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Communication and School Readiness Abilities of Hearing-Impaired Preschool Graduates: Exploring Outcomes of Early Intervention Preschool Programmes in Gauteng

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Declaration

I declare that "**Communication and School Readiness Abilities of Hearing-Impaired Preschool Graduates: Exploring Outcomes of Early Intervention Preschool Programmes in Gauteng**" is my own work, that it has never been submitted for any examination or degree in any other university, and that all sources to which I have made reference or quoted have been indicated and acknowledged by complete references.

Ntsako Precious Maluleke

January 2017

Signed:_____

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Glossary

Apartheid: Word meaning "the state of being apart", was a system of racial segregation in South Africa under which the rights, associations and movements of the majority black inhabitants were curtailed and Afrikaner minority rule was maintained (Herreweghe & Vermeerbergen, 2010).

Auditory-verbal therapy: an approach to intervention for hearing-impaired children that emphasizes the development of the child's residual hearing in the acquisition of spoken communication (Eriks-Brophy et al., 2012).

Aural habitation: Aural rehabilitation services for children are more appropriately referred to as "habilitative" rather than "rehabilitative." "Rehabilitation" focuses on restoring a skill that is lost; whereas in children, the skill may not be have been there in the first place (American Speech-Language-Hearing Association [ASHA], 2011a).

Cochlear implant: A surgically implanted electronic device that provides direct electrical stimulation to the auditory nerve in the inner ear. Children and adults with a severe to profound hearing impairment who cannot be helped with hearing aids may be helped with cochlear implants (ASHA, 2011b).

Co-morbidity: the presence of one or more additional disorders co-occurring with a primary disease or disorder (for the purpose of this research report, the primary disorder is a hearing impairment) (Northern & Downs, 2002).

Conductive hearing impairment: A hearing impairment due to disorders of the outer and middle ear, resulting in an obstruction to the flow of sound to the inner ear (ASHA, 2011c).

deaf: Audiological term relating to hearing difficulties (Murray et al., 2007). Deaf with an uppercase "D" refers to a cultural identity for persons with hearing difficulties (Lucas & Valli, 1992).

Early-identified: Hearing impairment identified between birth and 6 months (Yoshinaga-Itano, Sedey, Coulter & Mehl, 2006).

Early Hearing Detection and Intervention: The practice of screening every newborn for hearing impairment prior to hospital discharge. Infants who don't pass the screening receive diagnostic evaluations before three months of age and, when necessary, are enrolled in early intervention programmes by six months of age (ASHA, 2011d).

Early intervention: Intervention practices with children from birth to three years of age (Khoza-Shangase, Barrat & Jonosky, 2010)

Hearing aid: A small device worn on the ear that consists of a microphone, an amplifier or processor and a loudspeaker that transmits the optimised sounds into the ear (Ear Institute, 2016).

Late-identified: hearing-impairment identified after the age of 6 months (Yoshinaga-Itano, Sedey, Coulter & Mehl, 2006)

Mainstreaming: the placement of special education students in one or more regular education classes based on their skills level (Mellon et al., 2009)

Parent/family involvement: parent/family's active participation in the child's intervention program and plan as well as advocating for the child (Turan, 2012)

Postlingual hearing impairment: hearing impairment that occurs after a child has learned some language (Centre of Disease Control and Prevention [CDC], 2015)

Prelingual hearing impairment: hearing impairment that occurs before a child has learned to understand and use language (CDC, 2015)

Sensorineural hearing loss: A hearing impairment due to damage to the cochlea or the auditory nerve that carries the auditory signals to the brain (ASHA, 2012).

Acronyms and abbreviations

ABR:	Auditory Brainstem-evoked Response
AABR:	Automated Auditory Brainstem-evoked Response
ADD:	Attention Deficit Disorder
ADHD:	Attention Deficit/Hyperactivity Disorder
AIDS:	Acquired Immunodeficiency Syndrome
ANSI:	American National Standards Institute
ASHA:	American Speech-Language-Hearing Association
AVT:	Auditory-Verbal Therapy
DAS:	Developmental Assessment Scale
dB HL:	Decibels –Hearing Level
EHDI:	Early Hearing Detection and Intervention
EI:	Early Intervention
ENT:	Ear-Nose-Throat specialist
HI HOPES:	Home Intervention- Hearing and Language Opportunities Parent Education Services
HIV:	Human Immunodeficiency Virus
HPCSA:	Health Professions Council of South Africa

JCIH:	Joint Committee on Infant Hearing Screening
NHS:	Newborn Hearing Screening
NICU:	Neonatal Intensive Care Unit
NIH:	National Health Initiative
PLS:	Preschool Language Scale
OAE:	Otoacoustic Emissions
ODD:	Oppositional Defiance Disorder
OHC:	Outer Hair Cells
SANDF:	South African National Defence Force
SASLHA:	South African Speech-Language and Hearing Association
SES:	Socio-economic status
STA:	Speech-language Therapist and Audiologist
TACL:	Test of Auditory Conceptualisation of Language
TB:	Tuberculosis
UNHS:	Universal Newborn Hearing Screening
WHO:	World Health Organisation
WNL:	Within Normal Limits

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Abstract

Background: The benefits of Early Hearing Detection and Intervention (EHDI) services on communication, cognition and socio-emotional development, including academic and vocational outcomes are well documented internationally. However, reports on EHDI services in South Africa are limited to the establishment of programmes for early detection of hearing impairments, with little focus on the outcomes of the subsequent early intervention (EI) for children diagnosed with a hearing impairment.

Objective: This study explored the outcomes of two EI preschool programmes in the Gauteng province, South Africa. The current study aimed at describing the communication and school readiness abilities of hearing-impaired children who were enrolled in the EI preschool programmes, as well as to determine the factors that influenced the attainment of school readiness abilities.

Methods: A descriptive research study was conducted on eight hearing-impaired children who graduated from two EI preschool programmes in the Gauteng Province. Content analysis was used to analyse the qualitative data while frequency distribution and measures of central tendency were used to analyse the quantitative data.

Results: Participants were late-identified with subsequent late provision of amplification devices and commencement of EI services. Consequently, participants demonstrated sub-optimal communication and school readiness abilities for their age. Early access to EHDI services and age-appropriate communication abilities were identified as factors that influenced the attainment of age-appropriate school readiness abilities for children with a hearing impairment.

