC Assessment instruments included in the updated version of the CHRIB Assessment Protocol as presented in the KMP 482 Study Guide (2011).

Instrument	Aims/description
Level 1: Possible causes or contributing factors to the child's communication or hearing problem	
1. Genetic screening checklist Kritzinger, A., & Louw, B. (1998). <i>Clinica</i> , 2: 11-26.	Visual observation of external physical, intra-oral features of the child. The focus is on the head, ears and face, as genetic anomalies in these areas are likely to affect hearing, speech and language development
2. Risk Assessment Kritzinger, 1994, updated 2010.	Identification of pre- and perinatal conditions that may constitute risks for development. The outcome of the assessment is a cumulative risk profile of the child's early development which must be considered when determining causes or contributing factors to developmental delay or disorders.
3. Basic hearing testing battery, including otoscopy, immittance measurements, OAE and VRA	The aim is to screen the child's hearing ability, i.e. determine whether there is a problem or not, whether to refer to an ENT or ABR testing
4. Sensory Processing Characteristics Based on Dunn, W. (2007). Supporting children to participate successfully in everyday life by using sensory processing knowledge. <i>Infants and Young Children</i> , 20(2):84-101.	Description of information processing from 7 sensory experiences based on four patterns of self-regulation strategies or behavioural responses. Assists in understanding children's behaviours and emotional responses.
5. Regulatory Disorder Checklist Kritzinger, 2008.	Screening for sensori-motor or organizational processing difficulty so that a referral to an occupational therapist can be made
Level 2: Communication, language and feeding skills	
6. CHRIB Listening Scale Hugo, R., Louw, B., Kritzinger, A., & Smit, G. J. (2000). <i>Infant-Toddler Intervention. The Transdisciplinary Journal</i> , 10(1): 47-53.	Qualitative evaluation of listening skills during the communication evaluation and the hearing test
7. The Rossetti Infant-Toddler Language Scale Rossetti, L. M. (2006). Illinois: LinguiSystems, Inc.	A comprehensive language and communication assessment instrument relying on direct observation, elicitation and parental report, for children 0-36m
8. Assessment of Communication Skills Based on Wetherby & Prizant; Muller 2004.	Description of the child's communication functions and means, expressed as



	behaviour regulation, social interaction and shared attention, on a continuum of non-verbal to verbal communication
9. CHRIB Checklist for Infant-Toddler Feeding Skills Based on Jelm, J.M. (1990). Tucson: Therapy Skill Builders. Updated, 2010.	Reporting on feeding skills development and 6 point scale description of current feeding skills based on observation of feeding
10. CHRIB Emergent Literacy Developmental Checklist Based on van Kleeck, A. (1992); Roth F., & Worthington, C.K. (2005).	Description of book reading skills and drawing, based on observation of the child
11. Mother/Infant Communication Screening Based on Raack, C.B. (1989). Schaumburg.	Evaluation on a five-point scale of parent-child language interaction and synchrony, when the child is distressed, during feeding and play, and in a neutral state
12. Observation of communication interaction Based on Klein, M.D., & Briggs, M.H. (1987). <i>Journal of Childhood Communication Disorders</i> , 10(2): 95-106. Updated 2007.	4 point scale to assess the mother-child communication interaction on ten different variables
Level 3: General development	
13. Developmental Activities Screening Inventory (DASI-II) Fewell, R.R., & Langley, M.B. (1984). Austin: Pro-Ed.	The only norm-referenced test used in CHRIB. Assesses children's cognitive and fine motor skills, obtaining a developmental age and a developmental quotient. 0-5years
14. Developmental Assessment Schema (DAS) Anderson, D., Nelson, J., & Fowler, S. (1978). In Northcott, W.H. (Ed.) <i>Curriculum Guide: Hearing Impaired Children (0-3 years) and their Parents</i> . Washington DC. The Alexander Bell Association for the Deaf, Inc. Updated, 2010.	Assessment of seven developmental domains in three month intervals, from 0-5 years
15. CHRIB Checklist for Infant-Toddler Play Based on Owens, 2005; Rossetti, 2001; Roth & Worthington, 2005; Westby, 2000.	Provides a description of development of play from pre-symbolic to symbolic play, the types of play and nature of play experiences the child receives at home

All the information of each child's CHRIB assessment is documented in separate paper files and these files are stored in a secure office where only staff and students, actively involved in clinical service delivery and training, have access to it. Since research requires the speedy retrieval and manipulation of data which could only be established by means of a database system, the need for a computerized database system was identified by Kritzinger (2000) The following discussion provides the most important features of the CHRIB database system.

The CHRIB database system is a relational database in Microsoft®Access, which allows for multiple entries of data for one client to accommodate serial assessments and provides the opportunity for longitudinal research (Kritzinger, 2000:175). Table 3.2 indicates the total number of 1st assessments that were conducted on an annual basis from 1996 to 2009. The data were systematically recorded in separate rows, each row representing a child with CLP and his/her family. The total number of rows thus indicates the total number of datasets of participants with CLP and their families (Kritzinger, 2000:189). Each dataset comprises of 16 different tables, each table consisting of rows and columns which are labelled in abbreviated format, on the Main Form as *Client, Parentship, Persons involved, Referring persons, Persons, Diagnosis, Language, General Illnesses, Surgery, Medication, Viral infections, Perinatal, Assessments and Assessment on the Main form 2, Parent-child interaction and Memos.*

Table 3.2: CHRIB Statistics (1996-2009): An outline of the total initial and re-assessments conducted at CHRIB and the number of participants who were assessed with CLP per year

Year	1 st Assessments	Number of participants assessed with CLP	Percentage of participants assessed with CLP
1996	38	22	58%
1997	38	16	42%
1998	37	20	54%
1999	40	22	55%
2000	64	29	45%
2001	54	30	56%
2002	51	29	57%
2003	49	26	53%
2004	52	24	46%
2005	44	29	66%
2006	46	19	41%
2007	49	23	47%
2008	43	20	47%
2009	54	12	22%
TOTAL	659	321	
Mean	47	23	49%

According to Table 3.2, the mean number of all the participants with CLP assessed at CHRIB each year is 23 and almost half of the total number of participants that were assessed at CHRIB presented with CLP. These numbers could be related to the fact that a high percentage of referrals are from the local Facial Cleft Deformities Clinic (FCDC).

Although no material was utilized in the study, electronic forms were created in Microsoft®Word and Microsoft®Excel in order to organize the already existing data and provide a new direction in effective management of electronic data for future research purposes. These electronic forms are presented in table-format in Appendix III a and b.

3.7 DATA COLLECTION PROCEDURES

As previously discussed, the existing datasets in the CHRIB database had served as a retrospective data source in the study (Maxwell & Satake, 2006:214). An advantage of a retrospective data collection method is that the study utilized previously collected data and yielded to be less time consuming and to be more financially viable (Maxwell & Satake, 2006:215). In addition, the database allowed for easy access to an extensive amount of datasets which resulted in fast retrieval of a large sample of participants with CLP and their families. The disadvantage of the retrospective data collection method was that the validity of the findings was based on the integrity of the pre-existing data (Maxwell & Satake, 2006:215). The validity was, however, increased since the data in the CHRIB database were already comprehensively collected and captured in a uniform format based on the CHRIB Assessment Protocol (Kritzinger & Louw, 2002) which was used to assess all the children referred to CHRIB.

3.8 DATA PREPARATION

A computer system developer assisted the researcher with the extraction of the datasets from the CHRIB database. Since the computer system developer designed and developed the CHRIB database he was competent to provide information on the structure of, and the rationale for the database.

The computer system developer explained and demonstrated the procedures for data extraction and the researcher applied the same procedures. The researcher also conducted an in-depth literature study in order to familiarize herself with the contents of the CHRIB database and the features of the different software programmes utilized for statistical analysis including Microsoft®Access, Microsoft®Excel, Statistical Analysis System (SAS), (Version 9.2, 2011) and Statistical Package for the Social Sciences (SPSS) (Version 19.0, 2011). The following procedures were executed to extract the data from the database:

1. A back-up copy was made of the CHRIB database in Microsoft® Access.
2. Table ASSESSMENT_MAIN was opened.
3. Since some of the clients had multiple assessments at CHRIB, many of the Client ID's were duplicated in the column CLIENT ID. For the purpose of extracting only the first assessments, the first CLIENT ID was kept as it was (by looking at the ASSESSMENT DATE) and the rows of the follow-up assessments were deleted.
4. Queries were designed to sort and filter the data. The categories of data that were applicable to the study, their order, the filter criteria for each category and the order in which the categories must appear in the tables, were also specified (Aitken et al., 1997 in Kritzinger, 2000: 182).
5. In order to ensure that the final datasheets in Microsoft®Access consisted of only 227 rows, filters were designed to exclusively extract data relating to the initial assessments that were conducted and to include clients with CLP (ICD -10 codes (CSS, 1996) Q35>= d <Q38).
6. Each table was copied from Microsoft®Access to a spreadsheet in Microsoft®Excel. Each spreadsheet consisted of 227 rows and pivot tables were designed in cases where there was more than one entry per field.
7. All the spreadsheets were merged and then imported to SAS (Version 9.2, 2011) for editing of data and descriptive statistics on each variable in the database. The elaborated categories, originally used in the CHRIB database, were modified to cryptic code-names to enable

effective statistical analysis in SAS (Version 9.2, 2011). The original terms and categories and modified code-names are presented in Appendix III a. The programmes that were created in SAS to reduce the categories and to perform editing on the data are presented in Appendix IV. In the programmes the age groups are specified as 0-12 (i.e. [1;12) months age group), 12-24 (i.e. [12;24) months age group) and 24-48 (i.e. [24;48) months age group). The formula used to determine which communication areas were delayed and the related literature sources are presented in Appendix III b.

8. Extensive data processing of all the potential factors (independent variables), that may have had an influence on the early communication development areas (dependent variables) of participants with CLP, was performed in SAS. The data processing was performed in order to identify the most important relationships for each specific age group. In SAS, an appropriate pre-programmed statistical analysis procedure and specific syntax of options and statements, relating to each procedure, is specified (Cody & Smith, 2006: 495) (see Appendix IV)
9. A final analysis of the most important relationships, identified in SAS, was performed in SPSS (Version 19.0, 2011). SPSS Statistics consists of drop-down menus to select the appropriate statistical analysis procedures. The following components of SPSS were utilized for the purpose of descriptive and inferential statistical analysis of the data:
 - **Data Editor:** This spreadsheet function was used to edit and display data that were copied from Microsoft®Excel.
 - **Viewer:** This feature displayed the results by running a statistical procedure. The output could be in the form of statistical tables, charts, graphs or text, depending on the selection made when the procedure was applied.
 - **Multi-dimensional pivot tables:** These pivot tables enabled comparison of age-specific groups by splitting a table so that only one age-specific group is displayed at a time.

- **High-resolution graphics:** This feature creates high-resolution, full-colour pie charts, stacked-bar charts and histograms for graphical presentation of results.

The SAS software was suitable for data manipulation and analysis of a large number of variables and the features in SPSS enabled efficient reporting of the final statistical results in Chapter 4.

3.9 DATA ANALYSIS PROCEDURES

Basic descriptive statistics, which refer to process of classifying, organizing and summarizing observations on a single variable, were performed on each protective and risk factor (independent variable) and each area of communication development (dependent variable) (Maxwell & Satake, 2006:280; Struwig & Stead, 2001:158). Inferential statistics were performed by means of a chi-square test to determine the relationship between a categorical factor and a categorical area of communication development at a specific age group interval (Cody & Smith, 2006:106; Maxwell & Satake, 2006:336). An odds ratio was calculated to measure the size of the effect, thus describing how likely it is for the independent variable to have an effect on the dependent variable (Cody & Smith, 2006:100).

3.10 DESCRIPTION OF PARTICIPANTS IN THE DATASETS

The participants, whose datasets were utilized in the study, included 227 participants with CLP and their families, who were clients of CHRIB, referred to and assessed at CHRIB. All the participants were aged between 1 month and 48 months. The term 'dataset' thus refers to the electronic record of each participant and family in the CHRIB database.

The CHRIB was established in 1990 in the Department of Communication Pathology, University of Pretoria. The clinic had since served as an under- and post-graduate training facility where formal assessments are conducted and intervention is provided to young children with communication delay and disorders, and their families (Kritzinger, 2000).

All the participants and their families, who visited CHRIB, were assessed by means of the complete CHRIB Assessment Protocol (Kritzinger & Louw, 2002). The assessments were conducted by at least three of a team of four experienced ECI data collectors which rendered the datasets in the CHRIB database as scientifically sound (Kritzinger, 2000:165). The data of each participant were also consistently captured in the CHRIB database by the same ECI clinician, within a week after the assessment (Kritzinger, 2000:190). A general description of the participants' characteristics included gender, first language, age group, diagnostic category, type of day care, medical aid, mother's education, father's education, mother's occupation, referring person, previous ECI received, a family history of speech-, language- and hearing-difficulties and peri- and postnatal conditions of the participants.

Table 3.2 illustrates the 13 biological and demographic characteristics of the participants and their families in the study. Each of the characteristics is divided into different categories which were either retained from the original database or created for the purpose of statistical analysis. An age-specific profile of the participants' characteristics is presented in Table 3.3. The purpose of Table 3.3 is to demonstrate how the recorded data in the CHRIB database were classified and grouped according to specific age group categories for the purpose of advanced statistical calculations performed in chapter 4. The participants will be discussed based on each characteristic presented in Table 3.3 and Table 3.4.

Table 3.3: A general description of all the participants (children with CLP) and their families (n=227)

Characteristics	Categories	Frequency	(%)
3.10.1 GENDER	Female	100	44 %
	Male	127	56 %
	TOTAL	227	100 %
3.10.2 FIRST LANGUAGE	Afrikaans and English	22	10 %
	Other languages (German, IsiZulu, Italian, Memmon, Portuguese, Northern- Sotho, Sepedi, Setswana, Swazi, Tamil, Turkish, Urdu, Xhosa, Zulu, SeSotho)	26	11 %
	English	40	18 %
	Afrikaans	139	61 %
	TOTAL	227	100 %
3.10.3 AGE OF THE PARTICIPANTS Mean age = 16.15 months Median age = 13.56 months	[1;9) months	27	12 %
	[9;12) months	55	24 %
	[12;15) months	53	24 %
	[15;18) months	25	11 %
	[18;24) months	28	12 %
	[24;48) months	39	17 %
	TOTAL	227	100 %
3.10.4 DIAGNOSTIC CATEGORIES (three missing values)	Cleft lip	9	4 %
	Cleft palate	90	39 %
	Cleft lip and palate (14% with associated syndromes)	126	55 %
	TOTAL	224	100 %
3.10.5 TYPE OF DAY CARE (12 missing values)	Nursery School	18	8 %
	Other family members	30	14 %
	Day Care	31	15 %
	Caregiver	39	18 %
	Mother	97	45 %
	TOTAL	115	100 %
3.10.6 MEDICAL AID (one missing value)	No medical aid	46	20 %
	Medical aid	180	80 %
	TOTAL	226	100 %
3.10.7 EDUCATION OF THE MOTHER (five missing values)	No schooling	2	1 %
	Diploma/Certificate	38	17 %
	Degree	49	22 %
	High school education	133	60 %
	TOTAL	122	100 %
3.10.8 EDUCATION OF THE FATHER (five missing values)	No schooling	1	0.5 %
	Diploma/Certificate	39	18.5 %
	Degree	51	24 %
	High school education	119	57 %
	TOTAL	122	100 %
3.10.9 OCCUPATION OF MOTHER (25 missing values)	Administrative clerk	48	24 %
	Stay-at-home mother	76	38 %
	Professional	78	38 %
	TOTAL	202	100 %

Table 3.3 (cont.): A general description of all the participants (children with CLP) and their families (n=227)

Characteristics	Categories	Frequency	(%)
3.10.10 REFERRING PERSON (17 missing values)	Speech-language therapist	16	8 %
	Parents	17	8 %
	Community health nurse/ Medical service provider/ Maxillo-, Facial- and Oral surgeon	177	84 %
	TOTAL	110	100 %
3.10.11 PRIOR SPEECH-LANGUAGE THERAPY AND/OR AUDIOLOGY (two missing values)	Previous speech-language therapy and/or audiology	27	12 %
	No previous speech-language therapy or audiology	57	25 %
	Home programmes provided by speech-language therapist at FCDC	141	63 %
	TOTAL	125	100 %
3.10.12 FAMILY HISTORY OF SPEECH-, LANGUAGE-, HEARING PROBLEMS OR CLP	Family history	43	19 %
	No family history	184	81 %
	TOTAL	227	100 %
3.10.13 PERI- AND POSTNATAL CONDITIONS Mean birth weight= 3,03 kg	Low birth weight	41	18 %
	No low birth weight	186	82 %
	TOTAL	227	100 %
	Premature birth	30	13 %
	Full term	197	87 %
	TOTAL	227	100 %
	Respiratory distress syndrome	17	7 %
	No respiratory distress syndrome	210	93 %
	TOTAL	227	100 %
	Otitis media	115	51 %
No otitis media	112	49 %	
TOTAL	227	100 %	
3.10.14 MEAN AGE OF THE MOTHER AT THE TIME OF ASSESSMENT:	27 years		



Table 3.4: An age-specific description of the characteristics of the participants and their families (n= 227)

Characteristics	Categories	[1;12) (n=82)		[12;24) (n=106)		[24;48) (n=39)	
		Fre- quen- cy	%	Fre- quen- cy	%	Fre- quen- cy	%
3.10.1 GENDER	Female	37	45 %	44	42 %	19	49 %
	Male	45	55 %	62	48 %	20	51 %
	TOTAL	82	100 %	106	100 %	39	100 %
3.10.2 FIRST LANGUAGE	Afrikaans and English	5	6 %	12	11 %	5	13 %
	Other languages (German, IsiZulu, Italian, Memmon, Portuguese, Northern- Sotho, Sepedi, Setswana, Swazi, Tamil, Turkish, Urdu, Xhosa, Zulu, SeSotho)	9	11 %	10	9 %	7	18 %
	English	16	20 %	19	18 %	5	13 %
	Afrikaans	52	63 %	65	61 %	22	56 %
	TOTAL	82	100 %	106	100 %	39	100 %
3.10.3 AGE	[1;9) months	27	33 %				
	[9;12) months	55	67 %				
	[12;15) months			53	50 %		
	[15;18) months			25	24 %		
	[18;24) months			28	26 %		
	[24;48) months					39	100 %
TOTAL	82	100 %	106	100 %	39	100 %	
3.10.4 DIAGNOSTIC CATEGORIES	Cleft lip YES	4	5 %	4	4 %	1	3 %
	Cleft lip NO	78	95 %	102	96 %	38	97 %
	TOTAL	82	100 %	106	100 %	39	100 %
	Cleft Palate YES	30	37 %	41	39 %	19	49 %
	Cleft Palate NO	52	63 %	65	61 %	20	51 %
	TOTAL	82	100 %	106	100 %	39	100 %
	Cleft Lip and Palate YES	47	57 %	60	57 %	19	49 %
Cleft Lip and Palate NO	35	43 %	46	43 %	20	51 %	
TOTAL	82	100 %	106	100 %	39	100 %	
3.10.5 TYPE OF DAY CARE	Other caregivers (nursery school, other family members, day care, caregiver at home)	31	44 %	31	40 %	7	39 %
	Mother	39	56 %	47	60 %	11	61 %
	TOTAL	70	100 %	78	100 %	18	100 %
3.10.6 MEDICAL AID	No medical aid	14	17 %	84	79 %	29	74 %
	Medical aid	67	83 %	22	21 %	10	26 %
	TOTAL	81	100 %	106	100 %	39	100 %
3.10.7 EDUCATION OF THE MOTHER	High school education	47	69 %	63	74 %	28	82 %
	Tertiary education (diploma, certificate, degree)	21	31 %	22	26 %	6	18 %
	TOTAL	68	100 %	85	100 %	34	100 %

Table 3.4 (cont.): An age-specific description of the characteristics of the participants and their families (n= 227)

Characteristics	Categories	[1;12) (n=82)		[12;24) (n=106)		[24;48) (n=39)	
		Frequency	%	Frequency	%	Frequency	%
3.10.8 EDUCATION OF THE FATHER	High school education	39	51 %	57	58 %	24	71 %
	Tertiary education (diploma, certificate, degree)	37	49 %	42	42 %	11	29 %
	TOTAL	76	100 %	99	100 %	35	100 %
3.10.9 OCCUPATION OF THE MOTHER	Working outside the home (administrative work, professional)	49	64 %	59	63 %	20	61 %
	Stay-at-home mother	28	36 %	35	37 %	13	39 %
	TOTAL	77	100 %	94	100 %	33	100 %
3.10.10 REFERRING PERSON	Speech-language therapist	3	4 %	9	9 %	4	11 %
	Parents	7	9 %	7	7 %	3	9 %
	Community health nurse/ Medical service provider/ Maxillo-, Facial- and Oral surgeon	64	87 %	85	84 %	28	80 %
	TOTAL	74	100 %	101	100 %	35	100 %
3.10.11 PRIOR SPEECH-LANGUAGE THERAPY AND/OR AUDIOLOGY	Speech-language therapy and/or audiology (previous speech-language therapy and/or audiology / home programmes provided by speech-language therapist at FCDC)	62	78 %	74	70 %	32	82 %
	No previous speech-language therapy or audiology	18	22 %	32	30 %	7	18 %
	TOTAL	80	100 %	106	100 %	39	100 %
3.10.12 FAMILY HISTORY OF SPEECH, LANGUAGE, HEARING PROBLEMS OR CLP	Family history	16	20 %	89	84 %	10	26 %
	No family history	66	80 %	17	16 %	29	74 %
	TOTAL	82	100 %	106	100 %	39	100 %
3.10.13 PERI- AND POSTNATAL CONDITIONS	Low birth weight	13	16 %	24	23 %	4	10 %
	No low birth weight	69	84 %	82	77 %	35	90 %
	TOTAL	82	100 %	106	100 %	39	100 %
	Premature birth	12	15 %	17	16 %	1	3 %
	Full term	7	85 %	89	84 %	38	97 %
	TOTAL	19	100 %	106	100 %	39	100 %
	Respiratory distress syndrome	7	9 %	8	8 %	2	5 %
	No respiratory distress syndrome	75	91 %	98	92 %	37	95 %
	TOTAL	82	100 %	106	100 %	39	100 %
	Otitis media	35	43 %	61	58 %	19	49 %
No otitis media	47	57 %	45	42 %	20	51 %	
TOTAL	82	100 %	106	100 %	39	100 %	

3.10.1. Gender of the participants

Table 3.3 illustrates the gender bias with reference to the participants, presenting with CLP, in the CHRIB database. These results agree with findings of Kritzinger (2000:198) stating that male infants with CLP generally showed a higher prevalence of communication disorders than female infants with CLP. With reference to the Gauteng area, where the University of Pretoria is situated, Statistics South Africa reported that 40 068 males and 35 386 females presented with communication disorders (Statistics South Africa-Census, 2001). The higher percentage of boys presenting with CLP than girls in the participants supports the universal phenomenon that males may generally be more at risk for communication disorders than females (Peterson-Falzone et al., 2001:13). Male gender majority was therefore a characteristic of the participants' genotype. The first language of the participants formed part of their phenotype.

3.10.2 First language of the families

According to Table 3.3, the majority (61%) of the participants visiting CHRIB spoke Afrikaans while only 18% of the participants indicated English as their first language. The minority of only 4% of participants who use other languages can be attributed to the fact that CHRIB is situated at the University of Pretoria. The university is situated in the Eastern part of Pretoria, where Afrikaans is the most frequently spoken language, followed by English. According to Statistics South Africa (Census, 2001) 14.4% of the total population in Gauteng prefers Afrikaans as their home language, while 12.5% has a preference for English. Another reason for the high prevalence of Afrikaans speaking participants could be related to the fact that the Department of Communication Pathology was in the past mainly regarded as an Afrikaans institution.

3.10.3 Age group classification of the participants with CLP

According to Table 3.3, the ages of the participants presented within a broad spectrum ranging from 1 month to 48 months with an over-all mean age of 16 months and an over-all median age of 13 months. Due to the positively skewed nature of the age distribution the median age of 13 months is

regarded as a better representative measure of average age value in the group of participants than the arithmetic mean age of 16 months. Since the aim of the study is to determine age-specific factors influencing communication development, it was relevant to categorize the participants into suitable age groups. According to Table 3.3 the majority of the participants in the study, ranged within the age groups [9;12) and [12;15) months. The age-range could be attributed to the FCDC protocol which states that clients should be referred from the FCDC for a speech, language and hearing evaluation at completion of their primary cleft palate surgery (Bütow, n.d.). Depending on the type of surgery, the referral to CHRIB should occur after seven to nine months of age. The lower margin of the participants' age groups indicates that CHRIB succeeded in enrolling some clients at an early (neonatal) stage in their speech, language and hearing development, an age which is regarded as the ideal stage for commencing ECI (ACPA, 2007:1; Billeaud, 2003; Plante & Beeson, 2004:176; Rossetti, 2001:168). Table 3.4 illustrates the distribution of age group categories which was utilized for the purpose of statistical analysis. A visual representation of the age group distribution is presented in Figure 3.2.

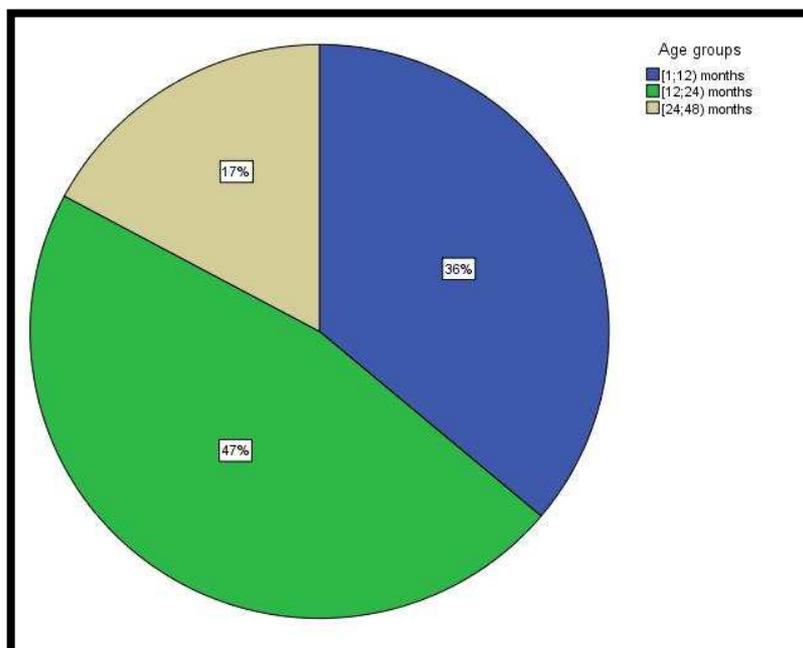


Figure 3.2: Age group distribution in months of the participants with CLP (n=227).