Conclusion: There is a great need for the establishment of more EI programmes that will meet the unique needs of hearing-impaired children in different contexts and ensure that they also have an opportunity to develop on par with their peers with normal hearing. Further research in this area needs to be undertaken exploring similar objectives to the current study with a larger, diverse sample for improved generalisability of the findings.

Keywords: *Hearing impairment, EHDI, early intervention, Communication abilities, School readiness abilities*

CHAPTER ONE:

BACKGROUND TO EARLY HEARING DETECTION AND INTERVENTION

This chapter provides an introduction to hearing impairment in children and a basic impressions of the adverse effects of an undetected hearing impairment in early childhood. It also provides a brief overview of early detection of hearing impairments and subsequent EI services, both in the South African context and internationally. Lastly, a brief rationale for the current study will be discussed.

Introduction

My interest in EHDI services stems from the birth of my younger sister in 2007. This was intensified by my involvement in conducting hearing screening on newborns and infants as a junior speech-language therapist and audiologist at Mokopane Hospital in 2009 and a year later at the 1 Military Hospital. However, I had been introduced to Newborn Hearing Screening (NHS) prior to 2007. In 2006 I was a third year undergraduate student at the University of the Witwatersrand and we were taught about Otoacoustic Emissions (OAEs). OAEs are low-intensity sounds that are generated by the Outer Hair Cells (OHC) of a healthy cochlear (Watkin, 2010). They are typically generated by a click stimulus presented to the ear and are recorded by a microphone sited in the ear canal (Kemp, 2002). We were taught that OAEs were widely used for hearing screening, especially in NHS programmes because OAE screening measures are objective and non-invasive (Oudesluys-Murphy, van Straaten, Bholasingh & van Zanten, 1996). Furthermore, OAE screening measures screen a range of frequencies critical for normal speech and language development (Kemp, 2002).

To me, OAE hearing screening sounded like valuable technology which could make an enormous difference in early identification of childhood hearing impairments. But I thought it would take a few years before I would be able to use such technology in clinical practice, as is usually the case with a lot of the new, progressive technology developed internationally. Then during my final year, on the 14th of April 2007 my aunt's youngest daughter, Kuxonga, was born

at the Netcare Parklane Clinic in Parktown. The day after she was born, I went to visit her and my aunt at the hospital. When I got there, my aunt was excited to tell me about an audiologist who had come to see her earlier that morning and had offered to screen Kuxonga's hearing. The audiologist had outlined the benefits of early detection of a hearing impairment especially during childhood where there is a higher prevalence of hearing impairments, and my aunt agreed to have the hearing screening conducted. Kuxonga passed the hearing screening and these results were relayed to my aunt within minutes. My aunt was impressed by this screening test and related how she now has a better understanding of our profession.

This incident resulted in my aunt and I having a discussion about how such a screening test could make a difference to so many children's lives. As a former high school teacher, she wondered how many of the children that she had encountered during her teaching career, who had been labelled as troublesome or who had dropped out of school because of poor academic performance, would have been identified as hearing-impaired if such technology had been available and accessible to them. From that moment, I had an appreciation early identification of childhood hearing impairments and an interest in working in this field.

I then completed my BA (Hons) speech-hearing therapy and audiology degree at the end of 2007 and was employed as a community services speech-language therapist and audiologist at Helene Franz Hospital in Bochum, Limpopo in 2008. In 2009, after completing my compulsory community services, I was employed as a junior speech-language therapist and audiologist at Mokopane Hospital also in Limpopo. Our hospital had a portable OAE screener and one of my responsibilities as a junior audiologist, entailed conducting NHS on the newborn babies before they were discharged from the hospital, which was usually within hours of their birth.

Unfortunately, despite our department's effort to screen every baby born at the hospital for congenital hearing impairments during the work week, there was poor follow-up for infants who

had failed the hearing re-screening, which was usually conducted on the same day. Hence I did not get much experience with the EHDI process beyond hearing screening and evaluation. In 2010, I was then appointed as a senior speech-language therapist and audiologist at 1 Military Hospital outside Pretoria, Gauteng. 1 Military Hospital is one of three hospitals in the country that cater to the South African National Defense Force (SANDF) community and their families. 1 Military Hospital was the biggest hospital of the three and thus had more resources and infrastructure; however, we did not have a portable OAE screener. Hence during my tenure at 1 Military Hospital we conducted NHS using noise-makers. Despite the lack of a portable OAE screener, 1 Military Hospital's EHDI programme was better established as compared to Mokopane Hospital. Consequently, I was able to follow the EHDI programme from screening, identification of the hearing impairment and initiation of EI services, specifically hearing aid fitting, and commencement of aural habilitation and speech-language therapy services.

After leaving 1 Military Hospital in 2012 I often wondered about the hearing-impaired children in the EHDI programme and what outcomes I would have observed had I continued my work at the hospital. I also wondered if indeed we had changed the trajectory of these children's lives through early detection of their hearing impairments and subsequent EI services. Hence I registered for my Master's Degree in Audiology with the aim of exploring outcomes of existing EHDI programmes in the South African context.

Background

An undetected hearing impairment in childhood can lead to delayed or impaired speech and language development, as well as social and emotional problems (Sininger, Grimes & Christenses, 2010; van Dyk, Swanepoel & Hall, 2015). Furthermore, these delays may result in lower educational and employment levels in adulthood (South African Speech-Language-

Hearing Association [SASLHA], 2007). The aforementioned negative effects of an unidentified hearing impairment can be further exacerbated by the poor socio-economic conditions and burdened health care systems characteristic of developing contexts such as South Africa (Meyer, Swanepoel, le Roux & van der Linde, 2012). From a societal perspective, failure to detect a hearing impairment timeously, and provide effective intervention early in a child's life means that the child may require special schooling, which is likely to be more expensive than mainstream schools. Furthermore the child is more likely to be reliant on social programmes (Petersen & Ramma, 2015).

But, infants with a hearing impairment, unlike those with many other congenital or early-onset disabilities, can develop speech and language skills on par with normal hearing peers if the hearing impairment is identified early enough and intervention is initiated timeously (Meyer, Swanepoel & le Roux, 2014; Swanepoel, Storbeck & Friedland, 2009). Early identification of the hearing impairment and initiation of intervention must take place prior to six months of age so that the child is able to maintain age-appropriate development with regards to speech and language skills (Storbeck & Pitman, 2008). The documented benefit of early identification and intervention necessitates implementation of EHDI services in order to prevent the widely documented individual and societal detrimental consequences of an unidentified, permanent, congenital or early onset hearing impairment (de Kock, Swanepoel & Hall, 2016).