According to Figure 3.2, the majority (47%) of the participants presented within the [12;24) months age group. Advanced statistical analysis was performed on these three age groups and reported as results in chapter 4.

3.10.4 Diagnostic classifications of the participants with CLP

At the time of data preparation and analysis in the present study the datasets in the CHRIB database consisted of a total of 559 participants of which 227 presented with craniofacial disorders. The cleft condition represents part of the participants' genotype. The diagnostic categories depicted in Table 3.3 indicate that the majority of participants presented with cleft lip and palate (54%) while only 4% present with cleft lip. Thus all the different cleft types in the sample represented 39 different ICD-10 codes. The results agree with international literature which indicates that CLP occurs more frequently than isolated cleft lip (Peterson-Falzone et al., 2004:15). Participants with isolated cleft lip are therefore not at risk for a communication disorder and would not have been referred to CHRIB (Peterson-Falzone et al., 2004:101). The following characteristics, i.e. the type of day care, medical aid, education of the parents and education of the mothers contributed to the participants' environment.

3.10.5 Type of day care attended by the participants

The combined results of all the age groups in the study in Table 3.3 indicated that the majority of the participants (45%) were cared for by their mothers during the day. Equal percentages of participants were either attended to by other family members or caregivers, or enrolled in day care programmes. The results imply that most participants spent a significant amount of time at home with their mothers. These results relate to the findings presented in 3.10.9 which revealed that 38% of mothers reported to perform the role of a stay-at-home mother. By analyzing the age group differences in Table 3.4 and Figure 3.3, it is evident that the [1;12) and the [12;24) months' age groups had the highest prevalence of mothers caring for the participants. In comparison, the [24;48) months' age group showed a reduction in the frequency of participants residing with their mothers during the day and an increase in the amount of

participants enrolled in either day care or nursery school. The results may be related to the number of hospitalizations during the first year of the child's life since the child with CLP may experience difficulties with sucking, poor weight gain, intermittent air-way obstruction and the undergoing of a series of corrective surgeries (Collet & Speltz, 2006:263; Smedegaard et al., 2008:628). Due to these reasons mothers in the study could have been more inclined to care for their infants themselves. In addition, parents were advised by the surgeon to keep the participants as healthy as possible prior to surgery (Bütow, n.d.) which serves as another reason for keeping the participants at home.

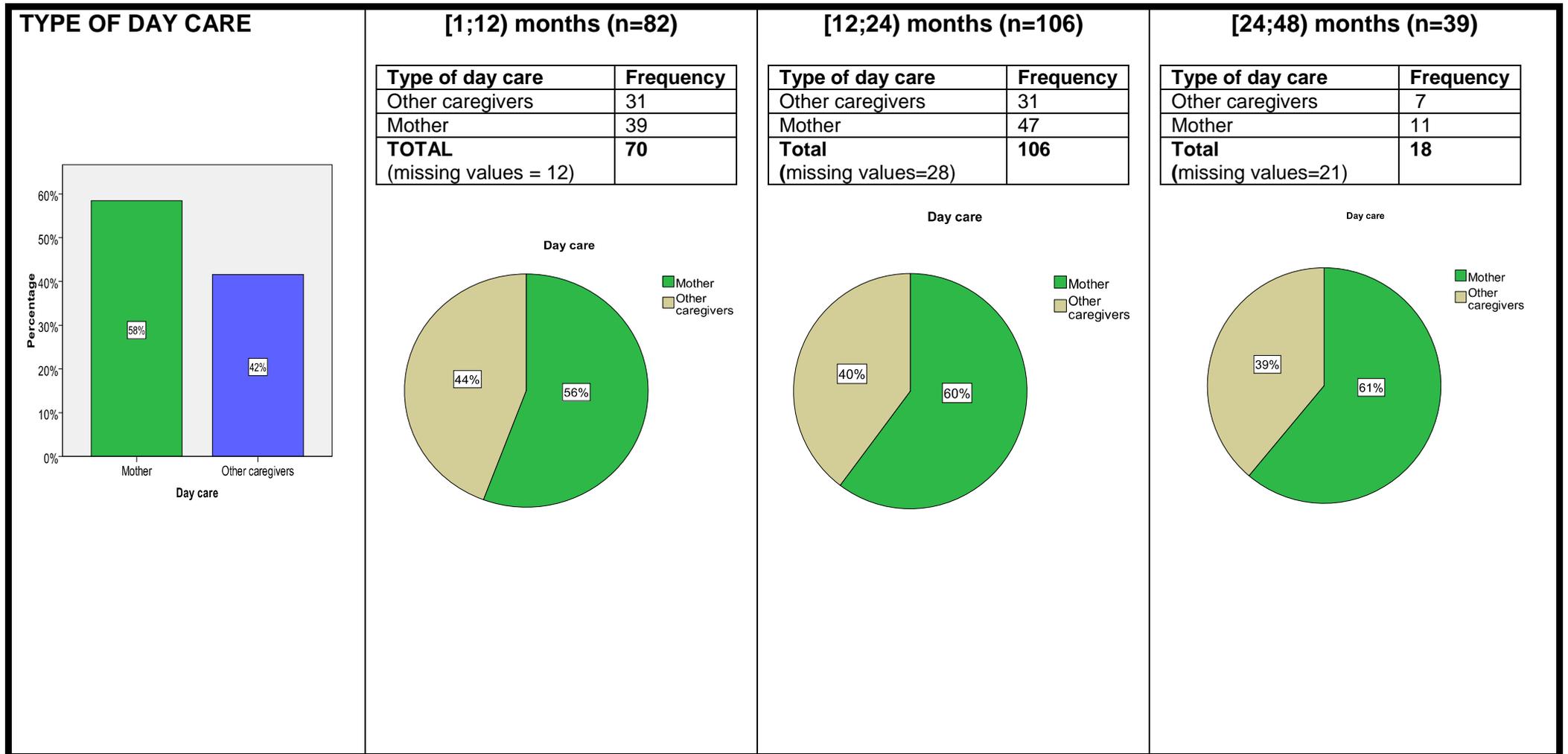


Figure 3.3: An age-specific representation of the type of day care attended by the participants

3.10.6 Medical aid

Table 3.3 depicted that 80% of the participants had access to a medical scheme to support their health expenses. According to the General Household Survey (Statistics South Africa, 2009) 9% of South Africans in the Gauteng province were enrolled in a medical scheme in 2007, which is the second highest percentage of the nine provinces in South Africa. The results indicate that the majority of clients who visited CHRIB were financially viable to afford a medical scheme.

3.10.7 & 8 Education of the parents

Further analysis of Table 3.3 revealed that the majority of the parents of participants with CLP had high school education, while 22% of mothers and 24% of fathers obtained a tertiary level education. The results imply that the parents of the participants with CLP were well-educated and generally literate. According to Statistics South Africa (Census, 2001) 34.3% of the total population group in Gauteng received some secondary education, while 28% had obtained grade 12 and only 12.6% obtained a higher tertiary education. It is thus clear that the population group in the present study is not representative of the South African population, since it relates mainly to a unique population group which had access to advanced educational opportunities.

3.10.9 Occupation of the mother

According to Table 3.3 and 3.4, a majority of mothers reported to be employed and working outside the home at the time they brought their child with CLP to CHRIB. The findings could relate to 3.10.8 in Table 3.3 which revealed that the majority of mothers had a tertiary level education. The higher level of education could imply that the majority of the mothers were employed and therefore, working outside the home.

3.10.10 Persons who referred participants to CHRIB

According to Table 3.3, the participants were mainly referred to CHRIB by professionals such as medical service providers, community health nurses at the FCDC and mainly one maxillo-, facial- and oral surgeon. The high

percentage of referrals from medical professionals revealed in Table 3.3 could be attributed to the FCDC serving as the main referral source of clients with CLP and their families to CHRIB. Additionally, as a result of the FCDC protocol (Table 4.3 in chapter 4), a high percentage of clients visiting CHRIB generates from the FCDC.

The FCDC at the University of Pretoria, Pretoria, South Africa was established in 1984 and provides interdisciplinary services to patients with cleft lip and palate and craniofacial anomalies (Louw et al., 2005:47). The therapy protocol was developed by Professor Kurt Bütow, the head of the FCDC (Bütow, n.d). The therapy protocol serves a threefold purpose. The purpose is: 1) to provide optimal treatment for an individual, 2) to provide optimal surgical intervention, and 3) to prevent over-treatment regarding surgery and orthodontic care, since it could result in ongoing dental, functional and speech difficulties and/or an aesthetically compromised patient (Bütow, n.d.:4). According to Bütow (n.d.:1), optimal treatment of a child with CLP results from the combined effort and specialized skills of different professions. The role of the speech-language therapist, who serves as an important member of the cleft-palate team, is to play an active role in early communication intervention of patients with CLP. The speech-language therapist's primary role includes that of identification, assessment and management of feeding difficulties and the valuable responsibility of information sharing (Bütow, n.d.:1).

3.10.11 ECI received prior to the CHRIB assessment

As presented in Table 3.3, the high prevalence of participants who received some form of ECI services before referral to CHRIB, relates to the home programmes received at initial visits to the FCDC. According to Table 3.4, 78% of the participants aged [1;12) months received previous speech-language therapy or home programmes at the FCDC when they initially visited CHRIB. Parent support at the clinic involves sharing knowledge and providing resources for information relating to cleft lip and palate and craniofacial anomalies (Kola & Smith, 2009:60; Louw et al., 2005:49). These home-programmes were initiated and developed by the first speech-language therapist involved in the clinic in 1986. Although the home programmes are

not individualized it provides practical information and support regarding hearing, speech and language development and how parents can stimulate these essential communication areas in the infants with cleft lip and palate (Kola & Smith, 2009:61). The prior exposure to ECI could imply that the families visiting CHRIB have previously received some guidelines on early speech and hearing stimulation of their child with CLP and may have been aware of their child's risk of a hearing and communication disorder.

3.10.12 Family history of speech, language or hearing disorders and CLP

According to Table 3.3, the high percentage of participants with no family history of speech, language and hearing problems could relate to literature indicating that CLP has many unknown causes which is not necessarily as a result of an inherited genetic disorder. According to Bzoch (2004:100) CLP has both genetic and non-genetic causes and results from a variety of genetic and environmental factors acting simultaneously on each other. Therefore, although a family history of speech, language or hearing disorders does not relate to CLP, it may add an additional risk for communication delay in the child with CLP. Speech, language or hearing disorders in the family may therefore add to the genotype of the participants.

3.10.13 Peri- and postnatal conditions in the participants

Compared to the [1;12) and [24;48) months' age groups presented in Table 3.4, low birth weight the most prevalent reported factor in the [12;24) months' age group. The majority of participants showed a very low occurrence of premature birth and respiratory distress syndrome.

Otitis media, as postnatal factor, had the highest effect on 58% of the participants in the [12;24) months' group. The presence of low birth weight and otitis media in young children with CLP show strong evidence in the literature. According to Phua, Salkeld, and de Chalain (2009:308), middle ear disease is a universal disorder in children with CLP which could still be diagnosed after repair of the cleft. Recurrent otitis media is also described as one of the most common illnesses of children with low birth weight (Rossetti,

2001:21). The research (Phua et al., 2009) explains the high incidence of otitis media and low birth weight in the [12;24) months' age group. Low birth weight, preterm birth and otitis media therefore added to the participants' CLP phenotype.

The following characteristics contributed to the participants' envirotype:

3.10.14 Age of the mother at the time of assessment

According to Table 3.3, the mean age of the mothers bringing their young children with CLP to CHRIB was 27 years. According to Ryan-Krause et al. (2008:1), the age of the mother may be one of the factors which could influence the developmental outcomes of young children since it had been indicated that adolescent mothers (younger than 18 years) often have unrealistic expectations and inaccurate information regarding their child's development. Literature has also indicated that young children of mothers younger than 16 years and older than 36 years display a higher risk of developing speech and language delay (Rossetti, 2001:25). Although the findings of Louw et al. (2004:49) indicated that 23% of the mothers who visited the FCDC and participated in their study were younger than 21 years, almost all the mothers of participants with CLP in the CHRIB database were generally in their mid-twenties and early thirties. Thus the mothers were of a mature age when they first brought their children with CLP to CHRIB.

3.10.15 Geographical distribution of the families

Table 3.5 illustrates the geographical distribution of the participants. These statistics were obtained from the annual report of CHRIB statistics from 1996 to 2009. Since not all of the data was entered in the CHRIB database, the total number of participants in Table 3.5 amounts to 742 and not to 227. The reason for missing data in the database could pertain to the fact that some of the data were incomplete and not reported by parents.

According to the CHRIB statistics (1996 to 2009) (see Table 3.5) the majority of participants were living in the Pretoria and Gauteng region. The University of Pretoria is situated in the Eastern Part of Pretoria, which suggests that

clients visiting CHRIB have access to these services. The clients visiting CHRIB are, however, an exclusive group since 50% of the population in South Africa experience poverty or shows an increased vulnerability to becoming poor (Children in 2001 cited in Swanepoel, 2004:15). The majority of families living in poverty is generally found in rural areas and mainly rely on social grants and remittance to survive (Swanepoel, 2004:15). These families do not have access to rehabilitative services and need to travel vast distances to health care services where a speech-language therapist could be consulted (Popich, Louw & Eloff, 2007:64). The data indicate once again that the population in the present study was representative of a middle-class group and not characteristic of the general South African population.

Table 3.5: CHRIB Statistics (1996-2009) - Geographical distribution of CHRIB Clients (n=742)

Location	2009	2008	2007	2006	2004	2003	2002	2001	2000	1999	1998	1997	1996
Pretoria	55	41	45	44	47	49	43	39	39	22	25	6	20
Gauteng	10	11	13	10	8	14	17	22	19	10	7	6	12
North West Province	3	5	4	3		1	2	3					
KwaZulu Natal			3					2					
Limpopo	3	1	2		2	1	1						
Mpumalanga			1	7	10	2	10	3					
Mauritius						1							
Saudi Arabia						1							
Free State							1						
Rural areas									6	8	4	3	6
Zimbabwe											1		
Northern Cape								2					
Eastern Cape								1					
Mozambique												1	
Total	71	58	68	64	67	69	74	76	64	40	37	16	38

3.10.16 Summary of participant characteristics

The preceding description provided a clear and in-depth understanding of the unique composition of the participants' genotype, phenotype and environment in the present study. The majority of the 227 participants were male and originated from Afrikaans speaking families living in Gauteng. The average age of the participants was 16 months and the majority's cleft type was cleft lip and palate. The participants were generally residing with their mother during the day and the majority of families were in the financial position to afford a medical aid. The mothers of the participants mainly had high school-level education and were stay-at-home mothers. Most of the participants had previously received speech and language stimulation and/or home programmes at the FCDC and very few incidences of a family history of speech and language disorders were reported by the parents of the participants. The comprehensive profile of the participants in the study was an integral part of the statistical analysis of the data.

3.11 RELIABILITY AND VALIDITY

In order to ensure the accuracy, meaningfulness and credibility of the study careful consideration was given to the external and internal validity of the research (Leedy & Ormrod, 2005:97). Although it was not possible to generalize the results of this study to other populations with CLP, the datasets pertaining to participants with CLP, comprised the largest subgroup in the CHRIB database. The threat to external validity was reduced as sample restrictions were controlled by this relatively large sample size (Maxwell & Satake, 2006:157; Struwig & Stead, 2001:136). According to Kritzinger (2000:287) the CHRIB database also proved to be effective in providing rich and detailed descriptions of a sample of the population served at CHRIB, therefore ensuring external validity.

Internal validity addresses the issue of whether the observed genotype and phenotype, the environmental factors and assets (independent variables), and not extraneous factors, were responsible for variations in communication development (dependent variable) as it could result in a confounding effect

(Maxwell & Satake, 2006:157; Struwig & Stead, 2001:136). The threat for internal validity was reduced by selecting the CHRIB Assessment Protocol (Kritzinger & Louw, 2002) as data-collection material. This protocol was specifically developed to address the individualized early communication needs of the clients and their families at CHRIB (Kritzinger, 2000:170). The assessment data were consistently recorded by the same group of experienced speech-language therapists and audiologists and captured by the same speech-language therapist who had exclusive access to the CHRIB database. To further ensure that the data were scientifically sound, data analysis was performed in collaboration with a statistician, assisted by a computer consultant with specialized knowledge of designing of queries and extraction of datasets out of the CHRIB database in Microsoft®Access and Microsoft®Excel. In order increase the reliability of the data, all the statistical procedures that were conducted by the researcher, were cross-checked for accuracy by the statistician and the computer consultant. This cross-check procedure was performed to ensure scientifically sound analysis and interpretation of results. Although the CHRIB database generated a substantial amount of results it was not possible to report on all the findings in this study. In order to improve the integrity of the data and report honestly on the data the rationale for the exclusion of particular results for the purpose of the study, is presented in Table 3.6.

Table 3.6: Rationale for excluding results which were not described in the study

Factor	Rationale	Example from CHRIB database
1. Small sample Size	Inferential statistics could not be applied on datasets with small sample sizes.	The factors “education” and “occupation” of the father presented with small sample sizes, since it was generally the mother who brought the child for the initial assessment to CHRIB.
2. Missing data	It is problematic to report on missing data.	Certain information was not recorded in the CHRIB database since the parents did not report on it on the parental questionnaire.
3 Faulty recording of data in the database	Validity of data is compromised.	Spelling mistakes leads to the misinterpretation of recorded data.



4. Insignificant Results	Significant results increase the statistical viability of the data.	The effect of otitis media on listening skills.
5. Results are irrelevant to the objectives of the study	The scope of the study becomes too broad which could result in vague and confusing conclusions.	Comparison between participants in the CHRIB database and children with CLP in other clinical contexts.

3.12 REFLECTION ON THE RESEARCH PROCESS

The unique procedures followed in the study are summarized and discussed based on Bloom's taxonomy (Anderson et al., 2001) and presented in Figure 3.4.

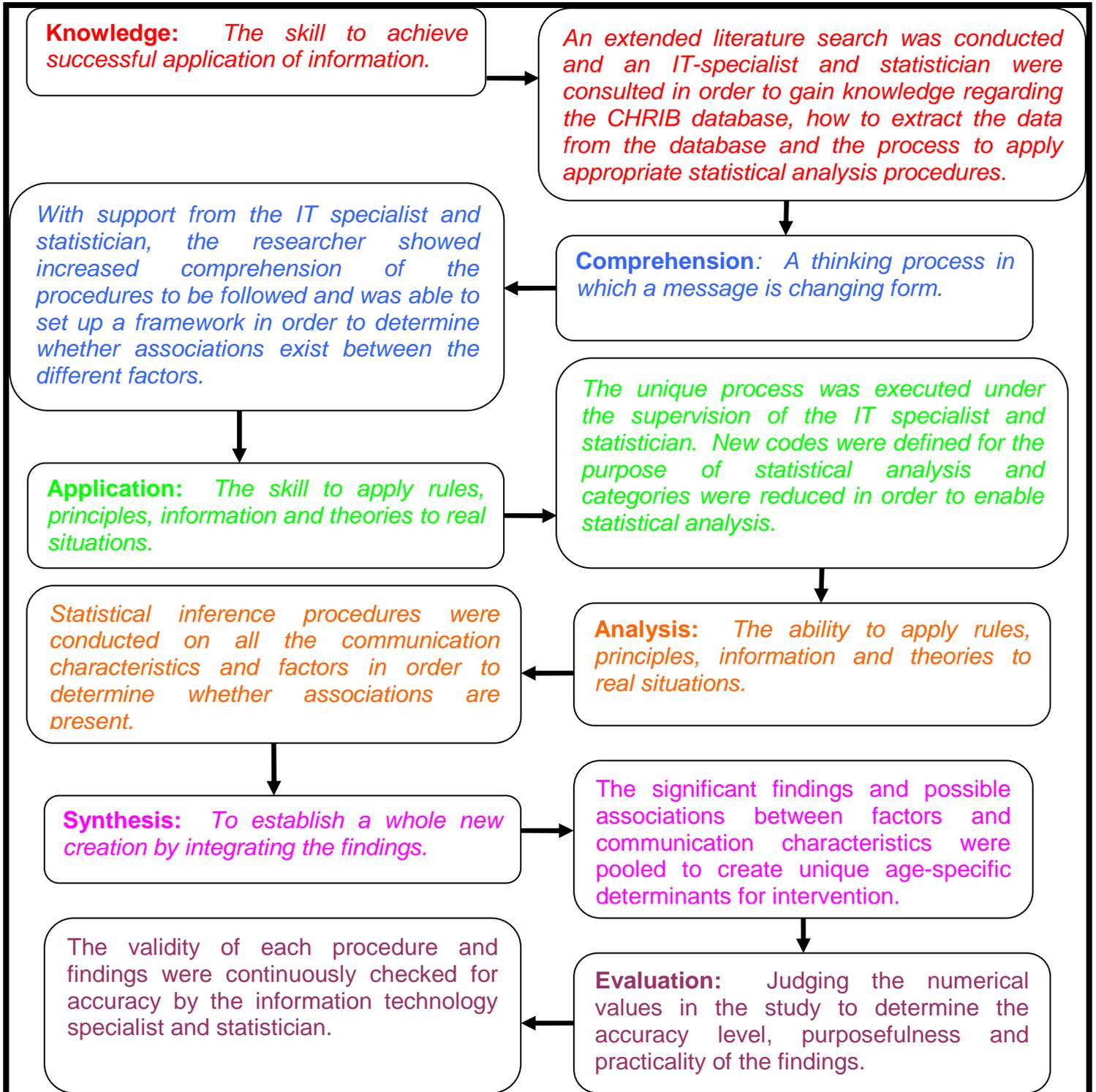


Figure 3.4: The researcher's own learning during the research process (based on Bloom's taxonomy, Anderson & Krathwohl, 2001)

Figure 3.3 provides an outline of the in-depth process which was followed in order collect, describe, analyse and critically evaluate the results of the present study. According to Figure 3.3, the researcher followed a sequence of procedures to obtain the findings. This process was time-consuming, since no previously established method for extracting and statistical analysis of the data in the CHRIB database existed to use as a guideline in the study. Table 3.7 provides a time-frame of the study to demonstrate the extensive amount of time spent on the present study.

Table 3.7: Outline of the procedures followed in Microsoft®Excel and estimated amount of time spent on each programme

Procedure in Microsoft®Excel	Purpose		Date finished	Estimated time spent per week	Total time spent on procedure
Extracting the data from Access and Modifying original names in Microsoft®Access to code names in Microsoft®Excel	To prepare datasets for descriptive and inferential analysis in SAS		2009/06/04-2009/08/17	10 hours	10 hours x 8 weeks= 80 hours
Procedure in SAS	Program name (See Appendix IV)	Purpose	Date finished	Estimated time spent on procedures per week	Total time spent on procedures
Exploring the data	a) Initial analysis	To combine the data extracted from ACCESS in order to create one dataset for further analysis	2009/08/17-2009/12/08	2 hours	2 hours X16 weeks= 32 hours
	b) Recoding of data		2009/08/18-2009/12/08	10 hours	10 hours x 16 weeks= 160 hours
	c) Compiling the data		2009/10/25-2009/12/08	13 hours	9 hours x 4 weeks= 36 hours
Describing the data	c) Describing the data		2009/12/08	3 hours	3 hours
			2009/12/08-2010/08/17	3 hours	3 hours x 32 weeks= 96 hours
Inferential statistics	d) Performing Chi-square tests and Fisher' exact tests		2009/12/27-2010/10/18	5 hours	5 hours x 40 weeks= 200 hours
TOTAL					934 hours

The comprehensive process of extraction of data from Microsoft®Access to Microsoft®Excel, recoding and editing of data and statistical analysis of the data amount to a total of 934 hours and the researcher spent 46 hours in joint consultation with the information technology-specialist and statistician.

3.13 CONCLUSION

The use of the CHRIB database in the present study demonstrated the significance of electronic information management for research in ECI. Novak (2005:2) stated in a keynote presentation at the 2005 Annual Council of Academic Programs in Communication Sciences and Disorders that “Technology is changing our global and professional cultures and we must become innovative, outcomes-focused and pro-active”. Since there is currently a dearth of research on the age-specific factors influencing communication development of young children with CLP, the current study hopes to contribute to innovative ECI research. By incorporating information technology such as the CHRIB database, the input from the FCDC team regarding assets and risks present in the clients at the FCDC clinic and the advanced statistical procedures, comprehensive insight into the factors influencing communication development of young children with CLP can be gained.

3.14 SUMMARY

Chapter 3 described the research aims, objectives and research design selected for the study as well as the ethical principles that were applied during the course of the research. The data-extraction process was described in order to establish a better understanding of the participant characteristics. A description of the participants, data collection procedures, data preparation and data analysis procedures followed. A comprehensive description of the participants’ genotype, phenotype and envirotype were presented and discussed. Finally, the reliability and validity of the study were described and justified.

CHAPTER 4

RESULTS AND DISCUSSION

CHAPTER AIM: The aim of this chapter is to describe, interpret and discuss the results of the present study in order to demonstrate potential age-specific factors that could possibly influence the early communication development of a group of young children with CLP.

4.1 INTRODUCTION

Although many researchers intensively studied the communication characteristics of young children with CLP (Chapman et al., 2007; Frederickson et al., 2004; Hardin-Jones & Chapman, 2008; Persson et al., 2005; Priester & Goorhuis-Brouwer, 2007; Salas-Provance et al., 2003; Scherer et al., 2008; Scherer & Kaiser, 2007), the comprehensive literature overview in Chapter 2 revealed that there is currently a dearth of research regarding age-specific factors affecting children with CLP younger than four years and their families. It is known that recurrent otitis media could peak at certain periods in the lives of young children with CLP (Phua et al., 2008:307; Viswanathan, Vidler, & Richard, 2007:87), that parents could experience different periods of stress at the birth and surgeries of their infants with CLP (Johansson & Ringsberg, 2004:166; Klein, Pope, Getahun & Thomson, 2005:592; Pope Tilman & Snyder, 2004:559; Ter Poorten & Louw, 2002:56) and that the child with CLP may experience a post-surgery developmental plateau (Scherer & Kaiser, 2007). In order to ensure comprehensive and timely ECI with the child with CLP and his/her family, the areas of strength and weakness that emerge at specific age-group intervals in the population with CLP should be promptly identified and appropriately addressed.