EHDI is now recognised as an undeniable right of children with hearing impairments and their families (Pribanikj & Milkovikj, 2009). It encompasses benchmarked indicators of hearing screening at birth, provision of amplification devices by three months and enrolment in EI services by six months of age (Joint Committee on Infant Hearing [JCIH], 2000). According to the Health Professions Council of South Africa (HPCSA) (2007), EHDI programmes are

recommended to identify, diagnose and treat newborns and infants with a disabling hearing impairment as early as possible in order to ensure that optimum, cost effective solutions, that enable persons to communicate effectively and develop their maximum potential.

Early Detection of Hearing Impairments

A hearing impairment is the most frequent occurring birth defect (Swanepoel, Delport & Swart, 2004). However, prior to the 20th Century, children born with a congenital hearing impairment would typically not have been identified until two-and-a-half to three years of age (Fitzpatrick, Durieux-Smith, Eriks-Brophy, Olds, & Gaines, 2007; White, Forsman, Eichwald & Muṅoz, 2010). This is despite the JCIH issuing regular position statements since 1982 to endorse the goal of universal detection of infants with hearing impairments as early as possible (Oudesluys-Murphy et al., 1996). It was only in 1990 that the United States Department of Health and Human Services established a goal to lower the average age of identification of hearing impairments from two-and-a-half to three years of age, to less than 12 months of age (Fitzpatrick et al., 2007; Maxon, White, Behrens & Vohr, 1995). Three years later, the National Institutes of Health (NIH) issued a consensus statement recommending early identification of hearing impairments in infants and young children through universal screening within the first three months of life (Maxon et al., 1995; Oudesluys-Murphy et al., 1996). In agreement with the NIH's recommendations, the JCIH released a position statement in 1994 stating that all infants with a hearing impairment should be identified before three months of age and receive intervention by six months (JCIH, 1994).

Since the 1994, Universal Newborn Hearing Screening (UNHS) is either recommended or already practiced and legally regulated in many European nations and America (Lasisi, Onakoya,

Lasisi, Akinla & Tongo, 2014; White et al., 2010). It is the most preferred model of early detection of hearing impairments owing to the high incidence of infant hearing impairment compared to other birth defects (Swanepoel et al., 2004). Furthermore, UNHS is preferred owing to the existing evidence that this model is a cost-effective approach for the timeous and effective detection of hearing impairments (Khoza-Shangase & Harbinson, 2015). Moreover, UNHS may be the only opportunity for infants with geographic and financial constraints to be identified and provided with treatment options (SASLHA, 2007). Through UNHS, the age of a confirmed hearing impairment has decreased to between two and three months of age in developed contexts (Swanepoel, 2009). Unfortunately, this advancement has not carried over to the developing world, where two-thirds of the world's hearing-impaired children reside (Olusanya, Luxon & Wirz, 2006).

The Word Health Organisation (WHO) encourages countries to increase prevention efforts and improve access to EHDI (WHO, 2010); however, in South Africa and other developing countries alike, identification of infant hearing impairments still remains primarily passive through caregiver concern about observed speech and language delays (Storbeck & Young, 2016). In some cases, identification may be prompted by the complications of an underlying childhood illness such as chronic otitis media (Olusanya, 2001). Furthermore, only 7.5 % of public sector hospitals and 53% of private sector hospitals offer NHS programs in South African, and this excludes universal screening (Butler, Cerino, Swart & Joubert, 2015). UNHS is offered by less than 1% of public sector hospitals and 15% of private sector hospitals (de Kock et al., 2016). Owing to the lack of universal and systematic implementation of NHS in South Africa, hearing-impaired children are still late-identified, after the age of 12 months. Ages at identification of hearing impairments range between 15.3 months to 44.5 months (Storbeck & Young, 2016).

It is only through early identification and intervention programmes that a developing context such as South Africa can reduce late identification of infant hearing impairments (Swanepoel et al., 2004). However, implementation of developed world models of UNHS in a developing context has been identified as impractical (Moodley & Storbeck, 2015). This is in part due to factors such as the high burden of infectious diseases (Swanepoel et al., 2009). The additional burden of life-threatening diseases such as Human Immunodeficiency Virus (HIV)/Acquired Immunodeficiency Syndrome (AIDS) and Tuberculosis (TB) is often endemic to sub-Saharan Africa, South Africa included (Petrocchi-Bartal & Khoza-Shangase, 2015). In response to the country's interlinked HIV and TB epidemics, government funding has been increased to allow for expansion of antiretroviral therapy, scaling up for prevention of mother-to-child transmission programmes, promotion of HIV and TB treatment as well as investments in new HIV infection prevention programmes (Friederichs, Swanepoel & Hall, 2012; Manyisi et al., 2012; Department of Health, 2010). Within this context, screening of infant hearing impairments is viewed as a method of prevention (Khoza-Shangase & Harbinson, 2015) and viewed as relatively less urgent (Petrocchi-Bartal & Khoza-Shangase, 2015). Thus, despite its reported benefits, preventative care such as early detection of hearing impairments has received lesser financial attention (Khoza-Shangase & Michal, 2014).

Undoubtedly, one of the main benefits arising from the implementation of UNHS programmes is early detection of hearing impairments in children (Lasisi et al., 2014). However; hearing screening in newborns creates an opportunity, it is not a guarantee of optimal outcomes. Early access to quality EI services is a critical component of this successful system (Yoshinaga-Itano, 2013).

Early Intervention

Timeous initiation of EI services represents the purpose and goal of the entire EHDI process (Yoshinaga-Itano, 2013), and its value is well reported in the literature (Olusanya, 2001). Infants whose hearing impairment is early-identified, before three months of age, and who receive intervention timeously have significantly better language abilities than those whose hearing impairment is identified later (Meizen-Derr, Wiley & Choo, 2011). The reason for this is that, with timeous intervention, children with hearing impairments can be fitted with amplification devices before the age of six months, thus enabling them to develop and maintain normal language skills in keeping with their cognitive development (Swanepoel et al., 2004).

Without individualized, targeted and high-quality EI services; screening and confirmation that a child presents with a hearing impairment is meaningless (Yoshinaga-Itano, 2013). EI is the first step in combating the effects of a hearing impairment on communication development (Carney & Moeller, 1998; Swanepoel & Almec, 2008). It is used broadly to refer to intervention practices with children from birth to three years of age (Khoza-Shangase, Barrat & Jonosky, 2010) who are identified as having, or being at risk of developing, a developmental delay (Ackah & Appiah, 2011). EI is grounded in the conviction that during the first three to five years of life there is a unique opportunity to prevent or reverse children's developmental delays (Fulcher, Purcell, Baker & Munro, 2015). The rapid brain growth that occurs at this time of children's lives is believed to be associated with critical periods during which children are uniquely prepared to benefit from developmental stimulation that is matched to their individualized needs and abilities (Turan, 2012). Ethically, a fundamental responsibility of parents and caregivers in every society is to nurture their young ones for full membership in that society. From a practical point of view,

promoting the health and development of children with disabilities increases their preparedness to participate as adults in the economic life of their communities (Ackah & Appiah, 2011).

EI services, thus, reduce the negative effects of the hearing impairment (Meinzen-Derr et al., 2011). They provide children with a hearing impairment with optimal and timely opportunities to develop to their full potential and in keeping with their peers (Harrington, DesJardin & Shea, 2010; HPCSA, 2007). This is achieved through maximizing the sensitive periods of development so as to prevent the aforementioned speech and language delays frequently observed in children with hearing impairments (Fulcher et al., 2015; Moeller, 2000). This ultimately results in more positive academic, social and employment outcomes (Fitzpatrick et al., 2007).

On the basis of these positive outcomes, developed countries have invested in early identification and comprehensive EI services (Storbeck & Young, 2016). Although numerous EI programmes have been implemented in South African hospitals and local communities, reported outcomes are isolated (Moodley & Storbeck, 2015). Currently, there is a dearth of evidence originating specifically from the South Africa context to inform implementation of widespread EI services.

Rationale

With the advent of EHDI services, reports from developed contexts have demonstrated a reduction or reversal of the negative effects of a hearing impairment, ultimately allowing children with hearing impairments the opportunity to develop to their full potential (Meizen-Derr et al., 2011; Harrington et al., 2010; HPCSA, 2007). Despite having a well-developed healthcare system, South Africa still experiences challenges regarding cost and burden of disease priorities

(Khoza-Shangase & Michal, 2014) within an overburdened healthcare system (Storbeck & Young, 2016). Thus, early identification of hearing impairments is regarded as less of a priority than preventing, diagnosing and treating life-threatening conditions such as HIV and TB (Khoza-Shangase & Michal, 2014; Storbeck & Young, 2016).

According to SASLHA (2007), the financial constraints that are characteristic of the South African healthcare system require adjustments to the implementation of EHDI services. The EHDI programmes must ensure that the goals of the programme are contextually relevant and achievable (SASLHA, 2007). Consequently, studies in the South African context have focused on validation of early hearing detection services and the development of contextually feasible models of service delivery (de Kock et al., 2016). However, little information is available for studies that demonstrate the medium to long-term benefits of the entire EHDI process from hearing screening to early intervention (Pillay, Moonsamy & Khoza-Shangase, 2010). Studies looking at the development of universal hearing screening, diagnosis and intervention across both the public and private healthcare system will provide much needed information on all aspects of EHDI in a developing world context (Moodley & Storbeck, 2015). The current study was accordingly conducted to explore the communication and school readiness abilities of hearing-impaired children who were enrolled in early intervention preschool programmes in Gauteng, South Africa.

CHAPTER TWO:

LITERATURE REVIEW

This chapter will provide an in-depth discussion of the issues discussed in chapter 1. More specifically, the negative impact of an undetected hearing impairment in early childhood on language development, academic and vocational attainment will be presented. EHDI services in the South African context will be deliberated on, and comparisons made to those in more developed contexts. The literature reviewed in this chapter is aimed at presenting a solid rationale for the current study.

Hearing Impairment and Its Consequences

A hearing impairment has been described as an overlooked epidemic of developing countries due to its silent, non-life-threatening nature (Theunissen & Swanepoel, 2008). A hearing impairment in children is defined as a difference from the normal ability to detect sound relative to the standard established by the American National Standards Institute (ANSI), of 15 dB HL at a variety of signal frequencies ranging from 500Hz to 8000 Hz (Carney & Moeller, 1998). According to WHO (2013) estimates, a hearing impairment is the most disabling condition globally. It is reported that annually, more than 800 000 babies are born with or acquire an early-onset hearing impairment worldwide (Friderichs et al., 2012). Also in 2013, the global prevalence of a disabling hearing impairment[1] was estimated in 360 million people, 32 million of which were children under the age of 15 years (WHO, 2013).

According to Ross and Deverell (2004), a hearing impairment has the second highest prevalence rating on the disability scale in South Africa. Prevalence figures of six infants per 1000 live births have been reported (de Kock et al., 2016; Moodley, 2016). For school-age children, prevalence figures of 2.2% were reported (Swanepoel, Johl & Pienaar, 2013). Evidence

[1] A disabling hearing impairment refers to a hearing impairment equal to or greater than 40 dB HL (Carney & Moeller, 1998).

suggests that of these hearing-impaired infants and children, very few will be afforded the opportunity to have their hearing screened in the South African context, resulting in late identification of the hearing impairment (Storbeck & Young, 2016).

It has long been recognized that an unidentified hearing impairment present at birth or in early life prevents language development in its normal course (Turan, 2012). Hearing is the primary sense to acquire spoken language; thus the presence of a hearing impairment can adversely affect its development (JCIH, 2007; Petersen & Ramma, 2015). Furthermore, the longer the hearing impairment goes undetected, the poorer the speech, language, literacy and educational outcomes are likely to be for the child, with higher associated long-term costs to the family, society and the country (Meyer et al., 2014). In order to fully appreciate the adverse effects of a hearing impairment on children's spoken language development, school readiness abilities and subsequently academic and vocational attainment, an understanding of the process of language acquisition[2] is needed.