The main aim of the present study was to identify and describe age-specific factors of risk and assets influencing the communication development of a group of children with CLP younger than four years within a specific early communication intervention (ECI) context. Firstly, the CHRIB database was utilized to compile a comprehensive profile of communication characteristics in order to establish whether delays (areas of weakness) were present in the group of 227 young children with CLP and also to determine the existing areas of strength in their development. Secondly, the different risk factors and assets which were found to be present in the participants were investigated. Increased adequacy in the identification of specific risk factors and assets influencing children with CLP younger than four years could expand evidence-based early communication intervention programmes to target the unique factors which are present in these children and their families. This knowledge can also assist parents to know what to expect and to gain better understanding of the development of their child with CLP.

Therefore, the aim of Chapter 4 is to provide a rich description and discussion of the results in order to contribute to an improved understanding of the communication characteristics and age-specific factors that may have influenced the communication development of the participants and their families. Where appropriate, the findings of the present study will be related to and compared to existing research. Figure 4.1 provides an outline of how the results will be described according to the data analysis, the sub-aims and the three age-group categories of the participants.

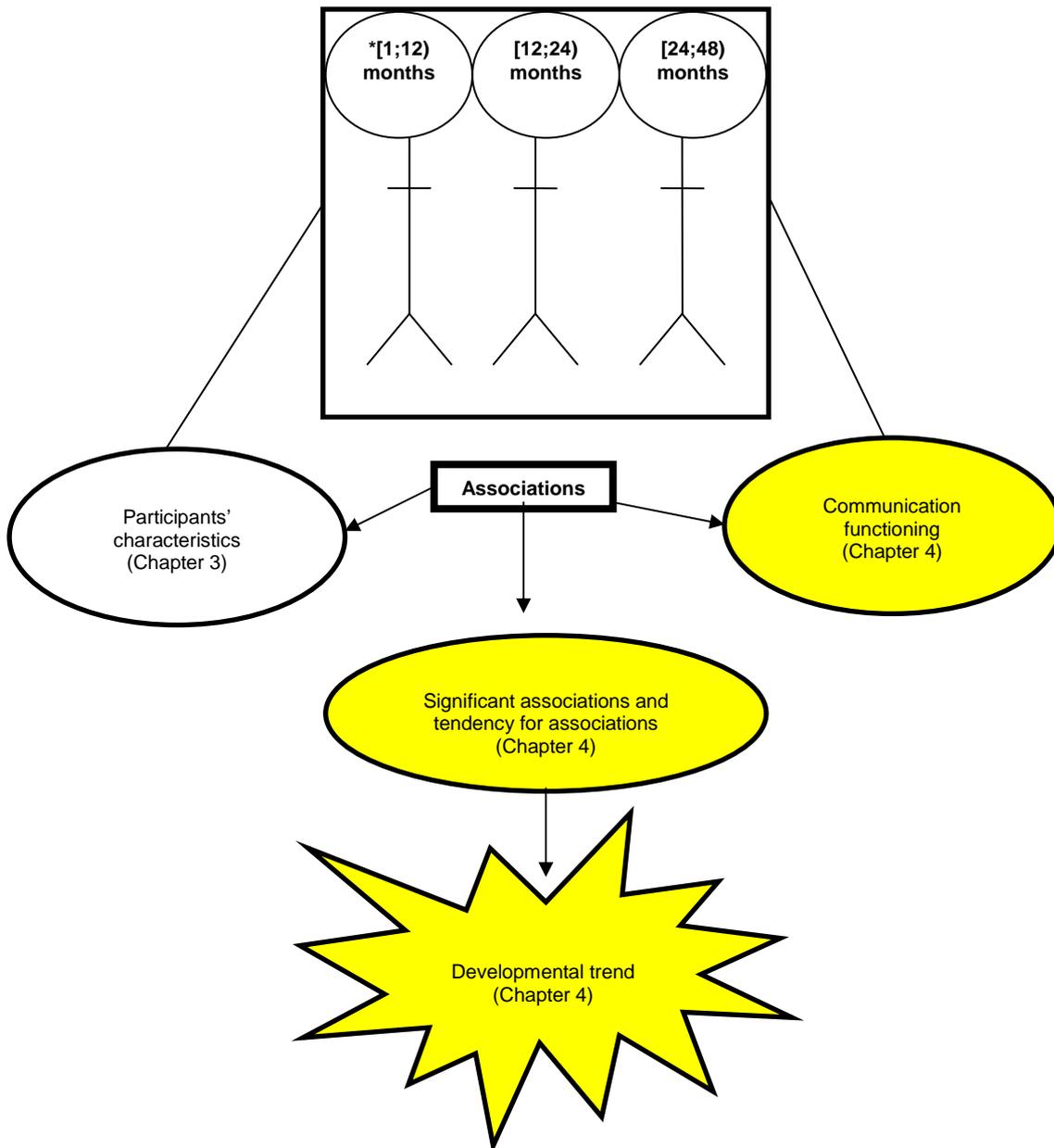


Figure 4.1: Results of the three sub-aims, highlighted in yellow

**The age group interval indicated by [1;12) refers to participants aged 1 month which were included in this interval (squared bracket), while participants aged 12 months are excluded from this interval (open bracket). The same notation is used for the other two age group intervals.*

As shown in Figure 4.1, an age-specific communication profile of young children with CLP indicating areas of weakness and strength in development as well as the significant associations which could be found between the communication characteristics and the risk factors and assets in the participants, will be presented in this chapter. The possibility of a developmental trend across the three age intervals depicted in Figure 4.1 will also be explored and discussed. Descriptive and inferential statistics were performed to summarize the set of raw data from the CHRIB database and to extract meaningful results from it. The results are presented and discussed as follows, based on the objectives of the research.

4.2 DESCRIPTIVE STATISTICS

The *first stage* of statistical analysis pertains to *descriptive statistics* of the whole data set. This stage is important in order to gain more insight into the collected data and describe the findings (Maxwell & Satake, 2006:280).

Objective 1

To describe the level of communication development of 227 participants at specific age group intervals ranging from 1 month to 48 months.

Table 4.1 provides an analysis of the communication characteristics of the participants with CLP at specific age-group intervals.



Table 4.1: Age-specific communication functioning of the participants

Communication area	Categories	[1;12) months (n=82)		[12;24) months (n=106)		[24;48) months (n=39)	
		Freq	%	Freq	%	Freq	%
1. Listening skills (hearing testing situation of CHRIB Listening Assessment Scale (Hugo et al., 2000))	Good	29	40%	41	41%	8	22%
	Inconsistent	40	56%	50	50%	26	70%
	Poor	3	4%	9	9%	3	8%
	TOTAL	72	100%	100	100%	37	100%
	Missing values	10		6		2	
2. Listening skills (communication interaction situation of CHRIB Listening Scale (Hugo et al., 2000))	Good	45	56%	33	32%	9	24%
	Inconsistent	31	38%	47	46%	22	58%
	Poor	5	6%	22	22%	7	18%
	TOTAL	81	100%	102	100%	38	100%
	Missing values	2		4		1	
3. Cognitive development (DASI-II (Fewell & Langley, 1984))	Above average/superior	13	16%	9	9%	0	0%
	Average	58	72%	75	72%	25	68%
	Below average/poor	10	12%	20	19%	12	32%
	TOTAL	81	100%	104	100%	37	100%
	Missing values	2		2		2	
4. Receptive language delay (DAS (Anderson et al., 1978))	No	35	64%	27	26%	21	54%
	Yes	20	36%	78	74%	18	46%
	TOTAL	55	100%	105	100%	39	100%
	Missing values	28		1		0	
5. Receptive language delay (RITLS (Rossetti, 2006))	No	16	30%	12	11%	12	32%
	Yes	38	70%	94	89%	26	68%
	TOTAL	54	100%	106	100%	38	100%
	Missing values	29		0		1	
6. Expressive language delay (DAS (Anderson et al., 1978))	No	20	36%	12	12%	14	37%
	Yes	35	64%	92	88%	24	63%
	TOTAL	55	100%	104	100%	38	100%
	Missing values	28		2		1	
7. Expressive language delay (RITLS (Rossetti, 2006))	No	8	15%	3	3%	10	26%
	Yes	46	85%	102	97%	28	74%
	TOTAL	54	100%	105	100%	38	100%
	Missing values	29		1		1	
8. Play developmental delay (RITLS (Rossetti, 2006))	No	23	43%	19	18%	17	45%
	Yes	30	57%	85	82%	21	55%
	TOTAL	53	100%	104	100%	38	100%
	Missing values	30		2		1	
9. Pragmatic developmental delay (RITLS (Rossetti, 2006))	No	29	53%	6	6%	1	8%
	Yes	26	47%	87	94%	12	92%
	TOTAL	55	100%	93	100%	13	100%
	Missing values	28		13		26	
10. Gestural developmental delay (RITLS (Rossetti, 2006))	No	25	86%	14	18%	8	30%
	Yes	4	14%	62	82%	19	70%
	TOTAL	29	100%	76	100%	27	100%
	Missing values	54		30		12	
11. Gross motor developmental delay (DAS (Anderson et al., 1978))	No	35	64%	37	41%	29	74%
	Yes	20	36%	54	59%	10	26%
	TOTAL	55	100%	91	100%	39	100%
	Missing values	28		15		0	
12. Delayed language use (CHRIB assessment protocol)	No	32	46%	59	63%	27	71%
	Yes	37	54%	35	37%	11	29%
	TOTAL	69	100%	94	100%	38	100%
	Missing values	14		12		1	

A between-subjects developmental design was implemented because the development of three *different* groups of participants at three age-group intervals at specific point in time was described in the study (Brink, 2002:9; Maxwell & Satake, 2006:221). As indicated in Chapter 3, the three groups were not equal due to pre-existing factors which interfered with the establishment of similarity in the groups and sample bias was present. The pre-existing factors included that the participants in the [1;12) months and the [12;24) months age groups were referred from the FCDC to CHRIB based on the guidelines of the FCDC Therapy Protocol (Table 4.2), whilst participants in the [24;48) months' age group mostly visited CHRIB due to parental concern about their child's communication development. The implication is that the two younger groups may have displayed less developmental difficulties than the eldest group of participants. The parents of the two younger groups complied with the FCDC guidelines and attended a CHRIB assessment, but not because they were necessarily concerned about their children. The assumption of a developmental trend across the age-groups should therefore be interpreted with caution.

The findings in Table 4.1 will be systematically discussed according to the different developmental areas.

According to Table 4.1, it is evident that the majority of participants displayed delays in a wide range of developmental areas such as listening, receptive and expressive language, play, pragmatic, gesture, and gross motor development across the age-spectrum from 1 month to 48 months. The findings in Table 4.1 confirm recent research of Frederickson et al. (2005: 179), Hardin-Jones and Chapman (2008), Salas-Provence et al. (2003) and Scherer et al. (2008), who endorse the presence of communication delay in young children with CLP.

A discussion on each communication area, as depicted in Table 4.1, is presented in corresponding sequence.

4.2.1 Listening skills

The CHRIB protocol specified the administration of the CHRIB Listening Assessment Scale (Hugo et al., 2000) which involved the assessment of listening skills in two different situations as depicted in Table 4.1, No 1 and No 2. Firstly,

the child is evaluated during the play-based communication assessment and the child's reactions to environmental sounds, whispered speech, non-speech sounds and speech are observed. Secondly, the child's conditioning to sound, localization of sound, consistency of responses and listening behaviour is formally tested in a sound-proof booth (Hugo et al., 2000). For the purpose of accurate reporting of results, these two measurements (Numbers 1 and 2) were separately reported in Table 4.1.

According to Table 4.1, No 1 and No 2, it is indicated that the majority of the participants across the three age groups presented with inadequate (both inconsistent and poor) listening skills. The findings in Table 4.1 regarding No 1 (hearing testing situation) and No 2 (communication interaction situation) both showed a steady increase in inadequate listening skills in the participants from respectively 60% and 45% in the [1;12) months' groups to 59 % and 68% in the [12;24) months' groups which peaked at 78% and 75% in the [24;48) months' groups.

According to the participants' description in Chapter 3, Table 3.4, the majority of participants in the [12;24) months age group presented with otitis media. It could be argued that the inadequate listening skills observed in the participants in the [24;48) months age group could be the effect of otitis media (Louw, Hugo, Kritzinger & Pottas, 2002), which peaked in the participants in the [12;24) months age group. An association between inadequate listening skills and otitis media could not be determined due to limitations in the datasets in the CHRIB database. Although the participants were referred to an ear, nose and throat specialist on the basis of abnormal middle ear measurements, the diagnosis of otitis media was not available by the time of data entry.

4.2.2 Cognitive skills

Cognitive development was determined by means of the Developmental Activities Screening Inventory (DASI-II; Fewell & Langley, 1984). The DASI-II is a norm-referenced test which was developed for early identification of developmental disabilities in children aged from one month to 60 months. The instrument includes 15 developmental components such as sensory intactness, means-end relationships, causality, memory, seriation and reasoning. The DASI-II provides a

good indication of cognitive development and requires manipulating construction toys and educational materials with fine motor skills, in response to the toys presented to them or to the evaluator's demonstrations. This measure is used effectively in young children since it does not penalise a child with known language deficits and can also be administered when a child is unable to respond to formal cognitive tasks.

According to Table 4.1, No 3, there was a small number of participants with *below average cognitive skills* across the three age-groups. Since only 14% of the participants presented with syndromes associated with CLP (Chapter 3, Table 3.3), the findings could explain the small number of participants presenting with below average cognitive skills across the three age-groups. Children with syndromes associated with CLP could present with additional developmental difficulties (Peterson-Falzone et al., 2001: 31).

The findings presented in Table 4.1 shows that the presence of below average cognitive skills become increasingly evident across the age categories and peaks at 32% in the [24;48) months' group. The slight decline in the percentage of *average cognitive skills* with the increasing age of the participants follows the same trend as below average cognitive skills. Currently, the cause of this decline in cognitive skills is not clear.

In terms of Table 4.1, the majority of participants across the three age groups showed steady average cognitive skills which imply a potential for learning. The results must be interpreted with caution as the predictive validity of cognitive tests in early childhood is not high (Rossetti, 2001:90).

4.2.3 Receptive language skills

According to Table 4.1, No 4 and No 5, two assessment instruments were utilized for assessing receptive language skills. The Developmental Assessment Schema (DAS) (Anderson et al., 1978) was completed during the parent interview based on parental perceptions and responses, while the Rossetti Infant-Toddler Language Scale (RITLS) (Rossetti, 2006) was administered and completed by the speech-language therapist while assessing the child. The DAS is a screening

instrument with three to four items per age interval, while the RITLS can be considered an in-depth language assessment instrument with 5 to 12 items per age interval, based on elicitations, observations and parental report. Six different language components are assessed, using the RITLS (Rossetti, 2006). The differences in the objective administration of the measures and the nature of the delay reflected in the results justified separate reporting of the findings of the two instruments on the same developmental area as depicted in Table 4.1.

In contrast to the DAS (Anderson et al., 1978), the results of the RITLS (Rossetti, 2006) showed a similar degree of delay across all the subtests which consistently peaked at the [12;24) months age-group (Table 4.1 No 4 and No 5). It could therefore be inferred that the RITLS (Rossetti, 2006) is an extensive assessment instrument which yielded comprehensive information on the communication development of child with CLP in the current study.

Table 4.1, No 4 and No 5 reveal that the participants in the [12;24) months group presented with the highest frequency of receptive language delay across the three age groups using both measures (DAS=74%; RITLS=89%). Although the presence of an expressive language delay in children with CLP is well reported in literature (Chapman, 2004; Hardin-Jones & Jones, 2004 Salas-Provance et al., 2003) limited research, describing the receptive language skills of young children with CLP in the [12;24) month's age group, could be found. This present study adds renewed insight regarding receptive language skills in young children with CLP and provides knowledge to the description of a comprehensive communication profile for the population with CLP.

4.2.4 Expressive language skills

As shown in Table 4.1, No 6 and No 7, the participants in the [24;48) months age group presented with the lowest percentages of expressive language delay (DAS=63% and RITLS=74%). In contrast to the other two age groups, the [12;24) months age group showed the highest frequency of expressive language delay of respectively 88% (DAS) and 97% (RITLS). The [1;12) months age group displayed similar percentages of delay as the [24;48) months age group of respectively 64% (DAS) and 85% (RITLS). Compared to the RITLS (Rossetti,

2006), the DAS (Anderson et al., 1978) results indicated a lower prevalence of delay in expressive language in the participants especially in the [1;12) months age group. As stated previously, the DAS (Anderson et al., 1978) is mainly based on parental responses and perceptions. The lower prevalence of delay reported in the participants could therefore be attributed to the parents' optimistic and subjective perception of their child's language abilities, which could tend to be better than their child's actual developmental performance.

The prevalence of an expressive language delay in the [1;12) months age group is confirmed by Berkowitz (2006:27) and Bzoch (2004:80), who describe the influence of the physical restriction of an open cleft palate on speech development at this developmental stage. Since the normal acquisition of speech development is hampered by the disrupted movements of the oral structures and absence of an upper oral boundary in children with CLP (Bzoch, 2004:80), the findings confirm that expressive language delay is expected in the [1;12) months age group. The FCDC Therapy Protocol (Table 4.2 under 4.2.1) therefore specifies surgery at an early age (five to seven months) to close the palate in order to prepare the child for speech development (Bütow, n.d.:3).

The findings relating to the [1;12) months age group are similar to those of Salas-Provance et al. (2003:34) who also concluded that a limited phonetic repertoire due to the presence of a cleft increases the risk for expressive language delay in 15 months old infants with CLP. Other research findings, which further validate the results of the present study, concluded that children with CLP have persistent receptive and expressive vocabulary delay, and vocalisation deficits beyond palatal closure (Scherer et al., 2008). The recurrent findings highlight the importance of utilising an in-depth and comprehensive language assessment tool such as the RITLS (Rossetti, 2006) within the CHRIB assessment protocol for monitoring the effects of an early intervention programme that promotes the facilitation of speech sound and vocabulary development.

According to two earlier studies (Bzoch & League, 1971; Swanson, 1973) cited in Bzoch (2004:441), delayed expressive language development appears to be consistently present from birth to age 30 months in children with CLP and is

especially marked at age 24 months. The research findings reported in literature are in accordance with those of the present study. It was similarly found that expressive language delay was present across the participant age groups from 1 month to 48 months and peaked at [12;24) months (Table 4.1). The results imply that children with CLP should be continuously monitored for receptive and expressive language delay even after surgery. ECI and parent guidance from birth onwards with regular serial assessments by a team of professionals in order to adequately address unique developmental needs, are implied.

Based on the discussion of the results, it is evident that the participants across the three age groups presented with receptive and expressive language delay as well as inadequate listening skills. According to Olswang, Rodriguez and Timler (1998:25), evidence suggests that expressive vocabulary and comprehension of language is a predictor of later language learning. Since these three factors, receptive and expressive language and listening skills were all interrelated and repeatedly identified as areas of weakness in the participants across the age groups from 1 month to 48 months in the present study, it could predict later academic failure.

4.2.5 Play skills

The majority (82%) of the participants in the [12;24) months age group displayed delayed play development (Table 4.1, No 8), while the [24;48) months age group presented with the lowest prevalence of delay in play development (55%) across the three age groups. These results are similar to the findings regarding expressive and receptive language delay, since the participants with delayed development also peaked at [12;24) months.

Since research has shown that play is the basis for establishing first words and word combinations and an important building block for language acquisition, including both language use and content (Olswang et al., 1998:26), the results of the present study are validated. In addition to the study of Olswang et al. (1998), Snyder and Scherer (2004) conducted a longitudinal study in which the language and play development of three groups of children, including one group of typically

developing children and two groups of children with palatal clefts, are described. The two groups with palatal clefts included children with isolated clefts and children with CLP. The three groups were assessed at respectively 18, 24 and 30 months. Although the group with CLP did not show any significant association between language and symbolic play development, the children with isolated clefts displayed a significant relationship between these two factors. These findings could be attributed to significant differences in abnormal brain morphology, using magnetic resonance imaging between the two groups, but more investigations are needed to determine the relationship between structural differences in the brain and the functional performance in language, speech and cognition (Snyder & Scherer, 2004:77).

According to Snyder and Scherer (2004:67), language, symbolic play as well as pre-symbolic play are closely connected in late talkers. The assessment of play skill development may therefore be of value in identifying children with CLP who are at risk for continued language delay. According to Table 4.1, the results of the RITLS (Rossetti, 2006) in the present study are similar in the participants across the subscales which confirm delays in both language and play development. The findings of Olswang et al. (1998) and Snyder & Scherer (2004) confirm the results of the present study. The importance of considering the interrelationship between symbolic play and language development could provide information on later language developmental outcomes in children with CLP.

4.2.6 Pragmatic skills

The (12;24] months and [24;48) months age groups displayed almost similar percentages of delay in pragmatic development of respectively 94% and 92%. The [1;12) months age group present with a majority of 53% participants with age-appropriate pragmatic development. These findings are similar to research findings of Frederickson et al. (2005:184, 185) who established that children with CLP, aged 33 to 44 months, showed fewer assertive utterances, were less likely to respond adequately to comments by caregivers and produced more topic maintenance, but less topic extending utterances than their non-cleft peers. These findings imply that the presence of a cleft may have a negative influence on the development of pragmatic skills in young children.

Compared to pragmatic development, further analysis of Table 4.1 revealed similar delayed development of expressive and receptive language and also of play development across the three age categories of the participants. The results emphasise the importance of comprehensive assessment of language and communication skills which are required to describe the detail of delayed communication development in young children with CLP. The complex language learning difficulties in infants and toddlers with CLP may not be identified if screening-type instruments are utilized during assessment.

4.2.7 Gestural communication skills

According to Rossetti (2006), gestural communication only develops at the end of the [1;12) months period and is therefore not assessed in the [1;12) months age group. Table 4.1, No 10, showed a majority (82%) of delay in gestural communication development in the [12;24) months age group and a slight decline of 70% in the [24;48) months age group. Since these findings relate to the other subtests of the RITLS (Rossetti, 2006) which also showed delayed development, all components of language are affected in the participants. Although research investigated and described the receptive and expressive language of children with CLP (Chapman, 2004; Chapman et al., 2001; Frederickson et al., 2005; Hardin-Jones & Chapman, 2008; Hardin-Jones & Jones, 2004; Peterson-Falzone et al., 2006; Salas-Provance et al., 2003; Scherer & Kaiser, 2007; Scherer et al., 2008), there is currently a dearth of research on the non-verbal communication aspects of communication such as pragmatic development, play development and gestural development in the young population with CLP. The implication of the findings is that the full range of language difficulties in children with CLP may not have been reported in the literature, since comprehensive communication assessment protocols, such as the CHRIB assessment protocol (Kritzinger & Louw, 2002), may not have been used in assessing this population.

4.2.8 Gross motor skills

In contrast to the [24;48) months age group, Table 4.1, No 11, indicates that the participants in both the [1;12) and [24; 48) months age groups presented with a lower prevalence of gross motor development delay, with a peak of 59% participants presenting with a delay in gross motor development in the [12;24)

months age group. Compared to the other developmental areas described, the gross motor development of the participants was not an area of concern since the majority of participants in the [1;12) and [24;48) months age groups showed age-appropriate gross motor development. The findings of the study are similar to a study by Kritzinger, Louw and Hugo (1996) who investigated the early communication functioning and hearing abilities of 44 infants with cleft lip and palate, aged between 3 and 31 months. The study also concluded that a minor delay in gross motor development was present in the infants with CLP.

4.2.9 Skill in language use

The functions relating to the development of language use in the participants were assessed by means of the *Assessment of Communication Skills: Functions and means expressed by infant or child* (based on Muller, 2004; Wetherby & Prizant, 1989), one of the assessment instruments of the CHRIB Assessment Protocol (Kritzinger & Louw, 2002). Skill in language use therefore indicated the child's skill in expressing intentional communication functions and means. The different communication functions such as non-verbal communication, regulation of behaviour, social interaction, shared attention and discourse structure were indicated as either present or absent on the CHRIB assessment form. The participants displayed a steady increase in the skill of language use across the age groups (Table 4.1, No 12). The observed delay in the [1;12) months' age group could be the result of typical absent intentional communication in the first eight months of an infant's life, since infants only develop intentional use of communication beyond seven months of age (Owens, 2001: 167). According to Table 4.1, No 12, the [12;24) and [24;48) months age groups' skills in language use were predominantly age-appropriate.

4.2.10 Summary of the communication development of the participants

In conclusion, the age-specific results regarding areas of strength and weakness in the participants are summarised as follows:

- **Areas of weakness in the [1;12) months age group:** According to Table 4.1 it is apparent that an expressive language delay and inadequate listening skills are regarded as the main areas of weakness displayed in the majority of participants aged 1 months to 12 months.
- **Areas of strength in the [1;12) months age group:** The majority of participants in this age group presented with average cognitive skills and age-appropriate development of pragmatic skills, gestural communication skills and gross motor skills. These four areas could serve as strengths in the [1;12) months group's development.
- **Areas of weakness in the [12;24) months age group:** According to Table 4.1, the [12;24) month group proved to be the most vulnerable to the development of delays in multiple areas of development. These areas included receptive and expressive language, pragmatic and play development and, to a lesser extent, gestural communication development and listening skills. These results, with exception of the area of listening skills, were based on the sub-scales of the RITLS (Rossetti, 2006) which proved to be a worthwhile measuring instrument for obtaining a comprehensive view of the language functioning of the participants aged [12;24) months in the present study. A post-surgical plateau in communication development could be related to the high prevalence of speech and language delay in the [12;24) months age group. Further research is required to explain this finding. In addition, a comprehensive assessment instrument such as the RITLS (Rossetti, 2006) provides an expanded (both in range and in depth) description of the language difficulties in this age group. By applying the between-subjects' developmental design across the three groups, the [12;24) months age group stands out as displaying delays in most areas of communication development.
- **Areas of strength in the [12;24) months age group:** The presence of average cognitive skills in the [12;24) months age group and the majority of

63% of participants who did not present with a delay in functions relating to skill in language use, could serve as areas of strength in this age group.

- **Areas of weakness in the [24;48) months age group:** Compared to the other areas of development in this age group, the area of expressive language displayed the most delays in participants in the [24;48) months age group. These findings are similar to those in the [1;12) months age group. Expressive language could be regarded as an area of weakness in the participants across the three age groups from birth until 48 months of age.
- **Areas of strength in the [24;48) months age group:** The majority of participants did not present with a delay in skill in language use (similar to the [12;24) months group) and showed predominantly age-appropriate cognition, pragmatic and gross motor development. These four developmental areas could serve as areas of strength in the [24;48) months age group.