Hearing as the Basis for the Development of Spoken Language

The development of spoken language is one of the most remarkable accomplishments of a child (Vlastarakos, 2012). Early access to sounds in the environment ensures that children are able to

[2] For the purposes of this study, language acquisition and language development are used interchangeably. However, there are theoretical issues that lie behind the choice of one term over another. 'Language acquisition' generally refers to the explanation of how it is possible for any child to learn any language, while 'language development' refers to an explanation of how children move from initial assumptions or representation of the meaning of the words in a language through successive stages to a steady end-state of language use (Foster-Cohen, 2001).

develop listening skills, which are the basis for the development of spoken language (Clark 2007; Vlastarakos, 2012). Studies related to spoken language development have prompted much debate over the years, as no single theory provides complete and irrefutable explanation of language acquisition (Taylor, 1999; Turan, 2012). Each theory contributes significant ideas and concepts which clarify the awareness of the way in which language is acquired (Turan, 2012). However, there are two theories that approximate a finite proposition of how spoken language is acquired by the developing child. These are Noam Chomsky's *Language Acquisition Device* theory and Jerome Bruner's *Stages of Learning* theory (Taylor, 1999).

Chomsky's *Language Acquisition Device* theory, maintains that the ability to acquire spoken language is completely innate, and that linguistic ability is part of our genetic makeup (Taylor, 1999). Chomsky proposed an innate 'language acquisition device', which enables information to be assimilated, stored and developed into the ability to communicate. Chomsky's theory proposed that experience determines which of the possible many languages a child will develop, and concluded that without hearing the spoken word, a child will not acquire spoken language even though the genetic coding is present for its development (Taylor, 1999; Forster-Cohen, 2001).

On the other hand, Bruner's *Stages of Learning*[3] theory proposes that children learn to use language rather than learning a language. He argued that children acquire language through their attempts to communicate with the world around them (Turan, 2012). He suggested that children within their environment use associated life experiences to acquire spoken language, and the

[3] Bruner's Stages of Learning is in agreement with Jean Piaget's theory. Piaget claimed that children began to think in symbols arising from a series of sensori-motor stages that are passed through. He believed that language was a reflection of an individual's thoughts; therefore the level to which an individual's cognition is developed determines their linguistic ability (Taylor, 1999).

contributing factors, both environmental and social, constitute the basis of a ‘language acquisition support system’. Bruner theorised that if children were falling behind at any of the stages of spoken language development; intervention, additional stimulation and teaching should be available to them in order for them to achieve their full potential (Taylor, 1999).

The intervention referred to in Bruner’s *Stages of Learning* above needs to take place in the period between the first six months of life and 18 months. Six to 18 months of age has been widely postulated as the period of optimal development, when the brain functions with maximal plasticity, and is thus a critical phase for speech and language development (Fulcher et al., 2015; Olusanya, 2001; Petersen & Ramma, 2015). During this time, prior to the child’s ability to use spoken language to communicate effectively, they need to develop the precursors of language (Taylor, 1999). These precursors of language, include joint attention, turn taking and communicative intent (Taylor, 1999; Fogle, 2008), and are the basis for the development of spoken language and influence cognitive, social, and emotional development in turn (JCIH, 2007). Once the precursors of language development have laid the foundation, spoken language development takes place through three proposed phases, namely sensory learning, sensorimotor output and stabilization (Fogle, 2008).

During sensory learning, children learn spoken language through the auditory modality and exposure to spoken language from their primary caregivers (Woodfield, 1999). Over time they develop a ‘template’ of the language (Fogle, 2008). The ‘template’ is a stored memory of aspects of language such as sounds of words (phonology), word meanings (semantics), how words are combined into meaningful sentences (syntax), and the use of language (pragmatics) (Woodfield, 1999; Vlastarakos, 2012).

During the sensorimotor output phase, children's productions of spoken language gradually begin to match the 'templates' of the adult spoken language (Vlastarakos, 2012). Children then use the feedback from others, reinforcement or praise, and themselves (hearing themselves) to recognize their increasing language development (Woodfield, 1999). Finally with increased use of the patterns and increased neural development, adult spoken language patterns become stabilized, during the stabilization phase (Fogle, 2008).

Literature pertaining to language development ascertains that hearing impaired children have the same innate capacity to develop fluent spoken language as do children with normal hearing. However, this is only possible when hearing-impaired children are given the "same opportunity" as their hearing peers to develop spoken language (Turan, 2012). "Same opportunity" to develop spoken language; however, is sometimes difficult with hearing-impaired children because the hearing impairment creates a context whereby the input from the linguistic environment is absent or poor. Absent or poor linguistic input may lead to a poor 'template' of the language, resulting in significant spoken language delays (Taylor, 1999; Nicholas & Geers, 2003).

Impact of a Hearing Impairment on Spoken Language Development

Normal hearing during early life is of the outmost importance for laying the neurological basis for speech and language development (Oudesluys-Murphy et al., 1996). The brain develops by an "experience-dependent" process, where experience activates certain pathways in the brain and not others. Hence experiences in early life are crucial in organising the brain's basic structures, as they create the neural foundation for all subsequent development and behaviour (Derrington, Shapiro & Smith, 2003). By its very nature, a hearing impairment provides incomplete access to

spoken language, which may result in a lack of stimulation or experience for the relevant pathways, leading to negative effects on spoken language acquisition (Derrington et al., 2003; Wang & Engler, 2011). Hence, a hearing impairment is often the first factor to be considered in cases of delayed language acquisition (Kotby, Tawfik, Aziz & Taha, 2008; Woodfield, 1999). Although there is no universal agreement as to the extent of normal variation between hearing children, estimates range from 2000 to 10 000 spoken words for a five year old. However, for hearing impaired children, estimates indicate that a five year old typically presents with approximately 25 spoken words (Vlastarako, 2012).

Various factors such as malleable and non-malleable factors have been identified as having an impact on the hearing-impaired child's ability to develop spoken language (Kotby et al., 2008). Non-malleable factors include onset, type and degree of the hearing impairment; and the presence of additional disabilities. On the other hand, malleable factors include; but are not limited to, the child's language environment and access to EHDI services (Eriks-Brophy et al., 2012; Fulcher, Purcell, Baker & Munro, 2012).

Extensive research has been conducted on the impact of non-malleable factors on spoken language acquisition. Studies have shown that the effects of a congenital or early-onset hearing impairment, before the child has learned to understand and use language, are greater than an impairment in the post-lingual period, after the child has developed some spoken language (Kotby et al., 2008). According to Woodfield (1999), with the presence of a congenital or early-onset hearing impairment, a child cannot take the first steps towards spoken language acquisition if s/he is not receiving adequate acoustic cues. Limited opportunities to "overhear" from auditory language models leads to impoverished experiences, with negative consequences for word knowledge, language rule formation, and vocabulary development (Carney & Moeller, 1998).

Consequently, studies have also reported delays in vocabulary development, grammatical skills, concept attainment and social conversational skills in children with a congenital or early-onset hearing impairment (Carney & Moeller, 1998; Kotby et al., 2008). Moreover, children with a sensorineural hearing impairment have also been documented to experience significant delays in language development compared to children with other types of hearing impairments (Delage & Tuller, 2007; Kotby et al., 2008). The reason for this is that, unlike other types of hearing impairments, a sensorineural hearing impairment reduces the intensity of the auditory stimulus the child perceives. However, a sensorineural hearing impairment also introduces an element of distortion into what is heard resulting in sounds being unclear even when they are loud enough (Vlastarakos, 2012).

Another non-malleable factor that has been identified is the degree of the hearing impairment. A severe-to-profound hearing impairment, which is defined as hearing sensitivity at 71 dB HL or greater, is reported to have a greater impact on spoken language acquisition than a mild-to-moderate hearing impairment, which is defined as hearing sensitivity between 15 dB HL and 70 dB HL (Itano & Gavel, 2001; Kotby et al., 2008) . Thus, the more severe the hearing impairment, the poorer children's outcomes with respect to speech and language abilities (Fulcher et al., 2012). Moreover, a child who presents with both a hearing impairment and another condition is at greater risk for language delay (Fogle, 2008). Forty to fifty percent of children who have a hearing impairment present with additional disabilities (Vohr et al., 2012); which may be in the form of sensory or neurological impairments (Marschark, 2007). Common co-morbidities include prematurity, developmental delays and learning difficulties, Attention Deficit Disorder (ADD), Attention Deficit-Hyperactivity Disorder (ADHD), visual impairment; intellectual and cognitive disabilities, as well as neurological problems that further compound the difficulty in developing speech and language (Tye-Murray, 1998; Northern & Downs, 2002).

In addition to non-malleable factors, the child's early language environment plays a critical role in shaping their language outcomes. The most important element is undoubtedly the linguistic input provided by the primary caregiver (Ambrose, Walker, Unflat-Berry, Olesen & Moeller 2015). Research in the field of normal language acquisition generally reports a strong relationship between the quantity and quality of language input provided to a child and the child's subsequent language development (Nicholas & Geers, 2003). Quantity refers to how frequently caregivers speak to the child. Higher amounts of linguistic input are correlated with stronger vocabulary growth and faster lexical processing in children (Ambrose et al., 2015). Hart and Risley (1995) provide confirmation of this statement in their study of children's learning language environments. Results from their study showed that quantity of caregiver talk was a better predictor of children's linguistic outcomes than any other feature of their early language experience.

Quality on the other hand refers to a wide range of language characteristics, including the richness of the vocabulary, the complexity of utterances, use of techniques designed to engage the child in conversational interaction, and verbal interaction style (Ambrose et al., 2015). Various studies explored vocabulary and utterance complexity, and reported a positive relationship between parent's use of complex vocabulary and utterances, and children's language outcomes (Turan, 2012). Parental use of techniques to engage children in conversational interactions has also been investigated by various researchers, who reported a positive association between parent's uses of open-ended questions with children's language outcomes (Ambrose et al., 2015).

Another feature of quality language input is parent-child interaction (Ambrose et al., 2015). Parent-child interaction refers to the process of reciprocal influence in the parent-child

relationship (Belsky, Youngblade, Rovine & Volling, 1991). Research on caregiver input on children with a hearing impairment revealed that caregivers are more directive and use less high-quality talk with their children and are less verbally responsible to their child's communicative attempt (Ambrose et al., 2015). Studies conducted on children 18 month and older who had been diagnosed with a hearing impairment have shown that parents undergo controlling, discouraging and negative interactions with them, which provides a less facilitative environment for language acquisition as well as social and cognitive development (Turan, 2012).

However, these reported adverse effects of a hearing impairment on spoken language acquisition can be mitigated primarily through early access to EHDI services (Jenkins et al., 2006; Kasai, Fukushima, Omori, Sugaya & Ojima, 2012; & Sininger et al., 2010). Through EHDI programmes, parents and families are equipped to guide their child's language and conceptual development through appropriate instruction, modelling and reinforcement (Ackah & Appiah, 2011); and their children have better opportunities to develop age-appropriate spoken language abilities (Larsen, Munoz, DesGeorges, Nelson & Kennedy, 2012; Vohr et al., 2012). This is in agreement with the findings of various researchers who maintain that, with early identification and amplification, children with a hearing impairment are able to receive a sensory device timeously and have the potential to receive the necessary linguistic information to reach speech and language competencies similar to their hearing peers (Harrington et al., 2010). However, there remains a need for research on the speech and language outcomes of children with a hearing impairment who have received EHDI services in the South African context.

Impact of a Hearing Impairment on Academic Achievement and Employment Opportunities.

The risk for speech and language delays for children with hearing impairments extends from early childhood to school age (Vohr et al., 2012), resulting in academic underachievement (Carney & Moeller, 1998; Kotby et al., 2008). Children with a congenital, bilateral severe to profound hearing impairment reportedly leave the education system with language abilities equivalent to those of nine year olds, while children with a mild to moderate hearing impairment leave school at the age of 18 years having achieved an average sixth-grade reading level and an average language age equivalent to that of 12-year-olds (Kotby et al., 2008).

The academic underachievement, reported in literature pertaining to children with a hearing impairment, can also have negative effects well into adulthood, resulting in lower employment opportunities (Hogan, O'Loughlin, Davis & Kendig, 2009; Larsen et al., 2012). In the USA, a hearing-impaired individual's average income after high school is reported to be 30% lower than that of an individual with normal hearing (Swanepoel et al., 2004). Some South African estimates indicate that more than 90% of all deaf[4] adults have no jobs and that up to 100% of deaf people in the rest of Africa have no work and no income (De Villiers, 2010). The few deaf adults who enter the open labour market do so in non-professional jobs such as office administration, upholstery, cosmetology, construction and hospitality (De Villiers, 2010). The high unemployment rate and limited employment opportunities for deaf adults in South Africa

[4] Small 'd' when referring to the term 'deaf' refers to audiological deafness, which is an entire loss of the ability to hear from one or both ears (WHO, 2010). It is perceived as a pathology, and the focus is on the impairment and the limitations that the person with a hearing impairment has with respect to oral communication (Pribanikj & Milkovikj, 2009). However, the term 'deaf', generally lends itself to severe and profound hearing impairments (Stach, 2010).

mirrors that of deaf adults internationally as demonstrated by two research studies conducted in the USA.