Consistent with other research studies (Chapman et al., 2007; Frederickson et al., 2005; Hardin-Jones & Chapman, 2008; Persson et al., 2005; Priester & Goorhuis-Brouwer, 2007; Salas-Provance et al., 2003; Scherer & Kaiser, 2007; Scherer et al., 2008), expressive language delay is the area mostly affected in all the participants across the three age groups. The [12;24) months age group displayed the highest prevalence of a range of language difficulties compared to the [1;12) months and [24;48) months age groups. These language difficulties included delays in receptive language, play, pragmatic and gestural communication development. The period between 12 and 24 months could thus be regarded as the most vulnerable time for communication development in toddlers with CLP. These vulnerable areas of communication development should be integrated as goals in a focused ECI approach to the treatment of the young population with CLP.

Limited research is available for comparison of the present data with previous studies. The continuation or progression of the participants' difficulties should be predicted with caution, since the [24;48) months old group does not represent the

same group of children as the [1;12) and [12;24) months age groups. In order to effectively address the delayed communication development and utilize the areas of strength in the participants' development, it is essential to determine which unique factors may influence the developmental delays in a young child with CLP. The findings relating to the timing and the type of surgery that was conducted on the participants, as well as its possible effect on communication development, will be discussed against the background of the FCDC Therapy Protocol.

4.2.11 The participants' surgery

- **The Therapy Protocol**

The Therapy Protocol displayed in Table 4.2 was developed to schedule sequenced treatment procedures for patients with CLP within a specific facial cleft deformities clinic (FCDC). According to Bütow (n.d.:4), the purpose of the Therapy Protocol is to treat an infant, child or adolescent at the most optimal time, with the most optimal surgical technique, and to avoid surgical and orthodontic over-treatment. An interdisciplinary team approach is followed and the speech-language therapist is an important member of this team from the onset of the child's treatment plan, contributing an ECI perspective to the Therapy Protocol (Bütow, n.d.:1). In addition, since the publication of the protocol, an audiologist has also joined the team to conduct an Early Hearing Detection and Treatment programme at the FCDC.

Many studies have been conducted to explore the effect of the type and timing of surgery on the speech and language outcomes in children with CLP and the consensus is that early surgery could have a positive influence on later speech and language development (Chapman, 2004; Chapman et al., 2007; Hardin-Jones & Jones, 2004; Kuehn & Henne, 2003).

Table 4.2: An excerpt of the Therapy Protocol (Bütow, n.d.) to demonstrate the timing and type of surgery conducted at the FCDC between the ages 5 months and 4.5 years

Timing	Procedures	Type of cleft
3 ± 3 month	Consultations Facial deformity examination (team) Advice on feeding Treatment plan Paediatrics Full examination Orthodontics Functional-orthognathic suction and drinking plate Suction and drinking plate Headgear Genetics Parent counselling Psychology Parent counselling Community nurse Communication pathologist	All All LAP hPsP, (sP) LA [b], LAP[b] All All
5 ± 1 month	Surgery Velum repair (and tensor sling) Hard palate repair (only in bilateral cleft, one side) Ear, nose and throat Examination	LAP LAP[b] LAP, hPsP, sP
7 ± 1 month	Surgery Velum repair Hard palate repair Anterior nasal floor reconstruction Lip repair	hPsP LAP LA, LAP L, LA, LAP
12 ± 1 month	Surgery Columella lengthening CHRIB Evaluation	L[b], LA[b], LAP [b]
1½ - 8 years	Speech-language therapy Active treatment Fluorographic and/or naso-endoscopic examination (3½ - 4½ years)	LAP, hPsP, sP LAP, hPsP, sP

Abbreviations used in Table 4.2:

L=cleft lip
LA=cleft lip and alveolus
LAP=cleft lip, alveolus, hard and soft palate
hPsP=cleft hard and soft palate
sP=cleft soft palate
[b]=bilateral

- **The type of clefts and timing of surgery**

Due to the great variety of cleft types and surgical procedures, the nature of the association between surgical intervention and communication characteristics of participants in the CHRIB database could not be statistically determined.

However, the type, number and timing of surgeries which were conducted on the group of 227 participants with CLP in the CHRIB database are depicted in Table 4.3 and Table 4.4.

Table 4.3: Type and number of craniofacial surgeries received by participants (n=227)

Type of surgery	1 st surgery Frequency	2 nd surgery Frequency	3 rd surgery Frequency	4 th surgery Frequency
Columella lengthening	1	3	7	1
Hard palate	4	7	3	0
Hard palate and velum	33	14	4	0
Lip and hard palate	3	59	14	0
Lip	16	11	3	1
Lip and velum	6	3	0	0
Velum	108	22	2	1
Velum, half hard palate	2	3	0	0
Hard palate and nose base	0	0	1	0
TOTAL	173	122	34	3

The type of surgery is directly related to the type of cleft and should be considered when interpreting the results shown in Table 4.3. According to Table 3.2 (a) in Chapter 3, the majority of participants (54%) presented with cleft lip and palate, while 38% presented with cleft palate and only 4% presented with a cleft of the lip. Based on the frequency of specific type of surgeries shown in Table 4.3, it is clear that the majority of participants had repair of the velum during their first surgery. Table 4.4 indicates that the mean age of the participants at the time of their first surgery was 4.5 months, which is consistent with the maxillo-, facial- and oral surgeon's cleft repair protocol (Bütow, n.d.) in Table 4.2. Furthermore, Table 4.3 indicates that the majority of participants underwent repair of the lip and hard palate during the second and third surgeries which were conducted at respectively 7 and 10 months of age (Table 4.4). Multiple hospitalizations could limit the child's play exploration for defined periods of time, since many infants are required to wear elbow restraints to prevent disruption of the incision post-surgery (Levy-Bercowski et al., 2009: 525). The possibility exists that the effect of the surgical procedures before 12 months could possibly show in the [12;24) months period.

Table 4.4: Mean age of participants with CLP at the time of surgery

n=	Mean age at 1 st surgery	n=	Mean age at 2 nd surgery	n=	Mean age at 3 rd surgery	n=	Mean age at 4 th surgery
211	4.5 months	142	7 months	46	10 months	7	16 months

Based on the results reflected in Table 4.3 and Table 4.4, the majority of participants received prompt and timely surgery according to the Therapy Protocol before they were referred to CHRIB. Hardin-Jones and Jones (2004:7) established that the critical sensitive period for speech motor development is between four and six months and recommended that the optimal time of surgery should be no later than 13 months. Children who received surgery at a later age could struggle to adequately integrate velopharyngeal movements for coordinated speech production (Hardin-Jones & Jones, 2004:11). However, not all the children from the FCDC are seen at CHRIB. It is mainly those families who respond to referrals and have transport to this clinic that are assessed and whose data is captured in the CHRIB database. The lack of access to the services of a cleft-palate team implies that many children with CLP receive neither surgery nor the appropriate follow-up speech-language services as specified in the Therapy Protocol (Bütow, n.d.). The lack of access may pose a significant risk factor to the development of a speech and language delay within the South African context.

According to Chapman et al. (2007:306) early surgery contributes to successful speech and language outcomes in children with CLP. There is a possibility of a combination of interacting factors which could also influence the speech and language development of children with CLP in the post-surgery period. These factors include the timing of intervention, the functioning of the velopharyngeal mechanism and the hearing status of the child. These factors could have a positive or negative effect on later communication skills (Chapman 2004:251). An example of a positive effect on communication development relate to earlier referral for the evaluation of the velopharyngeal mechanism where children who were functioning well pre-surgery, displayed poor post-surgical progress.

Scherer and Kaiser (2007:357) also described the distinctive speech characteristics in children with CLP which include delayed sound inventory due to the palate dysfunction, emergence of compensatory speech patterns, and slow speech and language development. According to Scherer and Kaiser (2007:375) these speech production and language deficits could persist from birth until 36 months, even after repair of the palate. Their findings imply that children with CLP who received surgery could reach a post surgery plateau in their language development which could also account for the speech and language delay which was found in the [12;24) months age group in the present study. Although the research of Scherer and Kaiser (2007) provided some explanation of the young child's expressive and receptive development, their study did not include an in-depth description and a comprehensive assessment of the age-specific factors which could result in language delay in young children with CLP. Some of the age-specific factors that could affect the speech and language development of young children with CLP are investigated in section 4.3.

4.3 STATISTICAL INFERENCE

The second stage of a statistical analysis is *Statistical Inference*, where statistical methods (tests) are used to draw conclusions about a population on the basis of sample data (Maxwell & Satake, 2006: 280). *Pearson's chi-square test* was used to test for an association between a dependent variable and an independent variable, where the counts in each cell (combination of categories of the two variables) were reported in a two-way frequency table (Field, 2005:682). The chi-square test statistic is based on *comparing the counts* (observed frequencies) *with the expected counts* (frequencies one might expect to get in those cells by chance). An important assumption of the chi-square test to be a valid test is that the *expected counts* in all the cells must be *larger than 5* (Field, 2005:686). If this is not the case, the categories of a variable must be grouped together, until the assumption holds. When this assumption is still not satisfied in a two by two, two-way frequency table (only two categories for each variable, thus $2 \times 2 = 4$ cells), the *Fisher's exact test* may be applied as a test for association between the two variables.

Each test statistic (Pearson or Fisher) was associated with a *p-value*, measuring the *exceedance probability* of the test. According to (Field, 2005:686), a conclusion about the rejection or not of a null hypothesis, was based on comparing this *p-value* with a *significance level of 5%*, which measures how frequently the conclusion, drawn from the statistical inference, will be wrong:

- If the *p-value is less than 0.01 or on the border of 0.01 (e.g. 0.015)*, the *null hypothesis was rejected and a highly significant association existed* between the dependent and independent variable.
- If the *p-value was less than 0.05 or on the border of 0.05 (e.g. 0.057)*, the *null hypothesis was rejected and a significant association existed* between the dependent and independent variable.
- If the *p-value was between 0.05 and 0.1 or on the border of 0.1 (e.g. 0.105)* an indication of a tendency for association between the two variables existed.
- If the *p-value was greater than 0.1, the null hypothesis was not rejected and no significant association is indicated* (Cody & Smith, 2006).

In order to ensure continuity in the discussion of the findings in Chapter 4 and to demonstrate the reliability of the data and validity of the methods and findings, the extensive statistical interpretation of the results is presented in Appendix V. The aim of the description in Appendix V is to create links between the study objectives and to demonstrate the sophisticated statistical process of data analyses which were conducted and which resulted in an integrative understanding of the findings. The sequence of the tested dependent variables was determined by the order of the content in the CHRIB database, e.g. the communication area *listening skills* was the first developmental area stored in the database, and was also the first area to be tested for an association with all the independent variables. Since no pre-existing associations between factors influencing communication characteristics of the participants with CLP were previously specified in the CHRIB database, the main purpose of the exploratory data analysis was to identify, describe and discuss the significant associations as well as the tendencies for associations. The statistical findings are presented in Appendix V and discussed in the following section.

Objective 2

To identify the risk factors and assets and determine the nature of the association between the risk factors and assets, and the areas of communication development within each age group interval.

Table 4.5 indicates the significant associations and tendencies for associations between assets and risk factors and the communication development of participants at specific age group intervals.

Table 4.5: The influence of risk factors and assets (independent variables) on communication development (dependent variables) according to the specific age-categories of the participants (n=227)

Communication development (Dependent factors)	Risk factors and assets (Independent factors)		
	[1;12) months	[12;24) months	[24;48) months
LISTENING SKILLS (Hugo et al., 2000)			No significant associations could be found
Hearing testing situation	Occupation of mother	*Occupation of mother	
Communication interaction situation	*Type day-care *Occupation of mother Education of mother	Low birth weight	
COGNITIVE SKILLS DASI-II (Fewell & Langley, 1984)	* Low birth weight	Premature birth Low birth weight	**Parent-child interaction
SKILL IN LANGUAGE USE (based on Muller, 2004; Wetherby & Prizant, 1989)			No significant associations could be found
Non-verbal communication	* Parent-child interaction		
Behavioural regulation	* Low birth weight		
Social interaction	Duration of stay in NICU	Education of mother **Parent-child interaction Low birth weight *Premature birth	
LANGUAGE			
Receptive language delay (DAS: Anderson et al., 1978)	*Parent-child interaction		*Parent-child interaction
Receptive language delay (RITLS: Rossetti, 2006)	**Education of mother	*Low birth weight Parent-child interaction	*Parent-child interaction
Expressive language delay (DAS: Anderson et al., 1978))	Parent-child interaction	Type of day-care	**Parent-child interaction
Expressive language delay (RITLS: Rossetti, 2006)			



GENERAL DEVELOPMENT (DAS)	No significant associations could be found		No significant associations could be found
Gross motor development		Low birth weight	
*Significant associations **Highly significant associations Tendencies for associations are indicated without asterisks			

According to Table 4.5, there are multiple factors which could influence communication development at different age-intervals in the participants in the sample. Each of these factors will be discussed according to the three age groups in which they were observed. Since a dearth of information exists regarding the factors influencing young participants with CLP within specific age group-intervals, some of the findings could not be compared to similar research regarding children with CLP.

4.3.1 Factors influencing listening behaviour of the participants during hearing testing and communication interaction

As already indicated, the CHRIB Listening Scale was used to measure the participants' listening skills in two different contexts, i.e. the play-based communication assessment and the hearing testing situations (4.2.1). The age-specific findings of the present study as well as related literature sources to validate the results are summarized in Table 4.6 a, and Table 4.6 b and discussed according to the three observed age groups.

Table 4.6 a: Independent factors influencing listening skills (hearing testing situation) and evidence from literature that validate the findings (n=227)

Age group	Independent factor	Related literature source	Statistical analysis and discussion
[1;12) months	Occupation of mother (Stay-at-home-mother/Working outside the home)	Bradley and Vandell (2007) Weigel, Lowman and Martin (2007)	Appendix V, No 3.1.1
	*Type of day care (Mother/Other caregivers)	Weigel et al. (2007)	Appendix V, No 3.1.2
[12;24) months	*Occupation of mother	Basilio, Puccini, Da Silva and Pedromonico (2005)	Appendix V, No 3.2.1
[24;48) months	No significant associations	Roberts, Burchinal and Zeisel (2002)	See list of insignificant factors in Appendix V: 87
*Significant associations **Highly significant associations Tendencies for associations are indicated without asterisks			

Table 4.6 b: Independent factors influencing listening skills (communication interaction situation) and evidence from literature that validate the findings (n=227)

Age group	Independent factor	Related literature source	Statistical analysis and discussion
[1;12) months	* Occupation of mother (Stay-at-home-mother/Working outside the home)	Bradley and Vandell (2007) Weigel, Lowman and Martin (2007)	Appendix V, No 3.1.3
	Education of mother (High school education/tertiary education)	Pan, Rowe, Singer and Snow (2005)	Appendix V, No 3.1.4
[12;24) months	Low birth weight	Rossetti (2001)	Appendix V, No 3.2.2
[24;48) months	No significant associations	Roberts, Burchinal and Zeisel (2002)	See list of factors in Appendix V: 87
<p>*Significant associations **Highly significant associations Tendencies for associations are indicated without asterisks</p>			

- **Associations for participants in the [1;12) months age group**

According to Table 4.6 a and the statistical analysis in Appendix V, No 3.1 (objective 3.1.1), a **tendency** for association existed between the **occupation of the mother** and the **listening skills (hearing testing situation)** of the participants. In order to measure the size of this effect of association, an odds ratio was calculated. The odds ratio revealed that participants with *stay-at-home mothers* were **2.3 times more likely** to present with inadequate listening skills (hearing testing situation) compared to participants with mothers *working outside the home*, in the age group [1;12) months.

Further analysis of Table 4.6 a and the statistical discussion in Appendix V, No 3.1 (objective 3.1.2), revealed that the **type of day care** also had a **significant** influence on the **listening skills (hearing testing situation)** of the participants in the [1;12) months age group. The odds ratio indicated that it was **2.6 times more likely** for participants, *staying with their mothers* during the day, to present with inadequate listening skills, compared to those participants staying with *other caregivers*, in the age group [1;12) months.

Based on the findings in Table 4.6 b and Appendix V, No 3.1 (objective 3.1.3), it was evident that the **occupation of the mother** had a **significant** influence on the **listening skills (communication interaction situation)** of the participants in the [1;12) months age group. The odds ratio revealed that it was **2.9 times more likely** for participants with *stay-at-home mothers*, to present with inadequate listening skills, compared to those participants staying with *mothers working outside the home*, in the age group [1;12) months. It is therefore evident that the occupation of the mother plays an important role in the listening skills of the participants with CLP in the age group [1;12) months, in both the hearing testing and the communication interaction situations.

Finally, according to Table 4.6 b and Appendix V, No 3.1 (objective 3.1.4), a **tendency** of association existed between the **education of the mother** and the **listening skills (communication interaction situation)** of the participants in the age group [1;12) months. The odds ratio revealed that participants with mothers with a *high school education* were **2.5 times more likely** to present with inadequate listening skills (communication interaction situation) compared to participants with mothers who obtained a *tertiary level education*, in the age group [1;12) months.

Based on the preceding discussions, the statistical findings are all interrelated and all three environmental factors (occupation of mother, education of mother and type of day care) involved the mother of the participant with CLP. The calculation of the odds ratio served to determine the strength of the findings and added to the reliability and validity of the results. These findings must be interpreted with caution as it was not clear for how long the mother had been working outside the house or at home. In addition, further analysis is needed to determine whether the mothers who stayed at home had lower education levels than mothers working outside the home. Due to the limited number of observations available per age group in the present study, it was not possible to investigate the interaction effect of all three environmental factors on listening skills. Evidence from literature, to validate above findings, will be discussed in the following paragraphs.

Bradley and Vandell (2007) investigated the effect of type of day care on the preschool child's functioning. The study concluded that children in day care centres presented with improved language scores and better early scholastic performance than children living at home with mothers with a lower educational level. Although children attending classes of more than 6 children showed an increased risk for middle ear infections, these infections had no long-term effects on the child's functioning (Bradley & Vandell, 2007:674). Since the findings in Table 4.6 a and b indicated that participants' listening skills were more consistent when they attended a day care centre or nursery school than when they were staying at home with their mothers, the results are in accordance with the conclusions of Bradley and Vandell (2007).

Weigel et al. (2007) also studied the influence of the type of day care on children's communication and listening skills before they enter school. Their findings revealed that the amount of language stimulation received by the child in the class room at 15 months was linked to increased vocabulary production and verbal comprehension at 24 months and also to their expressive and verbal comprehension at 36 months. According to Owens (2001:233) the role of significant caregivers such as parents and educators in stimulating language development as well as peer-group exposure, are crucial in pre-school children. The caregivers manipulate the conversational context to create optimal communication opportunities for the child to learn language. These findings are consistent with the results shown in Table 4.6 a and b and suggest that participants attending a nursery school and day care group could present with superior language outcomes compared to participants who stay at home with their mothers. It could be argued that mothers working outside the home and mothers with a higher education may provide more quality stimulation within a limited period of time than mothers working at home and mothers with a lower education level. Thus, the quality rather than the quantity of day care must be considered, since it is not indicated in the CHRIB database what kind of stimulation the child received during day care or when staying at home.

- **Associations for participants in the [12;24) months age group**

Similar to the findings of the [1;12) months age group, Table 4.6 shows that the **occupation of the mother** had a **significant** influence on the **listening skills (hearing testing situation)** of the participants in the [12;24) months age group (Appendix V, No 3.2 (objective 3.2.1)). The strength of this association (odds ratio) revealed that, in the [12;24) months age group, it was **2.5 times more likely** for participants with a *stay-at-home mother* to present with inadequate listening skills compared to those participants with *mothers working outside the home*.

Furthermore, based on the findings depicted in Table 4.6 b and showed in Appendix V, No 3.1 (objective 3.2.2), a **tendency** for association existed between **low birth weight** and the **listening skills (communication interaction situation)** of the participants. The odds ratio revealed that, in the age group [12;24) months, participants with *low birth weight* were **2.8 times more likely** to present with inadequate listening skills (communication interaction situation) compared to participants with *normal birth weight*.

Basilio et al. (2005: 729) investigated the listening and receptive language skills of children aged 2 to 5 years. Their findings concurred with the findings of the present study which indicate that participants, with mothers working outside the home, are more advanced in their listening skills, as well as in their receptive and expressive language development than children with stay-at-home mothers. The study suggests that professional mothers, who were working outside the home, could more readily access information with regard to child stimulation. This information could support them to increase their child's vocabulary, which could result in a positive effect on their child's listening skills (Basilio et al., 2005:729). It can therefore be concluded that, although the mothers working outside the home may spend less time with their children during the day, the mothers' level of stimulation may be more appropriate and therefore more beneficial for their children's language development.

Validation from research regarding the effect of low birth weight on listening skills in infants with CLP within the age group [1;12) months could not be found. It could be argued that participants with low birth weight were more prone to

illnesses such as otitis media which resulted in fluctuating hearing loss and inadequate listening skills (Louw et al., 2002). Recurrent otitis media is described as one of the most common illnesses of children with low birth weight which also proved to be a predictor of delayed language development (Rossetti, 2001:21). In addition, the negative effect of high noise levels in the NICU on the immature auditory system of the child with CLP should be considered (Brown, 2009:168). The cascading effect of low birth weight on all developmental areas is thus confirmed by the results of the present study.

- **Associations for participants in the [24;48) months age group**

According to Table 4.6, **no significant associations** could be detected between any of the independent factors and the dependent factor 'listening skills' of the participants in the [24;48) months' age group. A list of these insignificant factors (p-values more than 10%) appears in Appendix V .IV

Roberts et al. (2002:704) studied the relationship between the history of hearing difficulties during the first four years of life caused by otitis media and later academic achievement in reading and word recognition. They found that, although these children performed poorer in expressive language and presented with more verbal mathematical problems during the earlier years compared to their peers, they did not present with expressive language delay when they reached grade two. The findings of Roberts et al. (2002:704) suggest that children with CLP may present with catch-up growth in terms of their expressive language development by the time they are enrolled in primary school. These findings could explain why there were no significant factors influencing listening skills in the more mature age group. Furthermore, it could be inferred that otitis media is not directly related to expressive language development at a later developmental stage in the lives of the participants.

- **Summary of findings per independent factor across the three age groups**

Based on the above discussion, the factor *occupation of the mother* only played a role on listening development during the first two years of the participants' lives. In contrast, the effect of the education of the mother and the type of day care on

the listening development was only present during the first year of the participants' lives.

4.3.2 Factors influencing the cognitive skills of the participants

The findings regarding factors which influence the cognitive development (according to the DASII-II) of the participants in the three age group intervals are presented in Table 4.7.

Table 4.7: Independent factors influencing cognitive development and evidence from literature that validate the findings (n=227)

Age group	Factor	Literature source	Statistical analysis and discussion
[1;12) months	*Low birth weight	Foulder-Hughes and Cooke (2003) Rossetti (2001) Whitaker et al. (2006)	Appendix V, No 3.3, objective 3.3.1
[12;24) months	Premature birth	Caravele, Tozzi, Albino and Vicari (2005) Hediger et al. (2002)	Appendix V, No 3.4, objective 3.4.2
	Low birth weight	Rossetti (2001)	Appendix V, No 3.4, objective 3.4.1
[24;48) months	*Parent-child interaction (Klein & Briggs; 1987MICS, 1989;)	Murray et al. (2008) Bradley and Vandell (2007)	Appendix V, No 3.5, objective 3.5.1
<p>*Significant associations **Highly significant associations Tendencies for associations are indicated without asterisks</p>			

- **Associations for participants in the [1;12) months age group**

According to Table 4.7, low birth weight appears to be the main influencing factor of cognitive development in the infants within the age group [1;12) months. According to Table 4.7 and Appendix V, No 3.3 (objective 3.3.1), a **significant** association existed between **low birth weight** and the **cognitive skills** of the participants. The odds ratio revealed that participants with *low birth weight* were **4.4 times more likely** to present with below average/poor cognitive skills compared to participants with *normal birth weight* in the [1;12) months age group.

The high odds ratio indicates a strong association which adds to the validity, as well as the generalization of the finding to the young population with CLP.

This finding represents a long-established link. Foulder-Hughes and Cooke (2003:97) reported that children born preterm often present with poor gross and fine motor development that may result in later school failure in the presence of average intelligence. According to Rossetti (2001:15) low birth weight and preterm birth are the strongest predictors of poor developmental outcomes which also appeared to emerge from the findings of the present study. The long-term cascading effect of low birth weight on a child's cognitive development and the negative effect on future academic achievement were thus emphasized. Although a literature search could not reveal similar research findings for young children with CLP, these findings agree with a follow-up study of Whitaker et al. (2006). The participants consisted of adolescents with CLP who had a history of low birth weight. The findings suggested that the IQ scores of the group with low birth weight, although within the normal range, were significantly lower than the population norms (Whitaker et al. 2006:1044). These findings are similar to those of Eichenwald and Stark (2008:1702), who also found that complications of very low birth weight are associated with a poor neuro-cognitive developmental outcome. The long-term consequences of the compounding risk of low birth weight, in addition to CLP in an infant, should therefore be considered in ECI.

- **Associations for participants in the [12;24) months age group**

Compared to the significant association found in the [1;12) months age group, a **tendency for association** was found between **low birth weight** and **cognitive skills** in the age group [12;24) months (see Appendix V, No 3.4, objective 3.4.1). The odds ratio revealed that participants with *low birth weight* were **2.3 times more likely** to present with below average/poor cognitive skills compared to participants with *normal birth weight* in the [12;24) months age group.

A similar **tendency for association** was found regarding **premature birth, which is** related to low birth weight (see Appendix V, No 3.4, objective 3.4.2). The odds ratio revealed that participants born *preterm* were **2.9 times more likely** to present with inadequate cognitive skills compared to participants born *full term* in

the [12;24) months age group. The long-term effects of preterm birth in the participants with CLP could be ascribed to the cumulative effect of both low birth weight/preterm birth and the presence of the cleft. The presence of a cleft requires more specialized health care and care giving, therefore the young population with CLP are affected more than the children without clefts (Rossetti, 2001).

Although no evidence could be found in literature relating to age-specific factors in children with CLP, these findings are consistent with a study of Caravele et al. (2005:477) that aimed to determine whether a neuropsychological profile existed at three to four years in ex-preterm infants with a low risk for developmental delay. The findings of this study indicated that children aged between three and four years who were born preterm, presented with lower cognitive developmental scores compared to their full term peers. In contrast to the findings of the present study, Caravelle et al. (2005: 477) indicated that prematurity continued to have an influence on the participants' cognitive development beyond 24 months of age. Prematurity should therefore be considered a risk factor for the development of cognitive delay in children with CLP.