Boutin and Wilson (2009) analysed occupational classification of the types of jobs held by hearing-impaired adults across the United States of America in 2004. Results indicated that 47% of deaf adults were employed in non-professional occupations such as food preparation, secretarial work, office work and janitorial work. In Schildroth, Rawlings and Allen's (1991) study 18 years earlier, a survey of hearing-impaired children and youth conducted by the Centre for Assessment and Demographics studies at Gallaudet University in 1987 showed that 20% of deaf young adults one year out of high school were employed in food preparation jobs. Another 17% were employed in secretarial and office posts and 10% were employed as stock and freight handlers.

Hearing-impaired learners are fully capable of achieving the same educational outcomes expected of any other learner but are not currently achieving equal outcomes in an environment of low expectations (Parkin, 2010). According to Magongwa (2010), hearing-impaired adults in South Africa are largely excluded from tertiary education opportunities and professional employment as a result of poor education or no education at all. Sadly, the South African education system and school programmes do not empower individuals with a hearing impairment with the education to be productive, working citizens of the country (De Villiers, 2010). It is therefore vital that EHDI programmes are implemented in this context in order to mitigate these adverse effects that result in lower educational and employment levels in adulthood (SASLHA, 2007). Through these EHDI programmes, children with a hearing impairment may be given the foundation to develop communication and school readiness abilities, affording them the same educational and employment opportunities as their hearing peers (Harrington et al., 2010). This

can be achieved through further research on the medium and long-term outcomes of EHDI programmes that will inform best practice in the current context.

It has been argued that the poor vocational attainment of hearing impaired individuals in the South African context may also be a reflection of the history of South African Sign Language (SASL) and education for the deaf (De Villiers, 2010). Van Herreweghe and Vermeerbergen (2010) strongly argue that the impact of the apartheid regime on education is still evident two decades later. During apartheid, deaf people experienced great educational disadvantages that evidently continue to have major consequences today (Pascoe & Norman, 2011). During the regime, the South African education system was segregated on the basis of colour and ethnolinguistic backgrounds such as Afrikaans, English, Zulu, Sotho, Xhosa, etc. Deaf education was further divided on the basis of the language of instruction. Generally, schools for white, deaf pupils insisted on oralism whereas schools for the other races allowed for some degree of signing (Storbeck & Martin, 2010). Only in 1996, did SASL become a compulsory language of teaching for the deaf as stated in the 1996 South African School Act, that a recognised Sign Language has the status of an official language for purposes of learning at a public school (van Herreweghe & Vermeerbergen, 2010).

Even though SASL was acknowledged as the official language of teaching for the deaf, it was not recognised in the Constitution of 1996 and other bodies of law as one of the country's official languages. In 2010 a survey was then conducted on the use of SASL in schools for individuals with a hearing impatient. The survey revealed that of the 47 schools, units, and classes that accommodate learners with various degrees of hearing impairments, only 12 used SASL as the communication and instructional language; however, communication was not always through SASL in actual daily practice (Storbeck & Martin, 2010). Evidently, much

remains to be done to improve the lives of deaf people and the deaf community in the South African context (Storbeck & Martin, 2010); EHDI programmes may be a significant component in this process.

EHDI

The value of early identification and intervention services for infants and children with a hearing impairment is now well-reported in the literature (Olusanya, 2001). These services were first initiated in the 1960s, in America, when neonatal screening for metabolic disorders was expanded to include screening for congenital hearing impairments (Char, 2016). By 1965, health, education and welfare departments were recommending universal evaluation of hearing impairments on a national level (Moodley & Swanepoel, 2015). However, it took a period of 29 years, countless research studies and increasing efficiency and affordability of NHS equipment before implementation of UNHS was realised (Fulcher et al., 2015; Yoshinaga-Itano & Gravel, 2001). Since then, UNHS has become part of government-legislated routine practice in developed countries (Butler et al., 2015), including America, the united kingdom and Australia (Petersen & Ramma, 2015).

UNHS is typically conducted using OAE screening. Popularity for OAE hearing screening is due to the fact that it can be used to detect hearing impairments in newborn infants and children who are too young to cooperate in conventional hearing evaluations because no behavioural response is required (Watkin, 2010). Furthermore, OAEs are highly sensitive to cochlear pathology and in a frequency specific way. They are also very sensitive to minor conductive losses caused by middle ear fluid and ear canal debris in neonates. OAEs on can be detected in up to 98% of humans with normal hearing and are usually absent when there is a

hearing impairment of more than 29-40 dB (Kemp, 2002). OAE hearing screening provides preneural, non-invasive look into the human cochlear, (Abdala & Visser-Dumont, 2001). These factors, together with a recognition of the cost-effectiveness OAE screening measures in early identification of hearing impairments have made OAE hearing screening the most preferred method in NHS (Abdala & Visser-Dumont, 2001; Yoshinaga-Itano & Gravel, 2001). However, both physiological screening measures, OAE) and AABR are recommended for UNHS services (HPCSA, 2007; JCIH, 2007).

UNHS; though, is just the beginning of the journey for infants and their families (Sass-Laher, 2011). The value of early hearing detection of hearing impairments through NHS and UNHS programs is only evident if appropriate intervention is put in place timeously (Petersen & Ramma, 2015).

EHDI Services in South Africa

The South African health care system.

Post-apartheid, South Africa has experienced steady economic growth, and is respected globally for its constitution, which protects the humanity and dignity of all South Africans (Nkonki, Chopra, Doherty, Jackson & Robberstad, 2011). Despite this, South Africa remains the most consistently unequal economy in the world, with pockets of developed contexts in an overall upper middle income developing context (Nkonki et al., 2011; Swanepoel et al., 2009). Compared to other African countries, South Africa has a reasonably developed healthcare sector, but this is also characterized by inequality (Nkonki et al., 2011). Thirteen million (15% of the population) South Africans access the private health care sector, whilst 23 million (85% of the

population) rely on the public sector, which in most cases is less-resourced (Theunissen & Swanepoel, 2008).