- **Associations for participants in the [24;48) months age group**

According to Table 4.7 and Appendix V, No 3.5 (objective 3.5.1), a **significant** association existed between **parent-child interaction** and the **cognitive skills** of the participants. For this age group, the odds ratio revealed that participants who were exposed to *limited parent-child interaction* were **5.4 times more likely** to demonstrate lower than average/poor cognitive skills compared to participants who experienced *optimal parent-child interaction*.

Murray et al. (2008:115) reported that a breakdown in maternal interaction could result in lower IQ scores in young children of 18 months who present with CLP. The analysis of mother-infant interactions at 2 years of age revealed that children who received delayed surgery presented with more interaction difficulties and lower cognitive skills than their counterparts. Both the findings of the current study and those of Murray et al. (2008) indicated that there may be a sensitive

period in the life of a child with CLP when the exposure to social experience may be important for normal cognitive development (Murray et al., 2008:121).

- **Summary of findings per independent factor across the three age groups**

Both *low birth weight* and *premature birth* had an influence on cognitive development, but only during the first two years of the participants' lives. The factor *parent-child interaction* commenced to play a determining role in the participants' cognitive development beyond two years of age.

4.3.3 Factors influencing the skill of language use of the participants

The skill of language use were assessed by means of the *Assessment of Communication Skills: Functions and means expressed by infant or child (based on Muller, 2004; Wetherby & Prizant, 1989)*, one of the assessment instruments of the CHRIB Assessment Protocol (Kritzinger & Louw, 2002). The factors influencing the non-verbal communication, regulation of behaviour and social interaction skills as they relating to language use in the participants are respectively reported in Tables 4.8 a, b and c.

Table 4.8 a: Independent factors influencing the development of skill in language use (non-verbal communication) and evidence from literature to validate the findings (n= 227)

Age group	Factor	Literature source	Statistical analysis and discussion
[1;12) months	**Parent-child interaction	Cusson (2002) Slonims and Pasco (2009)	Appendix V, No 3.6 objective 3.6.1
[12;24) months	No significant associations	No age-specific comparative study to date	See list of factors in Appendix V:88
[24;48) months	No significant associations	No age-specific comparative study to date	See list of factors in Appendix V.IV
<p>*Significant associations **Highly significant associations Tendencies for associations are indicated without asterisks</p>			

Table 4.8 b: Independent factors influencing the development of skill in language use (regulation of behaviour) and evidence from literature to validate the findings (n= 227)

Age group	Factor	Literature source	Statistical analysis and discussion
[1;12) months	*Low birth weight	Wyszynski, Sarközi & Czeizel (2005) Landry, Swank and Smith (2006)	Appendix V, No 3.6 objective 3.6.2
[12;24) months	No significant associations	No age-specific comparative study to date	See list of insignificant factors in Appendix V.IV
[24;48) months	No significant associations	No age-specific comparative study to date	See list of insignificant factors in Appendix V.IV
<p>*Significant associations **Highly significant associations Tendencies for associations are indicated without asterisks</p>			

Table 4.8 c: Independent factors influencing the development of language use (social interaction skills) and evidence from literature to validate the findings (n= 227)

Age group	Factor	Literature source	Statistical analysis and discussion
[1;12) months	Duration of stay in NICU	No age-specific comparative study to date	Appendix V, No 3.6 objective 3.6.3
[12;24) months	Education of mother	Pancsofar and Vernon-Feagans (2006)	Appendix V, No 3.7 objective 3.7.1
	**Parent-child interaction	Pancsofar and Vernon-Feagans (2006) Bradley and Vandell (2007) Slonims and Pasco (2009) Frederickson et al. (2005: 179)	Appendix V, No 3.7 objective 3.7.2
	Low birth weight	No age-specific comparative study to date	Appendix V, No 3.7 objective 3.7.3
	*Premature birth	Cusson (2002)	Appendix V, No 3.7 objective 3.7.4
[24;48) months	No significant associations	No age-specific comparative study to date	See list of insignificant factors in Appendix V.IV
<p>*Significant associations **Highly significant associations Tendencies for associations are indicated without asterisks</p>			

According to Tables 4.8 a, b, and c, the functions relating to language use of the participants in the study were influenced by a variety of factors. A few studies were conducted to determine factors which could influence language use in

young children with CLP. Slifer et al. (2003:175) reported on the psychological effect of craniofacial disorders on social interaction patterns of children. The psychological well-being of the child with CLP may be influenced by multiple factors such as facial appearance, speech, hearing and feeding disorders, cognitive performance, temperament, surgery, family, personality and social factors. The authors suggested that the use of language by children with CLP may be mildly affected compared to that of their non-cleft peers (Slifer et al., 2003:181). According to Slonims and Pasco (2009:454) delayed language use may also result from internal factors such as abnormal neurological, cognitive or physical development, sensory disorders, premature birth or environmental factors such as abuse, neglect, emotional trauma or postnatal depression. Both studies (Slifer et al., 2003; Slonims & Pasco, 2009) emphasized that multiple factors could result in a communication developmental delay in young children. Although both studies explored the language use of school-aged children with CLP, these findings are consistent with the present study which also revealed a wide variety of factors influencing language use in a group of children with CLP between 1 to 48 months. These factors are discussed according to the specified age groups.

- **Associations for participants in the [1;12) months age group**

Firstly, according to Table 4.8 a and Appendix V, No. 3.6 (objective 3.6.1), a **highly significant** association existed between **parent-child interaction** and the **non-verbal communication skills** of the participants. For this age group the odds ratio revealed that participants who were exposed to *limited parent-child interaction* were **5.9 times more likely** to demonstrate non-verbal communication delay compared to participants who experienced *optimal parent-child interaction*.

Secondly, Table 4.8 b and Appendix V, No. 3.6 (objective 3.6.2) indicated a **significant** association between **low birth weight** and the **regulation of behaviour** in the participants. The odds ratio depicted that participants with low birth weight were **6.7 times more likely** to demonstrate a delay in regulation of behaviour compared to participants with *normal birth weight*.

Finally, based on the findings reported in Table 4.8 c and Appendix V, No. 3.6 (objective 3.6.3), a **tendency for** association existed between **the time spent in the NICU** and the **social interaction skills** in the participants. The odds ratio revealed that participants who *spent more than 48 hours in the NICU* were **3.1 times more likely** to demonstrate a delay in social interaction skills compared to participants who *spent less than 48 hours in the NICU*.

The findings related to low birth weight are consistent with literature in as far as children with very low birth weight may present with inappropriate regulation of behaviour (Landry et al., 2006:640). Children with low birth weight showed improvement in their use of language when they received optimal responsive parenting (Landry et al., 2006:639). Thus, the interaction of the factors (parent-child interaction and low birth weight) could influence non-verbal communication and regulation of behaviour in the [1;12) months age group. Due to the small number of observations available per age group in the present study, it was not possible to investigate the interaction effect of these two factors on the functions relating to language use.

Verification of the effect of time spent in the NICU on the communication skills of participants with CLP in the age group [1;12) months could not be found. It could, however, be argued that a child spending more than 48 hours in the NICU may have delayed social interaction skills. During the time spent in NICU, the child may not have the opportunity to interact with his environment in a normal manner in order to acquire the range of functions of language use. One of the main factors influencing infants in NICU is separation from parents, which result in a disruption in attachment and can also affect parent-child communication interaction patterns (Merrit et al., 2003:96). The negative cascading effect of low birth weight and increased stay in the NICU resulting in limited parent-child interaction and delayed behaviour regulation and social interaction must thus be considered in the [1;12) months age group.

- **Associations for participants in the [12;24) months age group**

According to Table 4.8 c and Appendix V No 3.7 (objective 3.7.2), a highly **significant** association existed between **parent-child interaction** and **social**

interaction skills, while a **significant** association (objective 3.7.4) existed between **premature birth** and the **social interaction skills** of the participants. Participants in the [12;24) months age group who were exposed to *limited parent-child interaction*, were **3.8 times more likely** to present with a delay in social interaction skills compared to participants who experienced *optimal parent-child interaction*. Furthermore, participants born *preterm* were **3.2 times more likely** to present with a delay in social interaction skills compared to participants born *full term*.

Furthermore, the results in Table 4.8 c and the statistical analysis in Appendix V No 3.7 (objectives 3.7.1 and 3.7.3), depict a **tendency for associations** between each of the independent factors (**education of the mother** and **low birth weight**) and the dependent factor, that is **social interaction skills**, of the participants. The odds ratio revealed that participants with mothers with a *high school education* were **3.3 times more likely** to present with a delay in social interaction compared to participants with mothers with *tertiary education*. The odds ratio also revealed that participants with *low birth weight* were **2.5 times more likely** to present with a delay in social interaction compared to participants presenting with normal birth weight.

The findings presented above compliment research findings stating that mothers' vocabulary, speech complexity and appropriate questions may support language outcomes in children with CLP if the parents are controlled for their level of education (Pancsofar & Vernon-Feagans, 2006:575). Since very few studies have considered the age-specific factors influencing language use of pre-school children with CLP, Frederickson et al. (2005) conducted a study to replicate and extend a previous study investigating the conversational skills of children with CLP. Their findings suggested that children with CLP were conversationally less assertive than their non-cleft peers. Furthermore, an association was found between speech production skills and conversational skills, which suggesting that poor speech may have an effect on language use in these children. The findings of this present study reveal the important role of parent-child interaction in the communication skills of the participants. The unique combination of factors at this stage, i.e. the presence of CLP, low birth weight and pre-term birth can be

associated with the mother’s education and her interaction with her child. The important role of parent training in ECI for children with clefts is thus emphasized, since toddlers’ communication skills were better when their mothers had a higher education and optimal interaction with their child.

- **Associations for participants in the [24;48) months age group**

Table 4.8 a, b and c indicate that none of the factors displayed any significance or tendency for association with the functions related to language use in the age group [24;48) months. It could be argued that the risk factors present in the participants at birth do not influence the child’s language use by age two and beyond.

- **Summary of findings per independent factor over the three age groups**

Based on the above discussion, parent-child interaction proved to be the strongest factor influencing the functions (non-verbal communication and social interaction skills) related to language use in participants from birth until two years of age. Low birth weight had a significant influence on the regulation of behaviour of the participants during the first twelve months. During the toddler stage of the participants’ life, low birth weight and its related factor namely preterm birth, both had an influence on social interaction skills of the participants.

4.3.4 Factors influencing the receptive language skills of the participants

Table 4.9: Independent factors influencing the receptive language skills in the participants and evidence from the literature that validate the findings (n=227)

Age group	Factor	Literature source	Statistical analysis and discussion
[1;12) months	*Parent-child interaction	Weigel et al. (2007:722, 723)	Appendix V, No 3.8, objective 3.8.1
	**Education of mother	Basilio et al. (2005: 729) Beitchman (2008:631) Hediger et al. (2002: 33) Pancsofar and Vernon-Feagans (2006: 584) Weigel et al. (2007: 722)	Appendix V, No 3.8, objective 3.8.2



		Zubrick et al. (2007: 1563)	
[12;24) months	*Low birth weight	Caravele et al. (2005: 478) Cusson (2002:405) Hediger et al. (2002: 33)	Appendix V, No 3.9, objective 3.9.1
	Parent-child interaction	No age-specific comparative study could be found	Appendix V, No 3.9, objective 3.9.2
[24;48) months	*Parent-child interaction	No age-specific comparative study could be found	Appendix V , No 3.10, objective 3.10.1
<p>*Significant associations **Highly significant associations Tendencies for associations are indicated without asterisks</p>			

- **Associations for participants in the [1;12) months age group**

According to Table 4.9 and the statistical discussion in Appendix V No. 3.8 (objective 3.8.1), a **significant** association existed between **parent-child interaction** and the **receptive language skills (based on to the DAS)** of the participants. The odds ratio indicated that participants who were exposed to *limited parent-child interaction* were **4.8 times more likely** to present with a receptive language delay compared to participants who experienced *optimal parent-child interaction*.

Further analysis for this age group based on Appendix V, No. 3.8 (objective 3.8.2), presented a **highly significant** association between **education of the mother** and the **receptive language skills (according to the RITLS)** of the participants. The odds ratio indicated that participants with mothers with high school education were **7 times more likely** to present with a receptive language delay compared to participants with mothers with a tertiary education.

The findings regarding the important role of parent-child interaction on receptive language in this study confirm previously reported findings for the two remaining age groups in the present study. The recurring findings validate and emphasize the importance of recognizing this influential factor on the language development of a child with CLP. According to Slonims and Pasco (2009:453) infants are predisposed to recognise the human voice at birth and to discriminate speech sounds while parents modify the manner in which they stimulate and enhance language learning. The important role of the mother to set a framework for communication and adjust her responses according to the child's abilities in order

to engage in a mutual dialogue is also described by Owens (2001:175). According to Owens (2001:194), children are 'pre-wired for communication' and the parents have a responsibility to create language-learning opportunities to stimulate language according to the child's level of communication. The role of parent-child interaction in the language outcomes of children with CLP was also investigated by Scherer and Kaiser (2007:355). Their study aimed to determine the use of naturalistic models of intervention which involved everyday interaction of mothers with their children with CLP to facilitate functional language and speech for the child. According to Scherer and Kaiser (2007:355), parents are an integral part of the intervention process since they are trained and supported to practice and apply the strategies on their children under the supervision of the speech-language therapist. The use of naturalistic models has been proved to be successful in enhancing speech and language development in young children with CLP. A parent-centred ECI approach should therefore be followed with young children with clefts. The parent-centred approach involves the training of parents during the intervention process to support their child's optimal speech and language development (Scherer & Kaiser, 2007).

The impact of the educational level of the mother on the participant's development was repeatedly confirmed in the findings of this study and highlights the importance of identifying this factor since it could serve as either a weakness or strength in the child's development. Furthermore, this finding agrees with literature stating that a higher level of education in the mother increases the child's vocabulary, while a lower level of education increases the risk of developmental delay in a child (Basilio et al., 2005:729).

- **Associations for participants in the [12;24) months age group**

Firstly, according to Table 4.9 and Appendix V, No 3.9 (objective 3.9.1), a **significant** association existed between **low birth weight** and the **receptive language skills** (according to the RITLS) of the participants. The odds ratio indicated that participants with low birth weight were **8.2 times more likely** to present with a receptive language delay compared to participants with normal birth weight.

Secondly, a **tendency for association** existed between **parent-child interaction** and the **receptive language skills (based on the RITLS)** of the participants (Appendix V, No. 3.9, objective 3.9.2). The odds ratio indicated that participants who were exposed to *limited parent-child interaction* were **5.7 times more likely** to present with a receptive language delay compared to participants who experienced *optimal parent-child interaction*.

The factors influencing receptive language in this age group are similar to findings in the previous age group since parent-child interaction were already indicated to have an influence on receptive language in the [1;12) months age group. Parent-child interaction is thus recurrently indicated as a strong predictor of language development.

Low birth weight, which is an established risk for development, presented as a new factor which could influence receptive language in the [12;24) months age group. Within the South African context, a review of the healthcare provided to mothers, infants and children revealed that newborn illnesses, such as low birth weight, are one of the five biggest challenges. According to a national review, 15% of infants are born with low birth weight and these infants are at great risk to die due to infections such as sepsis, pneumonia and meningitis (Bradshaw et al., 2008:4). The findings of the health review and the present study are in accordance with Rossetti (2001:20) who stated that low birth weight infants are prone to a wide range of complications that could increase their hospital stay and could be a determining factor in communication and other developmental delay.

- **Associations for participants in the [24;48) months age group**

According to Table 4.9 and Appendix V, No 3.10 (objectives 3.10.1 and 3.10.2) **parent-child interaction** showed **significant associations** with both measures of **receptive language skills** (RITLS and DAS) in the [24;48) months group. The odds ratio for the RITLS measurement indicated that participants who were exposed to *limited* parent interaction were **12 times more likely** to present with a delay in receptive language compared to the participants with *optimal* parent-child interaction. In contrast to the odds ratio of the RITLS measurement, the odds ratio of the DAS measurement showed that participants who were exposed to limited

parent-child interaction were **6.6 times more likely** to present with a delay in receptive language compared to the participants with optimal parent-child interaction. The differences in the odds ratios that were calculated could be attributed to the subjective nature of the parental perceptions reflected in the DAS.

Weigel et al. (2007: 724) confirmed these findings and stated that children showed improved language outcomes when parents engaged in language activities such as singing songs and reciting rhymes, story-telling, picture drawing and game playing. The researchers concluded that children of parents who understand and value their role in the outcomes of their child's language development showed improved receptive and expressive language skills (Weigel et al., 2007: 724).

- **Summary of findings per independent factor over the three age groups**

Based on the above results, it is evident that parent-child interaction is an important factor to consider in explaining the delay in receptive language in the participants across all three age groups from birth to 48 months. Thus, optimal parent-child interaction is an integral part of receptive language development in the first four years of the participants' life. Education of the mother is a strong influencing factor of receptive language development during the first year of the participant's life. In the second year of the participants' development, the presence of low birth weight proved to be a significant influencing factor on receptive language development.

4.3.5 Factors influencing the expressive language skills of the participants

The foundation for children's listening, speaking and communication skills are established during the pre-school years (Weigel et al., 2007). According to Cusson (2002:401) communication, which includes language, is the key element necessary for the development of appropriate social interaction skills. Language refers to the ability to comprehend what is being conveyed, the skill to use the correct grammatical structure (syntax) and the ability to produce sounds clearly and accurately during communication. Since literature indicated that early

language development is predictive of later language and literacy skills (Cusson, 2002), children should be exposed to factors that could enhance their early language development. Table 4.10 reveals the combined results of the two measures (RITLS and DAS) of the factors which may impact on the expressive language skills of the participants.

Table 4.10: Independent factors influencing the expressive language skills and evidence from literature that validate the findings (n=227)

Age group	Factor	Literature source	Statistical analysis and discussion
[1;12) months	Parent-child interaction	Weigel et al. (2007) Cusson (2002)	Appendix V, No 3.8, objective 3.8.3
[12;24) months	Type of day care	Weigel et al. (2007) Pancsofar and Vernon-Feagans (2006) Bradley and Vandell (2007)	Appendix V, No 3.9, objective 3.9.3
[24;48) months	*Parent-child interaction	Fewell and Deutscher (2002)	Appendix V, No 3.10, objective 3.10.2
<p>*Significant associations **Highly significant associations Tendencies for associations are indicated without asterisks</p>			

- **Associations for participants in the [1;12) months age group**

According to Table 4.10 and Appendix V, No 3.8 (objective 3.8.3), a **tendency for association** existed between **parent-child interaction** and the **expressive language skills** (based on the DAS) of the participants. The odds ratio indicated that participants who were exposed to *limited parent-child interaction* were **6 times more likely** to present with an expressive language delay compared to participants who experienced *optimal parent-child interaction*.

According to Cusson (2002:407) parent-infant interaction plays a crucial role in expressive language development as the infant provides the adult with signals, and the adult must be able to respond to those signals in an appropriate manner. Owens (2004:14) stated the following: 'Programs that involve the child's communication partners, especially parents, produce greater gains for children than programs that do not'. By integrating the literature findings and the age-specific results of the present study, it could be suggested that parents should be able to support the infant with CLP's unique expressive language learning style

since it could enhance later expressive language skills. The importance of appropriate parent-child interaction on the participants' expressive language outcomes is thus emphasized in the results.

- **Associations for participants in the [12;24) months age group**

Table 4.10 and the statistical analysis reported in Appendix V, No 3.9 (objective 3.9.3), depicted that the **type of day care** had a **tendency for association** on expressive language skills (based on the DAS). The odds ratio revealed that it was **4.4 times more likely** for participants, *staying with their mothers* during the day, to present with a delay in expressive language skills compared to those participants staying with *other caregivers* in the age group [12;24) months.

Compared to the [1;12) months age group that were not enrolled in day care, the majority of the participants in the [12;24) months age group entered day care after surgery and feeding problems had been resolved, and mothers decided to resume their careers. The findings of enhanced expressive language of participants in day care and nursery schools could be explained by the exposure to more frequent peer-group interactions and varied language models. These findings also agree with those of Bradley and Vandell (2007) who conducted correlation and experimental research on an international basis to determine the impact of age at entering into day care and quality and type of day care on a child's functioning and development. Their findings suggested that day care centres appear to enhance children's language and cognitive development (Bradley & Vandell, 2007:673). These findings could be explained by the fact that caregivers at day care centres could have received more professional training in child care development and were better qualified to provide structured activities to stimulate children's speech and language development. In contrast, participants who stayed at home with their mothers during the day and were not exposed to peer interaction may be more inclined to watch television and engage in casual learning activities which may have a negative impact on their expressive language developmental outcomes (Bradley & Vandell, 2007:673). These findings were confirmed by Pancsofar and Vernon-Feagans (2006:572) and Burchinal et al. (2000) who reported that young children in higher quality care presented with increased receptive and expressive skills compared to children

living at home. The combined findings imply that the quality, rather than the type of day care could predict later language outcomes. This is confirmed by the present study.

- **Associations for participants in the [24;48) months age group**

According to Table 4.9 and Appendix V, No 3.10 (objectives 3.10.3) **parent-child interaction** showed a **highly significant association** with **expressive language skills** (DAS) in the [24;48) months group. The odds ratio indicated a strong effect between the two factors. Participants, exposed to *limited* parent-child interaction, were **15.4 times more likely** to present with a delay in expressive language compared to the participants with *optimal* parent-child interaction.

The results in Table 4.10 indicate that the findings of the [12;24) months age group were repeated for the [12;48) months age group. Parent-child interaction also had an influence on the expressive language skills of participants in this age group. Fewell and Deutscher (2002) investigated the contributions of two factors of maternal style, namely 'responsiveness' and 'directiveness', to predict children's expressive language and reading performance at later stages in the children's life. The findings revealed that when mothers showed responsiveness towards their children, their children's verbal skills improved. In contrast, when mothers showed increased directiveness towards their children, the children may have lower verbal scores at five years of age. The findings of both the present study and Fewell and Deutchers' (2002) study provide an explanation for the significant influence that the nature of the parent-child interaction has on the child's verbal and reading outcomes.

- **Summary of findings per independent factor across the three age groups**

Compared to the observed significant role of parent-child interaction on receptive language skills across the three age groups, parent-child interaction showed a highly significant influence with expressive language in the participants beyond two years of age only. Furthermore, the type of day care had an influence on the participants in the [12;24) months age group only.

4.3.6 Factors influencing gross motor development of the participants

Table 4.11: Independent factors influencing the gross motor development and the evidence from literature that validates the findings (n=227)

Age group	Factor	Literature source	Statistical analysis and discussion
[1;12) months	None	No age-specific comparative study to date	Appendix V p 88
[12;24) months	Low birth weight	Whitaker et al. (2006)	Appendix V, No 3.11, objective 3.11.1
[24;48) months	None	No age-specific comparative study to date	Appendix V p 88
<p>*Significant associations **Highly significant associations Tendencies for associations are indicated without asterisks</p>			

- **Associations for participants in the [1;12) and [24;48) months age groups**

Table 4.11 shows that no factors showed significant associations with gross motor developmental skills in the participants in the [1;12) and [24;48) months age groups. However, a tendency for association were observed in the [12;24) months age group.

- **Associations for participants in the [12;24) months age group**

Table 4.11 and the statistical analysis in Appendix V, No 3.11, objective 3.11.1 indicated that **low birth weight** had a **tendency for association** with a delay in **gross motor skills** in the age group [12;24) months. The **odds ratio** revealed that participants with *low birth weight* were **2.7 times** more likely to present with a delay in gross motor skills compared to participants with *normal birth weight*.

Whitaker et al. (2006:1040) investigated motor and cognitive outcomes in adolescents who had low birth weight and its relation to specific prenatal and neonatal risk factors regarding these outcomes. The findings suggested that low birth weight may result in subtle motor and cognitive problems in school aged participants. Hediger et al. (2002) also reported on the effect of low birth weight on motor and social developmental outcomes in children aged 2 to 47 months. Their results indicated that male infants who were prematurely born showed a significant association with growth retardation in comparison to preterm females

(Hediger et al., 2002:42). Although these literature findings are not directly related to children with CLP, the trend exists that children with low birth weight may present with gross motor developmental delay. A summary of all the significant and tendency for associations across the age groups are demonstrated in Figure 4.2.

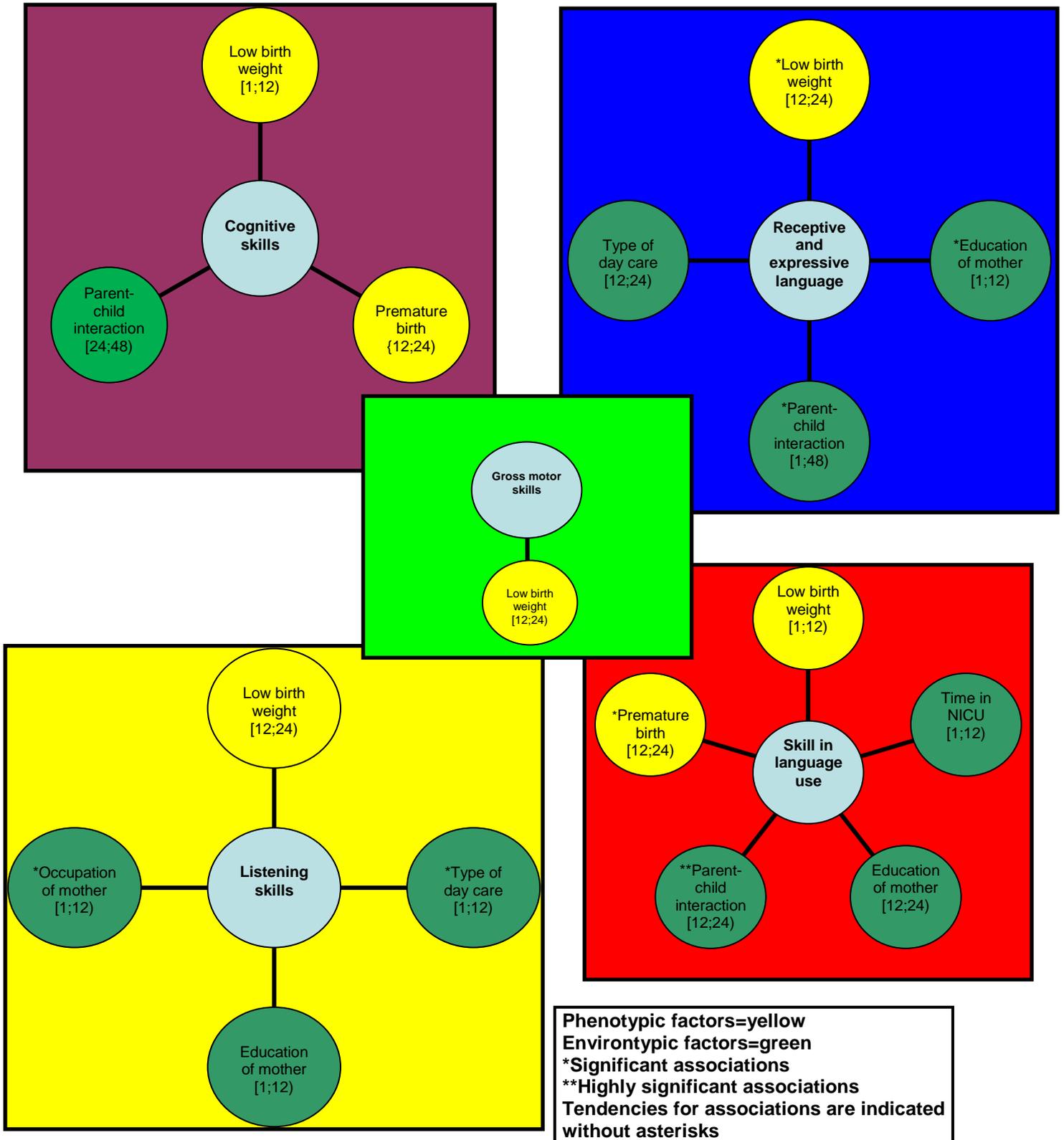


Figure 4.2: The main factors influencing communication characteristics in participants with CLP across the three age groups from 1 month to 48 months

In conclusion to objective 2, Figure 4.2 provides a summary of all the factors which were found to have a significant or a tendency for association with the communication development of the participants across the age groups from 1 month to 48 months. The purpose of this figure is to demonstrate the unique interrelationship between all the risk factors and assets influencing the participants' communication development:

- Low birth weight presented as a persistent phenotypic risk factor which influenced the development of functions related to language use in the [1;12) and [12;24) months age groups, and gross motor development and receptive language in the [12;24) months age group. Low birth weight was therefore the strongest risk factor influencing a variety of developmental areas.
- The envirotypic factors such as the education and the occupation of the mother as well as the type of day care indicated significant associations with listening skill development in the [1;12) months group and with the development of functions relating to language use in the [12;24) months age group. Parent-child interaction showed recurrent significant associations with receptive and expressive language across the three age groups.

OBJECTIVE 3

To identify and discuss the factors which have the greatest influence on communication development at specific age group intervals in order to determine an overall developmental trend in the participants aged between 1 month and 48 months.

4.4 DEVELOPMENTAL TREND

The **salient age-specific factors** that were evident to impact on the development of listening skills, cognition, expressive and receptive language, skills in language use and gross motor development of the participants are presented in Figures 4.3, 4.4, 4.5, 4.6 and 4.7 below.

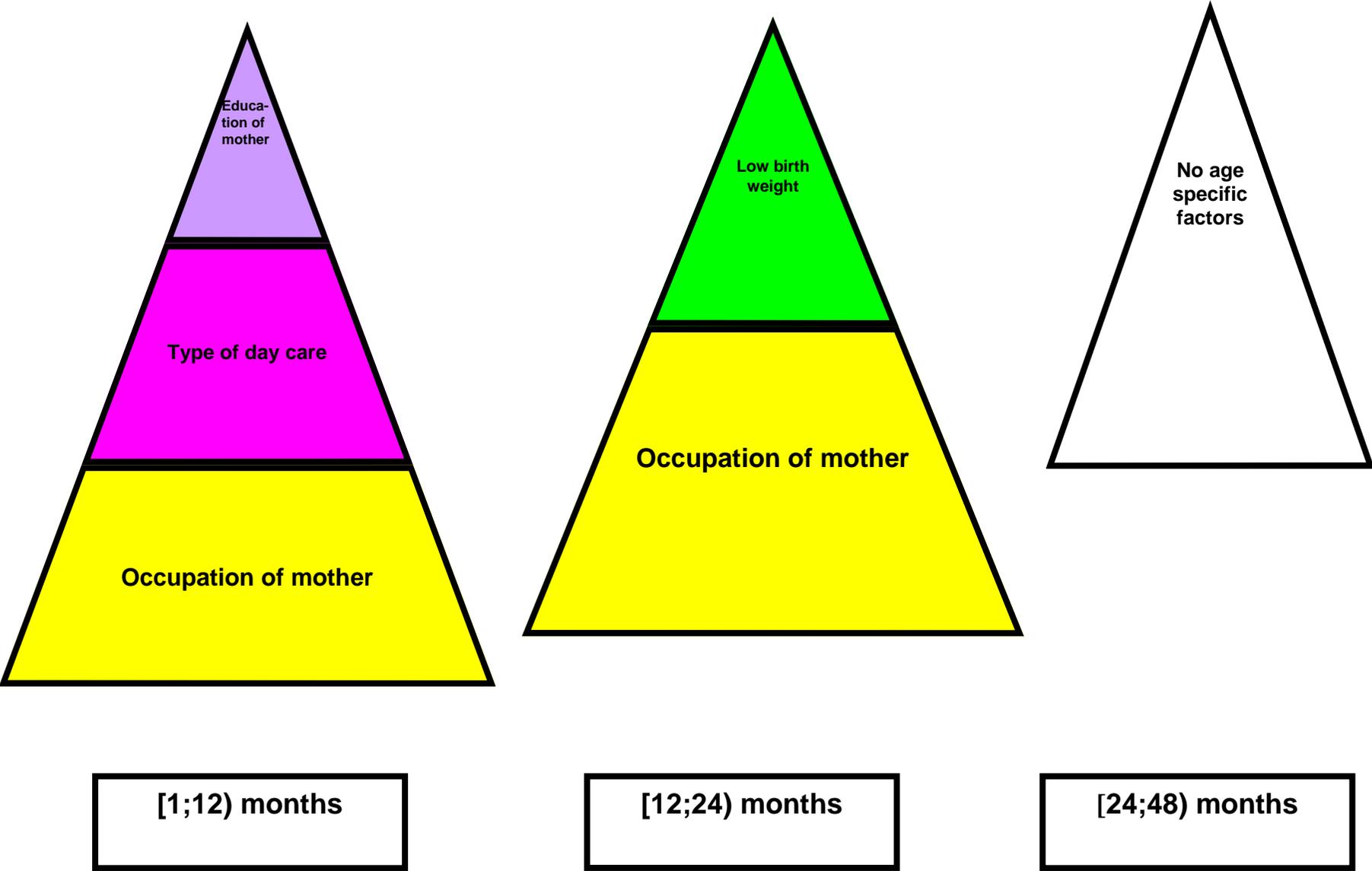


FIGURE 4.3: The age-specific factors influencing listening skills in the participants

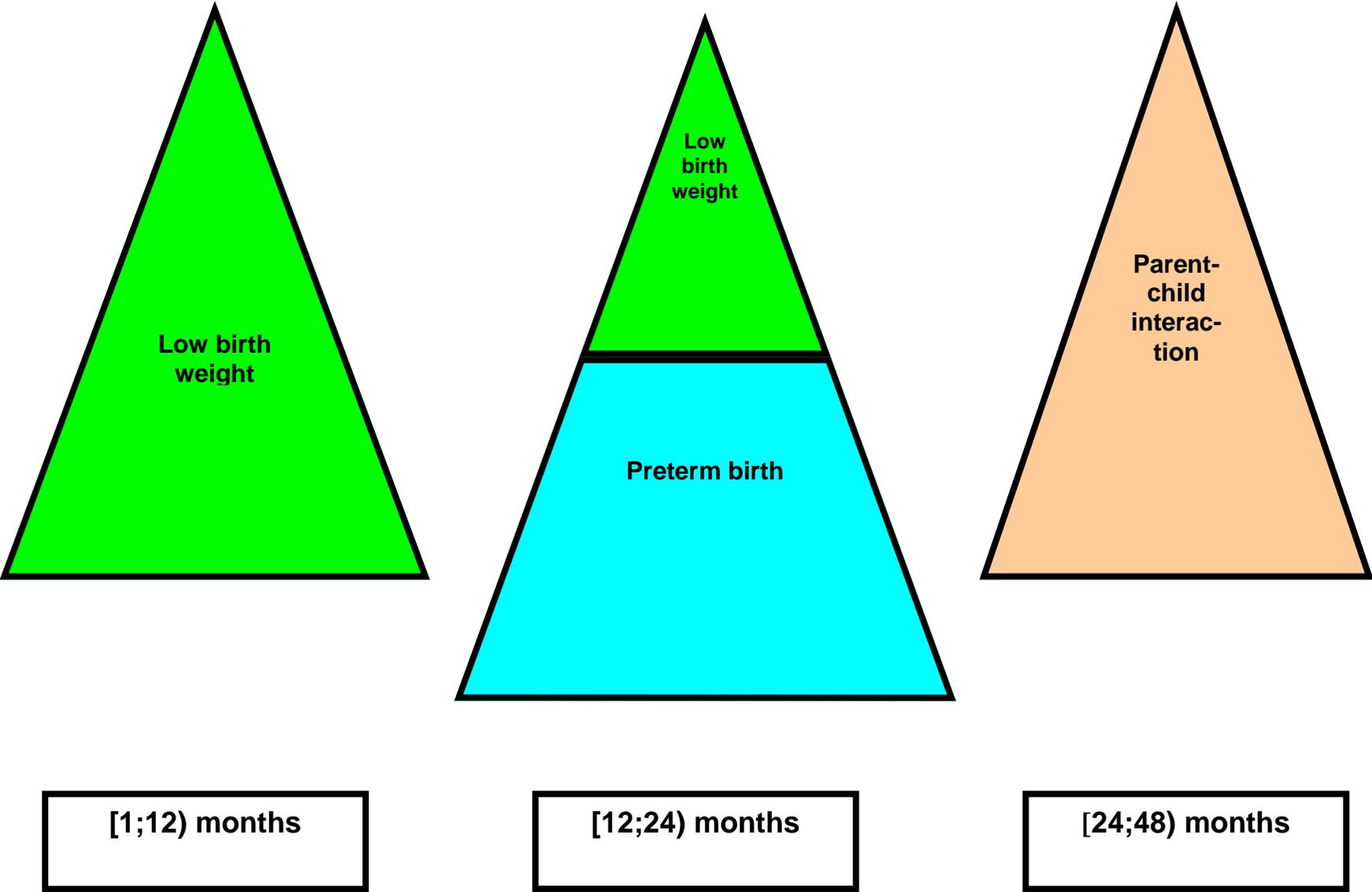


FIGURE 4.4: The age-specific factors influencing cognitive skills in the participants

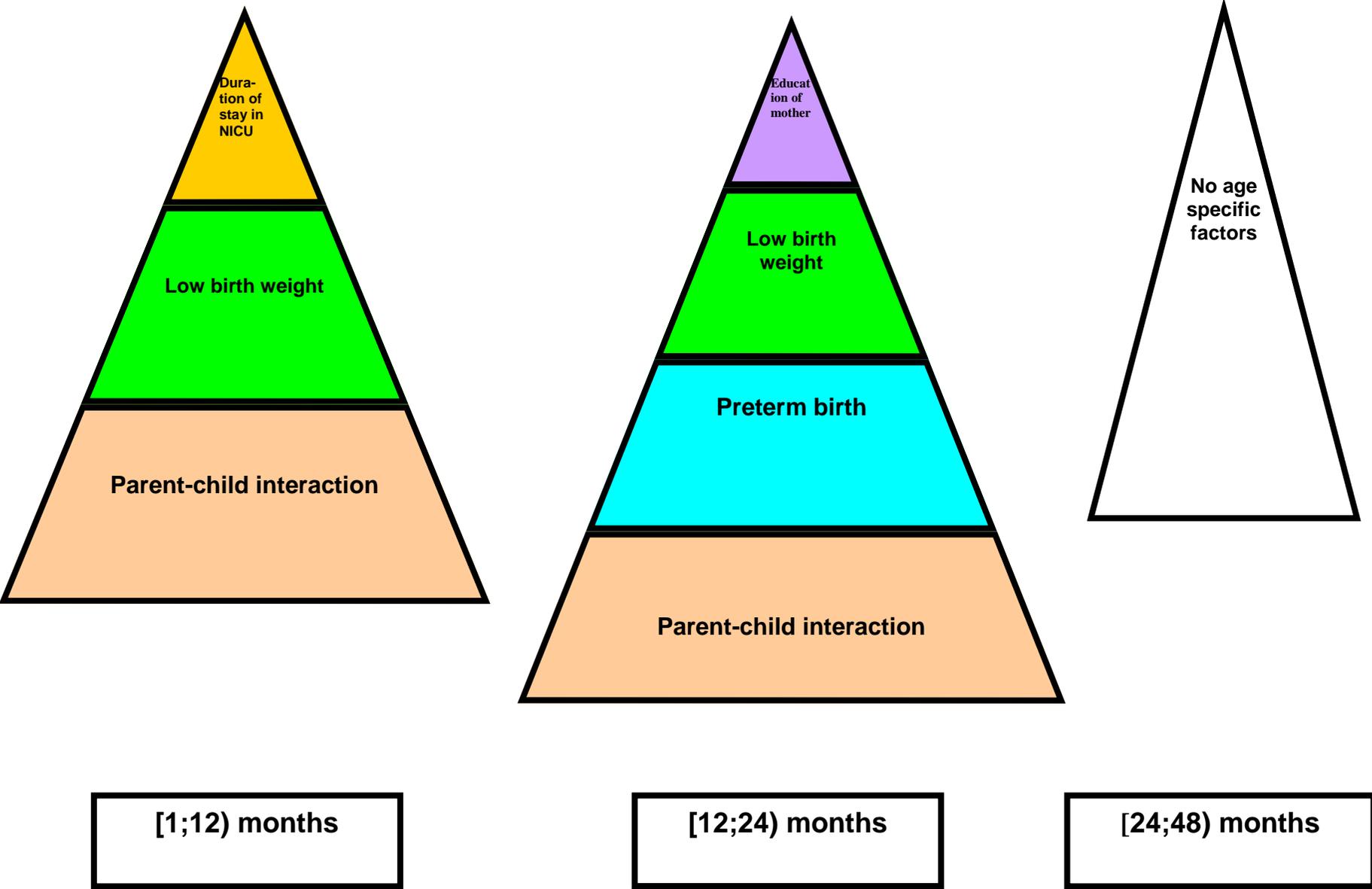


FIGURE 4.5: The age-specific factors influencing skills in language use in the participants

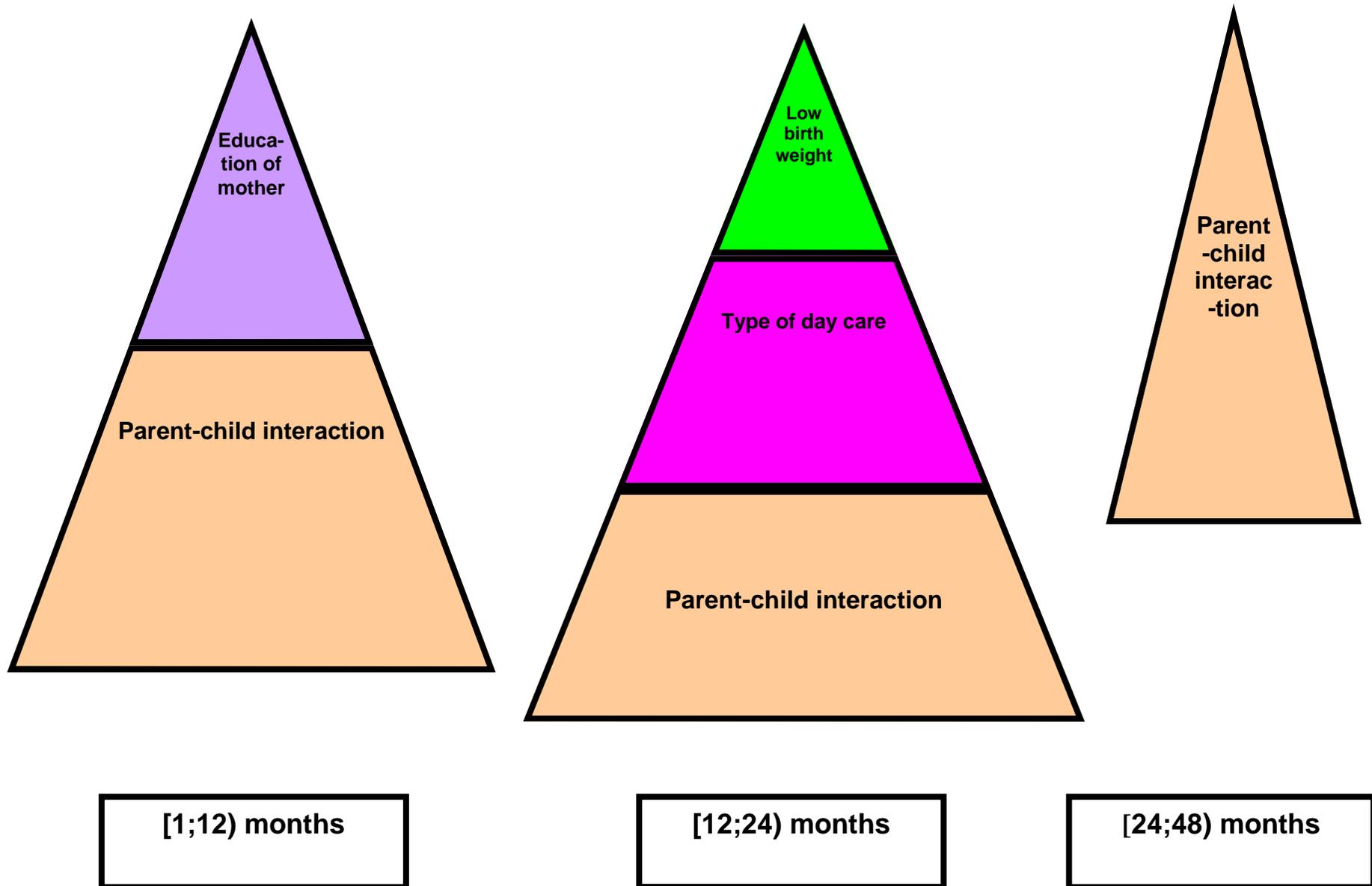


FIGURE 4.6: The age-specific factors influencing expressive and receptive language in the participants

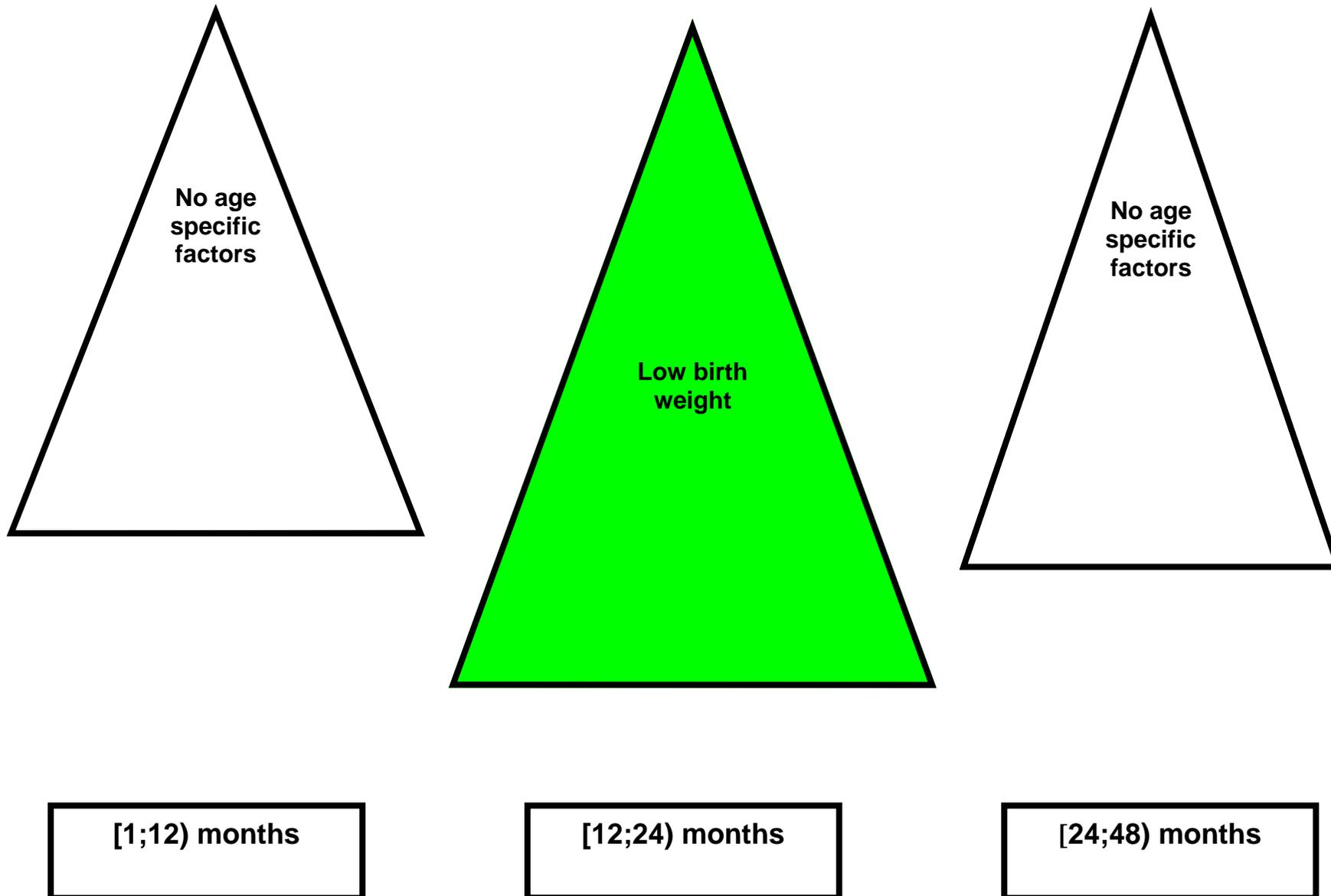


FIGURE 4.7: The age-specific factors influencing gross motor development in the participants

Based on the graphical representation in Figures 4.3 to 4.7, a two-way interpretation of the findings was employed to establish a *developmental trend*. Firstly, the number of factors that were present across the five developmental areas was considered *within each age group*. Secondly, the specific factors influencing the participants with CLP's development were studied *across the three age groups* to determine the factors which had the greatest influential effect on the participants' development from 1 month to 48 months.

4.4.1 The number of factors influencing the different developmental areas within a specific age group

- Within the [1;12) months age group, the participants' *listening development and skills in language use* displayed the *majority of influencing factors* compared to the other areas of development in this age group. These two areas of development were thus identified as the most vulnerable in the [1;12) months age-group.
- Similar to the [1;12) months age group, the participants' *skills in language use* continued to be *affected by the most factors* in the [12;24) months age group. Age-specific evidence for this finding, relating to young children with CLP could not be found.
- In the [12;24) months age group, *low birth weight* was a consistent factor influencing *all the developmental areas* of the participants. Within the South African context, newborn illnesses, including low birth weight, are regarded as one of the five big health challenges (Bradshaw et al., 2008). The negative effect of low birth weight on the development of young children, within the context of a developing country, could also be related to young children with CLP.
- The *only factor* impacting on the [24;48) months age group, was *parent-child interaction*. This factor had an influence on the participants' *expressive and receptive language development and cognition* in this age group. The positive effect of optimal parent-child interaction on communication development is

concurrent with research (Scherer & Kaiser, 2007), and emphasizes the important role of parents in the early developmental years of a child with CLP.

- Across the three age groups, the participants' gross motor development was the least influenced by phenotypical and environmental factors. Validation for the finding could not be attained from recent literature and further investigations are required to determine the effect of phenotypical and environmental factors on gross motor development in young children with CLP.

4.4.2 The factors influencing the participants in each developmental area across the three age groups

- The *occupation of the mother* had an influence on the participants' *listening skills* from birth until two years of age. Currently there is no evidence in literature available to validate this finding.
- Compared to the effect of the occupation of the mother, the *type of day care* had a similar influence on *listening skills* during the *first year* of the life of the infant with CLP, but had no effect beyond 12 months. The *type of day care* did, however, impact on *expressive and receptive language development* during the *second year* of the participants' lives. Similar to this developmental trend, Pancsofar and Vernon-Feagans (2006:583) found that the quality of day care contributed to the expressive language development of normally developing children at 24 months. Furthermore, research by Weigel et al. (2007:728) confirmed that both the developmental assets in the home and child care settings are interconnected to support children's language development. However, age-specific findings regarding the effect of type of day care on young children with clefts are currently not described in the literature.
- The *education of the mother* had an influence on the *listening skills* and *expressive and receptive language of the participants* in the *first 12 months* and continued to have an effect on the development of skills in language use of the participants during the toddler-stage. Although the influence of the education of the mother on language have been reported in literature (Pan et al., 2005 and Weigel et al., 2007:722), research describing age-specific associations between

the education of the mother and language and listening development of toddlers with CLP could not be found to support the findings.

- *Low birth weight* had a consistent effect on *all the developmental areas* in the participants between the ages of *1 month to 24 months*, but the effect of the low birth weight ceased to be of significance in the [24;48) months age group. The latest findings indicate an established link between very low birth weight and extremely low birth weight and developmental outcomes (Eichenwald & Stark, 2008:1700). According to Table 3.3 (Chapter 3), the mean birth weight of the participants was 3.03 kg, which could explain why there is no long term effect on development.
- *Parent-child interaction* had a persistent effect on the participants' *cognitive skills, expressive and receptive language skills and skills in language use* across all the age groups. The positive effect of parent-child interaction on language development is another long-established finding which was already validated by other studies (Billeaud, 2003; Landry et al., 2006; Rossetti, 2001; Scherer & Kaiser, 2007). In contrast to this well-reported finding, the effect of parent-child interaction on cognition, with specific reference to young children with CLP, is not evident in current literature.
- The *duration of stay in the NICU* had an initial influence on the participants' skill in language use, but did not have an effect on developmental areas in the participants beyond two years. Although no literature of the prolonged effect of the NICU on children with CLP could be found, the negative effect of hospitalization on language development was described by Peterson-Falzone et al. (2001:335).

Based on the above description of the results regarding the developmental trends in the participants, it may be postulated that the *majority of factors influenced the participants' skill in language use between the ages of 12 and 24 months*. Secondly, the cascading effect of low birth weight during the first two years (Rossetti, 2001) as well as the important role of parent-child interaction (Scherer & Kaiser, 2007) across the age groups should be highlighted. Thirdly, it may be concluded that most of the factors identified in

the [1;12) and [12;24) months age groups, did not have a persistent influence on communication development beyond two years of age. Finally, it may be concluded that research findings on the age-specific factors identified in this study are not readily available and therefore more studies on the young population with CLP is needed to confirm the findings.

4.5 SUMMARY OF OBJECTIVE 3

The present study revealed an extensive variety of age-specific results which were of statistical significance and/or showed a tendency for association with the participants' characteristics. Table 4.12 provides a list of all the areas of strength and weakness in the participants' communication as well as the assets and risk factors influencing the communication development of the participants at the three age group intervals.

Table 4.12: Age-specific areas of strength and weakness in the participants' communication development and the risk factors and assets (n=227)

Age group	[1;12) months	[12;24) months	[24; 48) months
Areas of strength in the communication characteristics of the participants	<ul style="list-style-type: none"> • Average cognitive skills • Gesture development • Pragmatic development • Gross motor development 	<ul style="list-style-type: none"> • Average cognitive skills • Skills in language use 	<ul style="list-style-type: none"> • Average cognitive skills • Gross motor development • Skills in language use
Areas of weaknesses in communication characteristics of the participants	<ul style="list-style-type: none"> • Listening skills • Expressive language • Receptive language • Play development 	<ul style="list-style-type: none"> • Listening skills • Expressive language • Receptive language • Play development • Pragmatic development • Gesture development • Gross motor development 	<ul style="list-style-type: none"> • Listening skills • Expressive language • Receptive language • Play development • Pragmatic development • Gesture development
Assets influencing communication of participants	<ul style="list-style-type: none"> • Parent-child interaction: optimal • Occupation of mother: Working outside the home • Type of day care: other caregivers • Education of mother: Tertiary education • Normal birth weight • Duration of time spent in NICU: less than 48 hours 	<ul style="list-style-type: none"> • Parent-child interaction: optimal • Occupation of mother: Working outside the home • Type of day care: Other caregivers • Education of mother: Tertiary education • Normal birth weight • Full term birth 	<ul style="list-style-type: none"> • Parent-child interaction: optimal
Risk factors influencing communication of participants	<ul style="list-style-type: none"> • Parent-child interaction: limited • Occupation of mother: Stay-at-home-mother • Type of day care: Mother • Education of mother: High school education • Low birth weight • Duration of time spent in NICU: more than 48 hours 	<ul style="list-style-type: none"> • Parent-child interaction: limited • Occupation of mother: Stay-at-home-mother • Type of day care: mother • Education of mother: High school education • Low birth weight • Pre-term birth 	<ul style="list-style-type: none"> • Parent-child interaction: limited

Colour-coding

- Areas of weakness and risks present across the age groups
- Areas of strength and assets present across the age groups

According to Table 4.12, the [12;24) months' age group presented with the most areas of weakness and the effect of the risk factors in the [12;24) months' age group were the highest. Further analysis of Table 4.12 revealed that average cognitive skills presented as a consistent strength in all three age groups. The distribution of the quotient scores which were obtained from the DASII, are presented in Table 4.13.

Table 4.13: Tabulation of the DASII quotient scores illustrating the mean, median, standard deviation and skewness of the scores

Statistics		
DASIIQ		
N	Valid	225
	Missing	2
Mean		95.384710
Median		95.120320
Std. Deviation		21.9391291
Skewness		.019
Std. Error of Skewness		.162
Minimum		10.1462
Maximum		202.9233
Percentiles	25	85.036245
	50	95.120320
	75	106.498200

According to Table 4.13, a symmetrical normal form of the distribution of DASII (Fewell & Langley, 1984) quotient scores about the mean of 95.4 is indicated, with the mean equal to the median. Since the measure of skewness in the above table is 0.019, thus very close to 0, it can be concluded that the majority (about 70%) of the DASII-Development quotient scores are within one standard deviation from the mean, that is between the values 73 (mean minus standard deviation) and 117 (mean plus standard deviation). Therefore, due to symmetry, only 15% of the scores

will be less than 73 and 15% of the values will be above 117. The information in the table can be presented in a box plot (Figure 4.5)

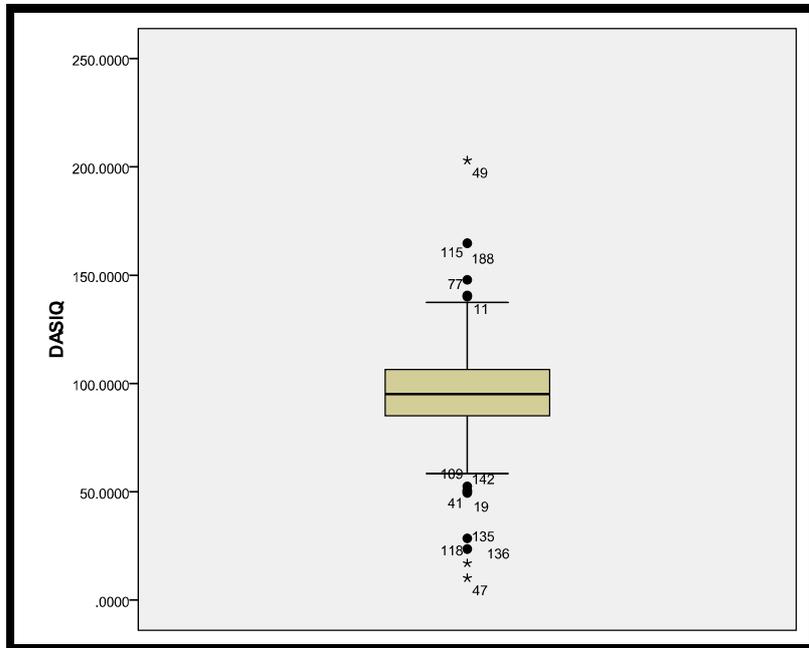


Figure 4.8: The box plot of DASI-scores

Figure 4.8 indicates that the top of the box is at the position of the 75th percentile, thus $P75=106.5$ and the bottom of the box is at the 25th percentile, thus $P25= 85$. According to Figure 4.5, the mid 50% of the data lies between $P25$ and $P75$. 25% of the data lies above $P75$ and 25% lies below $P25$. The symmetry of the distribution of the DASI-II development quotient scores is evident from the box plot, where the median of 95.12 splits the box plot in two evenly sized halves. A graphical representation of the distribution of the DASIQ scores is presented in the following histogram in Figure 4.9.

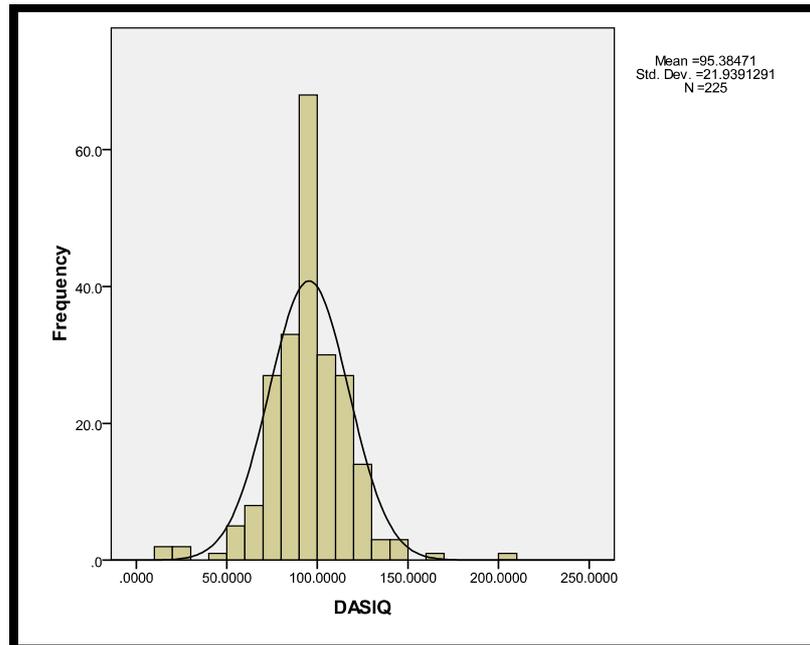


Figure 4.9: Histogram of the distribution curve of DASII development quotient scores

Both graphical representations illustrate the fact that the majority of DASII quotient scores are centered around the mean score, and that only a few outliers (marked by asterisks (*) or dots (.) outside the box plot), are far away from the mean or median score. This indicates that the majority of the participants presented with average cognitive skills with a normal distribution curve which is representative of typically developing children.

Furthermore, Table 4.12 revealed that listening skills, receptive and expressive language skills as well as play skill development were identified as persistent areas of weakness across all three age groups. Since little information about the listening skills of young children with CLP could be found and the central focus of research is more on expressive and receptive language development, the utilization of a comprehensive evaluation protocol is implied. A comprehensive evaluation protocol that includes all risk factors and assets is the key to the identification of all the components relating to a language disorder such as delay in listening skills, expressive and receptive language and play development. In addition, the persistent

delay in listening skills could be a possible early predictor of a central auditory processing disorder since this condition is diagnosed on the basis of listening difficulties which are present in the child, despite a normal audiogram (Dawes et al., 2009).

Across the three age groups the findings indicated that parents perform a central role in their child's language development, since optimal parent-child interaction resulted in increased language outcomes. The findings implied that a comprehensive treatment protocol for young children with CLP should include parent guidance and training in all the principles relating to ECI.

4.6 CONCLUSION

Although certain trends are apparent in Figures 4.3 to 4.7 as well as in the summary provided in Table 4.12, the results remain variable and the uniqueness of each child and his/her family should be considered when these trends are used for clinical guidance. However, since an asset-based approach is followed at CHRIB, it is important to focus on the areas of strength in development and the assets in order to overcome the areas of weakness and risks which were indicated. Since all three age groups presented with different, but also corresponding areas of weakness and risks, it is emphasized that ECI should start as early as the perinatal period. ECI could address the identified risk factors and optimise language development in the child with CLP by building on the areas of strength and assets.

4.7 CHAPTER SUMMARY

Results described, according to the three objectives in the study, revealed that expressive and receptive language and listening skills presented as the most vulnerable communication areas across all three age-groups from one month to 48 months. The cumulative effect of the risk factors was the greatest in the [12;24) months age-group since this age group presented with the highest frequency of delayed communication development. The majority of participants in all three age-groups presented with areas of strength, which include age-appropriate cognitive

skills, pragmatic development, gestural development and gross motor development. Low birth weight presented as a persistent phenotypical risk factor which influenced the development of functions related to language use in the [1;12) and [12;24) months age groups, and gross motor development and receptive language in the [12;24) months age group. The environmental factors such as education and occupation of the mother, as well as the type of day care, indicated significant associations with listening skill development in the [1;12) months group and with the development of functions relating to language use in the [12;24) months age group. Parent-child interaction showed recurrent significant associations with receptive and expressive language across the three age groups. This new age-specific knowledge regarding the areas of strength and weakness and the risks and assets in young children with CLP, could ensure an integrated ECI approach to CLP.

CHAPTER 5

CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

CHAPTER AIM: *The aim of this chapter is to present the conclusions regarding the research findings and relate them to the original research problem. Furthermore, the implications of the present study are discussed and the methodology and results are critically reviewed. Finally, recommendations for further research in early communication intervention for young children with CLP are presented.*

5.1 INTRODUCTION

When an infant is diagnosed with CLP at birth, the parents face considerable challenges and a range of additional stressors which could disrupt their daily functioning (Baker et al., 2008; Pope et al., 2004:556). The parents are often left with unanswered questions, limited information on their child's condition and may be in doubt as to how they could support their child in the best possible manner. According to Berkowitz (2006:1) the following questions are most frequently asked by parents of a newborn with CLP:

- *Can the cleft be surgically repaired?*
- *When can it be repaired?*
- *What will my child look like when he/she grows up?*
- *Will my child be normal in other aspects?*

In addition to the above, parents may ask their speech-language therapist the following additional questions in regarding to their newborn with CLP:

- *How will the CLP interfere with my child's communication development and when will it interfere?*

- *What can be done to help and facilitate my child's communication development and when should it be done?*

These questions, which were proposed as research questions in Chapter 1, were answered within the context of a specific ECI clinic providing services to families with young children with craniofacial disorders and other risk conditions. Bzoch (2004:4) emphasized the importance of speech-language therapists recognizing and addressing the different needs of a child with CLP at specific stages of the child's development from infancy to adulthood.

Kritzinger (2000:303) stated that the comprehensive risk profile of children with cleft lip and palate is generally under-emphasized in the literature. Furthermore, Kritzinger (2000:303) reported that parents are not informed regarding the identification of early signs of a possible communication delay at an early age in the development of their child with CLP. Early communication intervention is a transdisciplinary process and the role of parents should not be underestimated, since their involvement was found to be a determining factor in the communication development of participants in the present study. It is imperative to establish a rich description of the weaknesses and strengths and the unique risk factors and assets present in children with CLP in order to ensure that the child and his/her family receive optimal support and effective intervention. Based upon the conclusions and findings of the study, the current chapter aims to address the research problem presented in Chapter 1. An answer to the research problem could contribute to the establishment of enhanced family-centered intervention programmes which are adapted to include the unique communication characteristics of children with CLP. Figure 5.1 was created to provide an outline of the themes which will be discussed in chapter 5, i.e. the conclusions, implications, critical review of the current research, and recommendations for further research.

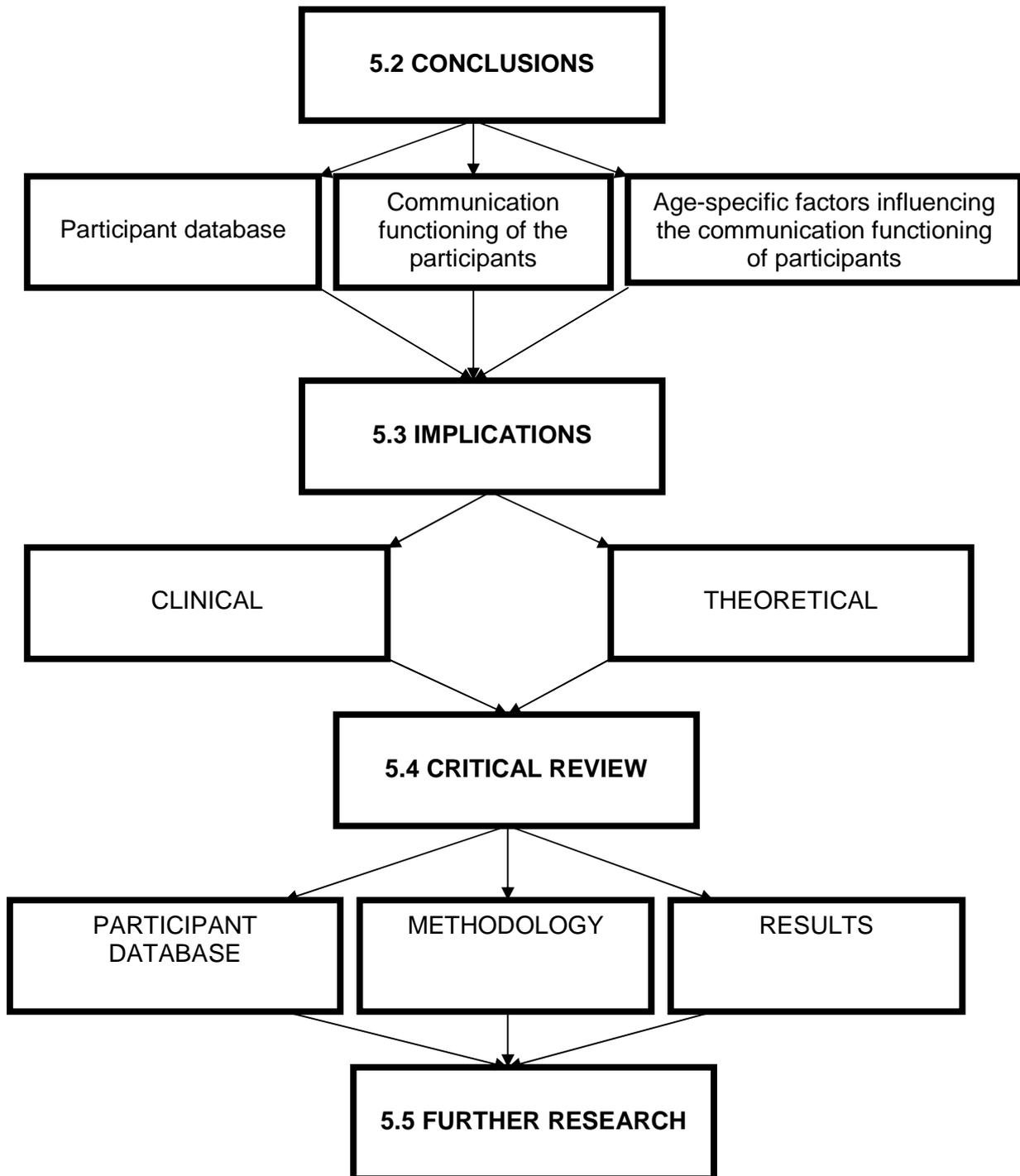


Figure 5.1: Outline of the chapter contents based on Kritzinger (2000)

5.2 CONCLUSIONS

In order to answer the research question and attain the main aim of the present study, the factors influencing children with CLP and their families at specific age group intervals were thoroughly investigated. A meticulous scientific process was followed to extract the relevant data from the CHRIB database. Each asset, risk factor and each area of communication development were subjected to basic descriptive statistical analysis techniques (Maxwell & Satake, 2006:280; Struwig & Stead, 2001:158). Inferential statistics were performed by means of chi-square test and Fisher's exact test, to determine the relationship between a categorical factor and a categorical area of communication development at a specific age group interval (Cody & Smith, 2006:106; Maxwell & Satake, 2006:336). The statistical description and analysis of the data resulted in an in-depth understanding of the communication development and the nature of the association between the risk factors and assets and the communication development of children with CLP. This new knowledge needs to be validated and confirmed by other studies in different contexts to ensure that the field of ECI may be better equipped to provide services to families with young children with CLP. Following the investigation of the data of a specific group of children with CLP, the question remains whether these comprehensive findings could be applied within the South African context to enable optimal ECI to the population of young children with CLP in this country. The conclusions and implications of the applicability to ECI, in the South African context, are subsequently discussed.

5.2.1 Conclusions regarding the participant database

In order to draw conclusions from the research findings it is important to discuss the results of the study against the background of the database which provided the rich participant datasets. Since a database is an organised collection of data (Rob & Coronel, 2007:4) that facilitates data management in order to generate accurate information (Rob & Coronel, 2007:9), the collection of data pertaining to young children with CLP provided opportunities for identifying numerous covert factors that were 'hidden' in the site- and age-specific groups.

The application of a database system to serve as a research tool in ECI was previously introduced by Kritzinger (2000). According to Kritzinger (2000:297), the vast amount of data in the CHRIB database could serve as a source for the in-depth description of the participants who received intervention in a specific early intervention context. In 2000, the CHRIB database proved to be a viable research tool. Since then, however, remarkable technological advances have emerged leading to improved methods for database analyses (Hick & Hainaut, 2006; Rob & Coronel, 2007). In addition, methods for improved data access, improved data sharing and better data integration have continuously been investigated (Rob & Coronel, 2007:7). These technological advances suggested the need for evolution within the CHRIB database.

According to Hick and Hainaut (2006:534), a database application should evolve in pace with the changing requirements in the environment, such as sharing of the database among other programmes. Rashid (2001:1) suggested the need for the evolution of such a database due to the following reasons:

- The need for correction of mistakes in the database design
- The possible addition of new features
- The advantage of reflecting the changes of real world artefacts modelled in the database

Various challenges present as part of the evolution process. The process requires the structural modification of the schema of the database as well as modification of the data captured in the database (Hick & Hainaut, 2006:525). During the process of data extraction and the performance of the statistical analysis on the data the following **conclusions** were drawn regarding the participants' database:

- The CHRIB database proved to be a useful instrument for allowing access to a vast amount of data for administrative and research purposes. Since the

aim of the study was to describe age-specific risk factors and assets and their association with the participants' communication characteristics, the *expanded research capacity of the database* was effectively demonstrated.

- The CHRIB database consists of in-depth and comprehensive datasets of a large sample of participants with CLP which enabled a *rich description* and the *application of advanced inferential statistical techniques*.
- The *consistent and accurate manner* in which the *data* was originally *recorded* by the same experienced speech-language therapist in the CHRIB database, enhanced the *reliability* of the data for research purposes.
- The comprehensive *descriptions* in the CHRIB database were *categorized in a meaningful manner to enable performance of extensive statistical analysis procedures*.
- The CHRIB database showed *compatibility with a range of advanced statistical programmes* such as SAS (Version 9.2, 2011) and SPSS (Version 17.0, 2008) that were utilized to analyse the data.
- The use of an advanced statistical programme such as SAS (Version 9.2, 2011) provided insight into *faulty recording of data* in the CHRIB database and *informed the modification* of the data.

Based on the above conclusions, the CHRIB database, that is considered to be one of the first to be utilized in an ECI clinic in South Africa, provided direction for clinical data management. The present study identified several limitations which should be addressed in order to accommodate the fast-evolving research demands of the 21st century regarding the storage and extraction of data for research purposes.

5.2.2 Conclusions regarding the communication functioning of the age-specific participant groups

This section aims to address the following questions, which were previously formulated in 5.1:

'How can the CLP interfere with my child's communication development?'

– in other words, what is the nature of the developmental vulnerability of the child with CLP?

'When will CLP interfere?' – this question relates to the time frame in which the child with CLP may be more vulnerable for communication delay.

The findings of the current study provide greater insight into the communication and general development of participants with CLP. An in-depth perspective on existing knowledge regarding the communication and general developmental areas in young children with CLP is presented below. These presented areas of communication include skills in listening, expressive and receptive language, pragmatics, gestures and language use, whilst the general developmental areas comprise play skills, cognition and gross motor development. A summary of the findings regarding the developmental areas of weakness and strength in each of the three age groups is presented in Figure 5.2.

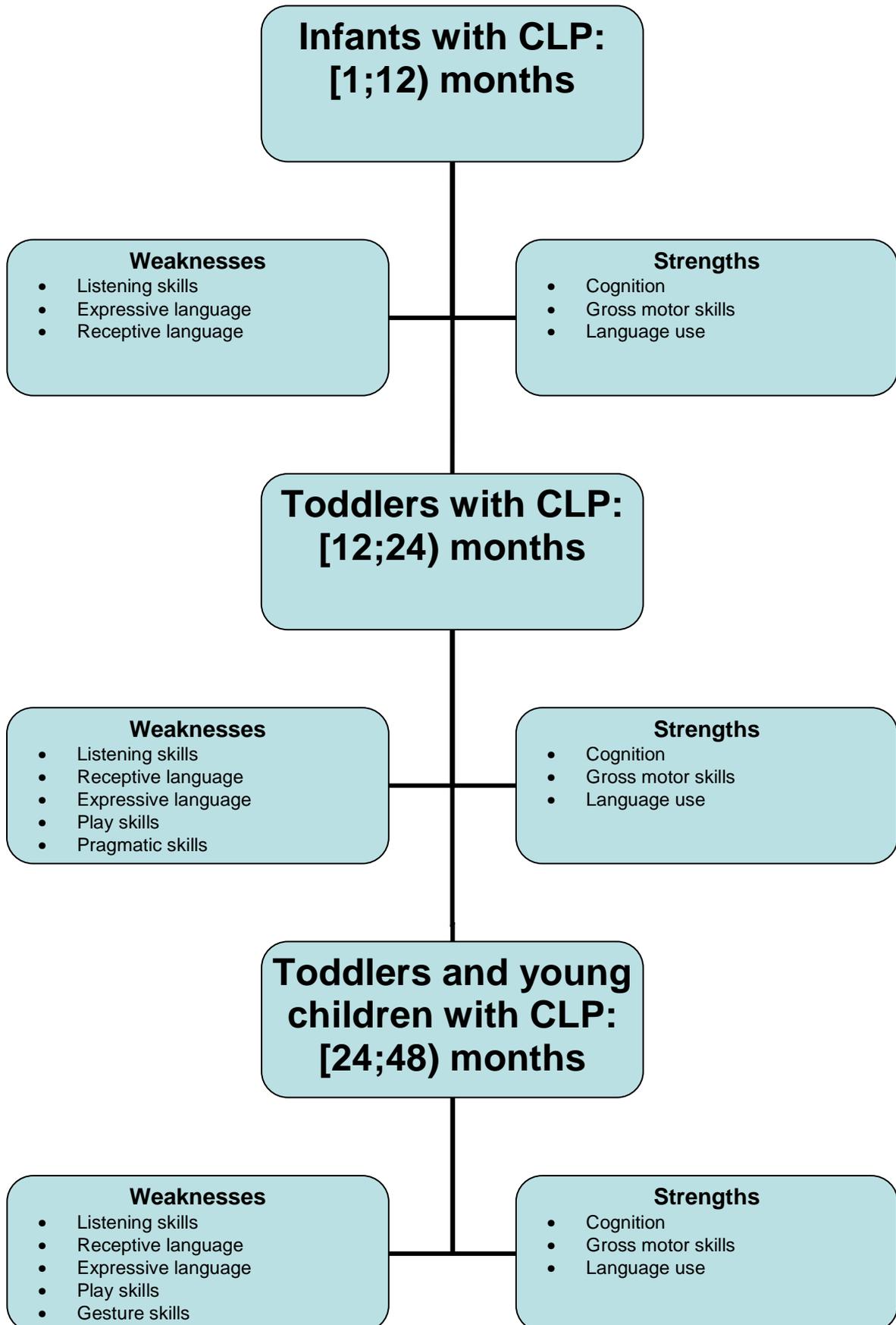


Figure 5.2: A visual presentation of the areas of strength and weakness within each age group with CLP

5.2.2 a Areas of communication development

- **Listening skills:** Figure 5.2 illustrates that the majority of the participants presented with inadequate listening skills across all age groups. The groups displaying the highest percentage of inadequate listening skills were the infants in the [1;12) months age group and the toddlers in the [12;24) months age group. Based on these results it can be concluded that inadequate, listening skills should be regarded as a weakness in the communication development of infants and toddlers with CLP and therefore early listening skill development should be stimulated in ECI from as early as one month of age. Although no statistically significant association between otitis media and listening skills could be determined in the present study (see Appendix V. IV), the majority of 51% participants that presented with otitis media, especially in the [12;24) months age group (Table 3.3), warrants early referral to an Ear-, nose- and throat specialist for prompt management of middle-ear disorders. The slight decline in delayed listening skills in the [24;48) months age group could be explained by the research of Bzoch (2005:359) who found that auditory function may improve after palatal repair due to improved surgical techniques which enhances both the physiological structure for speech production and Eustachian tube functioning.
- **Receptive language skills:** Referring to Figure 5.2, the toddlers with CLP in the [12;24) months age group presented with the highest frequency of receptive language delay across the three age groups. Delayed receptive language skills observed in the [12;24) months age group could be related to the high prevalence of inadequate listening skills in this group, but further research is needed to determine a possible association. The findings imply that receptive language and listening skills should, if not sufficiently stimulated at an earlier stage, be optimally and simultaneously addressed in the [12;24) months age group.

- **Expressive language:** According to Figure 5.2 and consistent with literature (Bzoch, 2004; Chapman, 2003; Peterson-Falzone et al., 2006; Salas-Provence et al., 2003), all the age groups in the present study presented with delayed expressive language development. The results emphasize the importance of involving and training parents to stimulate vocabulary growth and to expand their child's phonetic repertoire during daily routines (Sherer & Kaiser, 2007:358).
- **Pragmatic skills:** Consistent with the other communication delays in the areas of language and listening development that were identified in the [12;24) months age group, the development of pragmatic skills were also not age-appropriate in the toddlers with CLP. Inappropriate pragmatic skills could contribute to possible social-interaction problems and therefore the influence of the cleft on the social use of language should be recognized and addressed in ECI.
- **Gestural communication skills:** Compared to the other two age groups' development of appropriate gestural use, the findings indicated that the [12;24) months group showed the highest risk for a delay in the development of gestural skill. As stated in Chapter 4, the use of gestural skills is only assessed from 12 months of age (Rossetti, 2006). Since gestural skill development is preliminary to the development of verbal communication Owens (2001:137), an ECI programme should include facilitation of functional gestures to enable young children with CLP to communicate their needs effectively, especially in the toddler-stage starting from twelve months to 24 months.
- **Skill in language use:** This area could serve as an area of strength since the participants across the three age groups presented with a minor delay in their development of the functions related to language use. This implies

that, although expressive language delay was prominent across the three age groups, children with CLP do communicate more regularly in a non-verbal manner. This area of strength could support the child's acquisition of receptive and expressive language skills.

5.2.2 b Areas of general development

- **Cognitive skills:** Results from the DASII-II (Fewell & Langley, 1984) indicated that the participants' development of cognitive skills displayed a normal bell-shaped distribution curve (see Chapter 4). According to Figure 5.2, average cognition presented as an area of strength across the three age groups presented in Figure 5.2 and could therefore serve as a foundation for the development of speech and language in infants, toddlers and young children with CLP.
- **Gross motor skills:** The participants across the three age groups generally presented with age-appropriate gross motor skills and this developmental domain can be regarded as an area of strength in the young child with CLP and concur with findings of Kritzinger et al. (1996).
- **Play skills:** The area of play development was found to be an area of weakness especially in the [12;24) months age group. Play development is closely linked to language and cognitive development (Snyder & Scherer, 2004:67), implying that this weakness in toddlers with CLP should be included and addressed in the ECI program. Parent-guidance, to support play development, is also a crucial-component of ECI. Parents should be trained to be attentive to the specific milestones in their child's play-development and to be advised as to how to support their toddler in developing the underlying skills which could serve as building blocks for language development (Olswang et al., 1998:26).

Based on the combined findings, listening skills, as well as receptive and expressive language skills, were identified as persistent areas of weakness across all three age groups. The [12;24) months age group, demonstrated the highest percentage of delay across developmental domains. It can be concluded that the effect of delay or weakness were cumulative in this age group. The areas of strength in the participants included age-appropriate gross motor development, average cognition and appropriate language use.

The research question can now be answered since the findings indicated that listening skills, together with receptive and expressive language skills, are the three areas which are most likely to interfere with communication development. The participants showed increased vulnerability at [12;24) months in language-related areas, while general developmental areas proved to be strengths across the three age groups. The results regarding the communication development of the participants indicated that the team of early intervention professionals working with young children with clefts should recognize the multifaceted nature of the disorder in the young population with CLP. A speech-language therapist should prioritise the goals of the ECI program to focus intervention on the salient areas of delay within a specific age group.

5.2.3 Implications of the findings regarding the communication characteristics of the participants

The findings relate to the communication characteristics of the group of participants with CLP within a specific ECI clinic. However, the implications of these findings could also apply to other CLP clinics with similar case-loads:

- The application of the CHRIB Assessment Protocol (Kritzinger & Louw, 2002) within the public health care sector should be explored in future research since, in the present study it proved to be an effective tool for identifying a wide range of speech, language and hearing disorders in

young children with CLP. Although the CHRIB protocol may be a time-consuming instrument to administer within the time constraints of the public health care context, collecting more specific information may streamline the intervention planning process, making it more time-efficient.

- The age-specific findings relating to areas of strength and weakness in the development of children with CLP could guide a more focused ECI process. Based on the results it is concluded that receptive and expressive delays as well as listening skills, which is also a prerequisite for normal language development, were the most salient areas of weakness that need to be addressed at specific age group intervals. The areas of strength in a child with CLP's development such as average cognitive skills, age-appropriate gross motor skills and appropriate language use should also be recognised as it could serve to reinforce and strengthen other communication areas within a holistic and more comprehensive ECI program.
- An ECI program could also be developed to focus on age-specific communication areas of weakness for each age group with CLP. Age-specific treatment programs could ensure evidence-based service delivery to the young population with CLP in an era where evidence-based practice is of paramount importance (Johnson, 2006).
- The age-specific developmental functioning for the [1;12) months age group could assist the service providers at the FCDC to expand the Therapy Protocol (Bütow, n.d.). The home programs, to facilitate language and listening development at the FCDC, could be modified to increase the focus on the age-specific risk factors and assets in development of the young population with CLP. Furthermore, parent-guidance at the FCDC could be tailored to increase parental awareness of areas of weakness and strength in their child's communication development and support them in identifying assets and risk factors at specific developmental ages. Within the South African context, it is important to acknowledge the uniqueness of

each family, to follow the asset-based approach and to be sensitive to cultural differences and in order to empower families to support their children in attaining their full potential (Louw et al., 2005).

In order to address the communication delay of children with CLP in the most efficient manner it was imperative to identify the potentially interrelated influencing factors in the life of the child with CLP. The next question to be addressed in the following section is:

Which age-specific factors influenced the participants' communication development?

5.2.4 Conclusions regarding the risk factors and assets influencing the participants' communication development across the age-specific groups

In Chapter 2 the integrated framework of risks and assets was used as a theoretical foundation to reflect on local and international research findings regarding the interrelated risk factors and assets which could influence a young child with CLP. As conclusion to the research study, the framework needs to be expanded to include and reflect the findings of the present study. The enlarged framework could also provide a new age-specific ECI perspective on children with CLP. Firstly, the integrated scientific framework of risks and assets in CLP (Chapter 2) is presented in Figure 5.3. Secondly, an expanded and modified version of the same framework is presented in Figure 5.4, based on the findings of the current study. The purpose of the modified framework is to categorize the results according to the different components of the framework and therefore to demonstrate the influence of age-specific risk factors and assets on specific developmental areas.

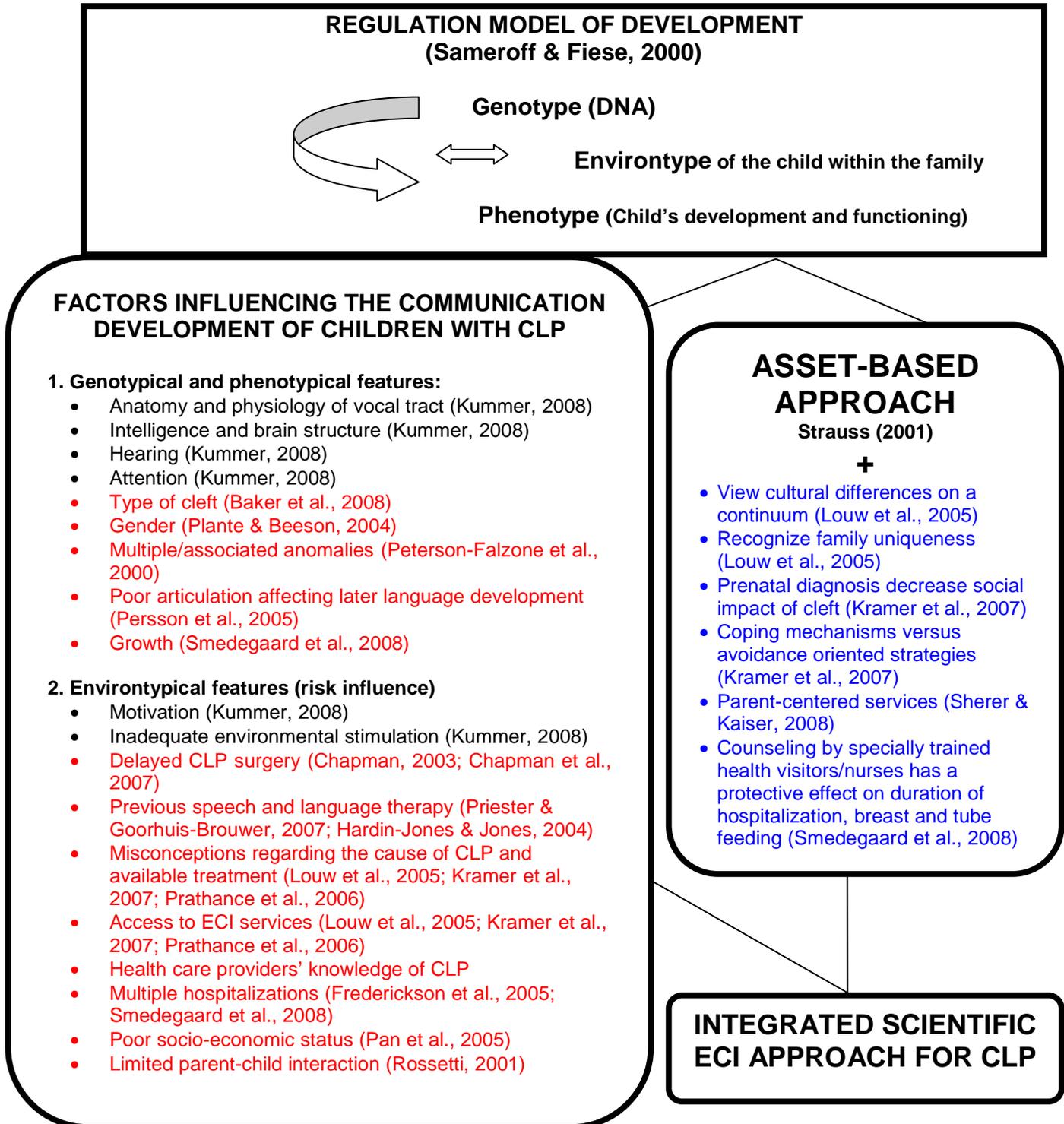
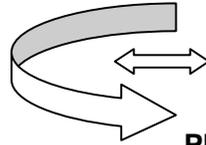


Figure 5.3: Presentation of the proposed integrated theoretical framework (Chapter 2) to reveal the research findings on the early functioning of the child with CLP and the family

**REGULATION MODEL OF DEVELOPMENT
(Sameroff & Fiese, 2000)**

Genotype (DNA)



Environment of the child within the family

Phenotype (Child's development and functioning)

FACTORS INFLUENCING THE COMMUNICATION DEVELOPMENT OF CHILDREN WITH CLP

1. Genotypic and phenotypic features:

[1;12) months:

- Low birth weight ⇨ Language use
- ⇨ Cognition

[12;24) months:

- Low birth weight ⇨ Listening
- ⇨ Cognition
- ⇨ Language use
- ⇨ Gross motor development
- ⇨ Receptive language
- Premature birth ⇨ Cognition
- ⇨ Language use

[24;48) months: No age-specific factors

2. Environmental features (risk influence):

[1;12) months:

- Occupation of mother (Stay-at-home mother) ⇨ Listening
- Type of day care (Mother) ⇨ Listening
- Education of mother (High school education)
 - ⇨ Listening
 - ⇨ Receptive language
- Parent-child interaction (Limited)
 - ⇨ Language use
 - ⇨ Receptive language
 - ⇨ Expressive language
- Time in NICU (>48 hours) ⇨ Language use

[12;24) months:

- Occupation of mother (Stay-at-home mother) ⇨ Listening
- Education of mother (High school education)
 - ⇨ Language use
- Parent-child interaction (Limited)
 - ⇨ Receptive language
 - ⇨ Language use
- Type of day care (Mother) ⇨ Expressive language

[24;48) months:

- Parent-child interaction (limited)
 - ⇨ Expressive language
 - ⇨ Receptive language
 - ⇨ Cognition

ASSET-BASED APPROACH

[1;12) months:

- Occupation of mother (Working outside the home) ⇨ Listening
- Type of day care (Other caregivers)
 - ⇨ Listening
- Education of mother (Tertiary education)
 - ⇨ Listening
 - ⇨ Receptive language
- Parent-child interaction (Optimal)
 - ⇨ Language use
 - ⇨ Receptive language
 - ⇨ Expressive language
- Time in NICU (<48 hours)
 - ⇨ Language use

[12;24) months:

- Occupation of mother (Working outside the home)
 - ⇨ Listening
- Education of mother (Tertiary education)
 - ⇨ Language use
- Parent-child interaction (Optimal)
 - ⇨ Receptive language
 - ⇨ Language use
- Type of day care (Other caregivers)
 - ⇨ Expressive language

[24;48) months:

- Parent-child interaction: (Optimal)
 - ⇨ Receptive language
 - ⇨ Expressive language
 - ⇨ Cognition

AN EXPANDED INTEGRATED SCIENTIFIC ECI APPROACH FOR CLP

Figure 5.4: An expanded version of the proposed theoretical framework to map the research findings in the present study to the different components of the risk and asset framework

Illustrated by Figure 5.4, the following findings were highlighted as the most prevalent across the three age groups:

- The [12:24) months age group demonstrated the most risk. It can be concluded that the cumulative effect of the risk factors was the highest in this age group, since the participants in this group also presented with the most delays in their communication development (see chapter 4).
- The important role of parents in the communication development of the child with CLP was recurrent in the results. Parent-centered ECI, which includes parent-involvement and training, is therefore emphasized when treating young children with CLP.
- The genotypic risk factors that were identified to influence all age groups included low birth weight and premature birth.
- The phenotypic and environmental risk factors which consistently impacted negatively on all the age groups included the following:
 - the education of the mother (*high school education*),
 - the occupation of the mother (*stay-at-home-mother*), the type of day care attended by the child (*mother*), parent-child interaction (*limited*) and the amount of time spent in the NICU after birth (*more than 48 hours*).
- Based on the findings illustrated in Figure 5.4 the assets which had a positive effect on the communication development of the participants included the following:
 - the education of the mother (*tertiary education*),
 - the occupation of the mother (*working outside the home*),
 - the type of day care (*other caregivers such as day care centres or nursery schools*) and
 - the amount of time spent in the NICU (*non or less than 48 hours*).

The value of the age-specific information, including risk factors and assets and the association with each communication area in Figure 5.4, serves to provide specific

guidelines for ECI for young children with CLP and are discussed in the following section.

5.2.5 Implications of the findings regarding the age-specific risk factors and assets on communication development of infants and young children with CLP

The second question in paragraph 5.1 is: *What can be done to help and facilitate my child's communication development and when should it be done?* An attempt at answering this question follows below.

The implications of the findings in the expanded scientific framework of the Regulation Model of Development (Sameroff & Fiese, 2000) are discussed according to relevant parameters for evaluation and treatment of patients with cleft lip/palate or other craniofacial anomalies described by the ACPA (2007).

- *'Each child and family should be seen for an information session on normal speech and language development before/by six months of age.'* Such an information session should increase the parents' awareness of the age-specific risk factors and assets present at each age group interval and the possible age specific delays in their child's communication development. This could be especially useful for parents who are not in the position to participate in regular follow-up intervention, but still want to monitor their child's language development. Such an information session could also enable the speech-language therapist to identify and prevent specific risks which could influence the speech and language development of the child with CLP, such as low birth weight, time spent in NICU and type of day care received.
- *'When the child with CLP does not present with age-appropriate speech and language abilities, an early speech-language intervention program which includes the facilitation of speech sound development, stimulation of language and establishment of a home program for parents and other service providers*

should be initiated.' The holistic focus of holistic language intervention should be on the multi-faceted communication and developmental areas such as listening-, receptive and expressive language-, play-, language use- and gross motor skills that were identified in the present study. The importance of a parent-centred approach is emphasized as optimal parent-child interaction was found to have a significant association with the participants' positive communication developmental outcomes. Several salient factors such as the education and occupation of the mother proved to determine the outcome of the participants' communication functioning and highlighted the importance of obtaining a complete case history. A comprehensive parental interview that includes eliciting of factors such as occupation and education of the mother as well as the type of day care in which the child with CLP resides, is indicated.

- *'Speech-language evaluations need to be administered at least twice during the first two years of life and after that on an annual basis until the child reaches age six.'* The age-specific factors identified in the study could serve to expand the relevant areas which should receive special attention at each age group from birth until four years. Age-specific guidelines still need to be determined for the 4-5 and the 5-6 years old age groups.
- *'Speech evaluations should be conducted as part of a team.'* The FCDC provides interdisciplinary care for children with clefts by following the principles of the Therapy Protocol (Bütow, n.d.) at the particular clinic. Continuous training should be established at the particular clinic to train other members of the craniofacial team to assist them in identifying the unique developmental risk factors and assets present in young children with CLP.

The main aim of this study was to investigate whether age-specific factors influencing communication development in young children with CLP could be found. This aim was successfully achieved and numerous risk factors and assets were identified. The findings of the study are supported by local and international research (Chapman, 2004; Frederickson et al., 2005; Hardin-Jones & Chapman, 2008; Hardin-Jones & Jones, 2004; Louw et al., 2005; Peterson-Falzone et al., 2006;

Salas-Provance et al., 2003; Scherer, et al., 2008; Scherer & Kaiser, 2007) and emphasizes the need for an integrated scientific approach to the treatment of young children with CLP, especially within the broader South African context.

5.3 CLINICAL AND THEORETICAL IMPLICATIONS

Based on the conclusions regarding the CHRIB database, the communication profile and the risk factors and assets in the communication development of participants with CLP, as well as the clinical and theoretical implications, are discussed below.

5.3.1 Clinical implications

- The CHRIB database should be modified to include all the communication areas and new terms specified in the updated version of the CHRIB Assessment Protocol (See Appendix V a). Evolution of the CHRIB database could imply utilizing advanced technological systems which are ultimately more user-friendly and compatible with current statistical analysis programs. The study included correlation research but it should be noted that the CHRIB database has the potential to provide data for *ex post facto* research, longitudinal research and true experimental research (Leedy & Ormrod, 2005:217; 233-237).
- The use of a comprehensive assessment protocol such as the CHRIB Assessment Protocol (Kritzinger & Louw, 2002) provided an in-depth description of the various communication development areas in the participants. As a result of the extensive nature of the data collected, advanced statistical analysis procedures could be performed to determine associations between the communication development and risks and assets in young children with CLP. The implementation of a comprehensive assessment protocol, similar to the CHRIB Assessment Protocol, is therefore implied to attain optimal understanding of the communication development of young children with CLP.
- The undergraduate training curricula should be expanded to include both theoretical and clinical aspects of the expanded integrated approach to ECI for

enhanced identification of assets and risks and areas of strength and weakness. The age-specific knowledge and application thereof, could empower students to deliver accountable ECI to young children with CLP and their families.

The following *age-specific intervention guidelines* are implied:

- The focus of intervention for *infants with CLP in the [1;12) months age group* should be to develop and enhance the areas of weakness - expressive and receptive language skills as well as listening skill development. Parents should receive guidance to increase their knowledge regarding risk factors such as the cascading effect of low birth weight on their infant's development of skills in language use and cognition. Furthermore, the educational level of the mother should be considered when intervention is planned, since in the present study, this proved to play a role in the infant's communication development. Mothers with a lower level of education should receive optimal support and be provided with clear guidelines on language stimulation and developmental surveillance. The role of the mother's occupation and the type of day care received by the infant with CLP should be discussed with the parents, since it could have an effect on the infant's listening skills and receptive language development. It is imperative that parents should be optimally involved to serve as primary team members during the ECI process. Parent-centred programs need to be adapted and expanded in order to support parents of infants with CLP in providing appropriate and optimal stimulation at this critical developmental stage in their infant's life. The influence of the duration of time spent in the NICU, should be considered in infants presenting with delay in the functions relating to language use.
- *Toddlers in the [12;24) months age group* presented with the highest risk for delayed development of communication, thus intensive ECI is implied. Toddlers with CLP should receive optimal language and auditory stimulation to address

the three persistent areas of weakness similarly identified in the [1;12) months age group. In addition, two other communication areas of concern should receive attention - play skill development and support in the development of pragmatic skills. The role of the type of day care and the occupation and education of the mother on listening skills, skills in language use and expressive language should be explained to the parents. The speech-language therapist should also equip the parents with specific guidelines on how to effectively enhance their toddler's receptive language as well as expanding their functions of language use.

- The importance of optimal parent-child communication interaction should be emphasized to parents with *toddlers and young children aged [24;48) months*, since it had a highly significant effect on the development of expressive and receptive language skills, as well as cognitive development in participants with CLP. In addition to persistent intervention to address listening skills, receptive and expressive language skills and play skills in the young child with CLP, ECI should further focus on the development of functional gestures in communication in the [24;48) months age group to ensure enhanced communication development at this age interval.

5.3.2 Theoretical implications

The findings of the study served to prioritise the factors which are more salient at specific stages of communication development in a child with CLP than other developmental periods. The following refined guidelines for timely and effective treatment of young children with CLP are provided:

- Firstly, it is important for speech-language therapists and audiologists to be informed of interrelating factors influencing a young child with CLP's communication development. The speech-language therapist and audiologist should be able to identify and address the unique factors present in young children with CLP with the appropriate and timely assessment methods and

intervention techniques at the specific age group intervals. Regular continuous professional development (CPD) workshops could equip speech-language therapists with the necessary clinical skills and theoretical background in the identification of age-specific risk factors and assets.

- Secondly, the parental questionnaire of the CHRIB assessment protocol needs to be modified to include the specified age-related factors identified in the study. The CHRIB database could be adapted in a similar manner to include all the age-specific areas, specified in the parental questionnaire, since this questionnaire serves as one of the sources of the data in the CHRIB database.

5.4 CRITICAL REVIEW

The critical review is an important stage in the evaluation of the accuracy, purposefulness and practicality of a research study (Anderson & Krathwohl, 2001). Certain limitations were encountered during the investigation and these are subsequently discussed in terms of the participant database, the method followed in the study and the results obtained during the study.

5.4.1 Limitations of the participant database

- The study was conducted using data collected within a specific clinical context and the participants mainly originated from middle class households. Although this sample is not representative of the general population with CLP in a developing country such as South Africa, the substantial sample size of 227 participants ensured that the findings can be generalized to other clinical contexts which serve young children with CLP from middle class populations.
- Some of the information in the CHRIB database could not be utilized for statistical analysis since the data were either missing, not reported or incompletely stated to in the parental questionnaire. Due to the large dataset the minority of missing data did not restrict the detailed findings which were obtained in the investigation.

5.4.2 Limitations in the methodology

The following limitations were identified in the methodology process:

- The laborious process of extracting the data from the CHRIB database was extremely time consuming and required specialized expertise in statistics and information technology. The specialized procedures conducted were carefully documented throughout the course of the study and could therefore be followed and repeated by future researchers.
- Due to the variety of cleft types encountered in the participants, not all the data (such as the data on surgery) was suitable for further investigation. The data on surgery was therefore described, but not utilized for statistical inferential purposes.

5.4.3 Limitations in the results

After critical evaluation of the study the following limitations were identified regarding the findings:

- Due to the large volume of information it deemed not feasible to report on all the findings. No previously established hypothesis regarding the age-specific associations between communication development and risk factors and assets in young children with CLP had, to the date of the study, been specified. As a result, only the significant associations and tendencies for associations could be reported in the current study. The factors that did not have a significant association or tendency for association on the communication development of children with CLP should also be described and validated in future studies.
- Some of the results could not be justified against the background of related research and there is currently a dearth of research on the age-specific factors influencing young children with CLP. Therefore, more research studies, specifically exploring the early factors affecting development in young children with CLP, are suggested to confirm the findings.

5.5 RECOMMENDATIONS FOR FURTHER RESEARCH

Based on the findings of the present study the following recommendations for further research with young children with CLP and for the utilisation of the CHRIB database are suggested:

- The CHRIB database system could be modified to be more user-friendly for present research with a selection of drop-down choice categories which would deem compatible with contemporary statistical analysis programs such as SAS (Version 9.2, 2011) and SPSS (Version 19.0, 2011).
- The current parental questionnaire could be revised to include specific categories to reduce elaborate descriptions and to rather include the most salient parental factors identified in the study. The drop-down categories will also be less time consuming and support the accurate reporting of assessment findings. These parental factors should also be congruent to the already existing categories in the CHRIB database.
- Age-specific factors influencing communication development for the other diagnostic categories in the CHRIB database (e.g. Down syndrome and Autism Spectrum Disorder) which is related to the ICD-10 (CSS, 1996) could be established. These factors could provide more focused intervention guidelines in ECI.
- A comparative study on early communication functioning and the influencing factors affecting young children with and without CLP could provide the speech-language therapist with an in-depth understanding of young clients with CLP and their families.
- Further research could compare the strengths, weaknesses, the risk factors and assets present in young children with CLP in different clinic-specific contexts locally and internationally. The establishment of age-specific guidelines in South Africa could contribute to the establishment of local guidelines for age-specific treatment of young children with CLP. The findings of the study could assist in the facilitation of the identification and development of age-specific intervention guidelines to assist professionals in the evidence-based treatment

of young children with CLP and their families. It is important to focus on each age group separately and to adapt treatment targets according to the individual communication needs of the young child with CLP and his/her family. These guidelines could also be used in other developing countries with comparable contexts.

5.6 FINAL WORDS

In conclusion to the study, the following statement should be considered:

'Working with children who have developed cleft palate speech presents questions that open many doors to new information on widely different subject areas, all related to effective work in speech-language pathology. Some of the doors could only be opened partly...' Bzoch (2004:16)

The complexity of individualized needs of young children with CLP is still not fully understood. Speech-language therapists should continually strive to renew and expand their knowledge regarding the unique communication profiles of young children with CLP and the factors influencing communication functioning. By following an asset-based approach to treatment, the areas of strength and the assets identified in a child with CLP are likely to impact positively on the child's communication developmental outcomes.

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