Consequently, an estimated 90% of children born in South African have no access to hearing screening services (de Kock et al., 2016). This is despite the high quality audiological training and available infrastructure in some regions to ensure that international best practice standards for EHDI services can be met (Storbeck & Young, 2016). The lack of hearing screening services may be attributed to various factors. In addition to an over-burdened and resource-constrained healthcare system (Khoza-Shangase & Michal, 2014); there is a dearth of evidence originating from the South African context that would justify prioritizing EHDI programmes alongside other competing health, social and economic demands currently experienced by the country (Storbeck & Young, 2016). To date, studies conducted in the South African context have largely focused on the benefits and costs of early hearing detection and have not included outcomes of EI services (Friderichs et al., 2012).

Secondly, there is a shortage of audiologists, especially in the public healthcare sector (Swanepoel & Storbeck, 2008). Most audiologists work in the private healthcare sector, servicing only a minority of the population (Khoza-Shangase & Michal, 2014); also, these audiologists do not represent the linguistic and cultural diversity of the country's population (Pascoe & Norman, 2011). Audiologists working in public sector hospitals report low audiologist-to-patient ratios and heavy clinical service loads (Khoza-Shangase et al., 2010). In acknowledgement of the shortage of audiologists, there has been a move towards using well-trained non-audiologists to conduct infant hearing screenings (Petersen & Ramma, 2015). The HPCSA recommended using nursing staff, community health care workers or lay volunteers as screening personnel, following adequate training. This would ensure the cost-effectiveness of the

EHDI programmes as well as enable audiologists to resume their role as EHDI programme director or diagnostic specialist (HPCSA, 2007). However, studies on the utilisation of screening personnel also report low coverage rates due to already burdened nursing staff (Friederichs et al., 2012). Hence, attention to EI services that promote communication, social and cognitive development has not been a priority (Storbeck & Young, 2016).

Lastly, there is no national legislation that mandates UNHS. Although the principles of EHDI programmes are supported by the Integrated National Disability Strategy White Paper, SASLHA and the HPCSA, it is not mandated or universally included as part of maternal birthing services (Meyer et al., 2012). According to Petersen and Ramma (2015), one lesson that can be drawn from countries that have successfully implemented EHDI programmes is that there has to be support from policy and legislature. However, this is not the case in South Africa (Khoza-Shangase & Michal, 2014). A non-threatening, yet debilitating condition such as a hearing impairment is not receiving the institutional support, research funding and political advocacy it deserves (Swanepoel et al., 2004). As a result, only a limited number of private sector hospitals and an even smaller number of public sector hospitals offer some form of NHS programme (van Dyk et al., 2015).

Infant hearing screening is also not covered by medical aid schemes as part of the ‘birthing package’, which means that parents have to cover the additional costs of the hearing screening, which they are at times unwilling to do (Butler et al., 2015). Scheepers, Swanepoel and le Roux (2014) conducted a study to investigate screen refusal and follow-up default characteristics together with reasons for screen refusal and follow-up default in two South African UNHS programmes. Results of the study indicated that 53% of caregivers across the two hospitals refused the service. A majority 72% of the caregivers indicated that they refused UNHS services

because the costs were not covered by their medical scheme or because the cost was not included in the birthing package. Other reasons given were associated with caregiver knowledge of NHS (64%).

Owing to the above-mentioned factors preventing the implementation of wide-spread early hearing detection screening services, documented research studies have been small-scale and have not encompassed the full diversity of the general South African population (Storbeck & Young, 2016). Despite this, it remains essential to assess outcomes of these EHDI initiatives within the infrastructure of existing early hearing detection programmes. This data is necessary to establish the nature and impact of these EHDI programmes in order to determine a relevant course of action (Swanepoel et al., 2004). Consequently, context-specific research endeavours for the implementation of cost-effective and accountable EI programmes must be undertaken.

EHDI services: South African context versus developed contexts.

Comprehensive EHDI programme implementation is characterized by three stages, firstly, hearing impairments must be identified through hearing screening services. Secondly, the hearing impairment must be confirmed, described and categorized. Lastly, intervention services must be provided (Storbeck & Pittman, 2008). For these services to achieve maximum effectiveness, the services offered must be of high quality and regular frequency, and should aim at minimising the progressive problems associated with the hearing impairment (Reynolds, 2004). In their 2007 position statement, the JCIH outlines the following principles and guidelines in order to achieve maximum effectiveness (JCIH, 2007, pp. 900-901):

- All infants should have access to hearing screening at no later than one month of age.

- Those who don't pass the hearing screening and subsequent re-screening should have an appropriate audiological evaluation to confirm the presence of a hearing impairment at no later than three months of age.
- All infants with a confirmed permanent hearing impairment should receive intervention services before six months of age.
- The EHDI system should be family-centred.
- The hearing-impaired child and family should have immediate access to high-quality technology, including hearing aids, cochlear implants, and other assistive devices when appropriate.

The 2013 supplement to the JCIH 2007 position statement further recommends the following (American Academy of Paediatrics, 2013, pp. 1326-1338):

- All children with a confirmed hearing impairment should have access to timely and coordinated entry into EI programmes.
- All children who are hearing-impaired and their families should experience timely access to service coordinators who have specialized knowledge and skills related to working with hearing-impaired individuals.
- All children who are hearing-impaired from birth to 3 years of age and their families should have EI providers who have the professional qualifications and core knowledge and skills to optimize the child's development and child/family well-being.

- All children who are hearing-impaired with additional disabilities and their families should have access to specialists who have the professional qualifications and specialized knowledge and skills to support and promote optimal development outcomes.
- All children who are hearing-impaired and their families from culturally diverse backgrounds and/or from non–English-speaking homes should have access to culturally competent services with provision of the same quality and quantity of information given to families from the majority culture.
- All children who are hearing-impaired should have their progress monitored every 6 months from birth to 36 months of age for language, mode of communication, social-emotional, cognitive, and fine and gross motor skills.
- All children identified with any degree of hearing impairment and those with a progressive or a fluctuating hearing impairment must receive appropriate monitoring and immediate follow-up intervention services where appropriate.
- Families will be active participants in the development and implementation of EHDI systems.
- All families should have access to other families who have children who are hearing-impaired and who are appropriately trained to provide culturally and linguistically sensitive support, mentorship, and guidance.
- All children who are hearing-impaired and their families should have access to support, mentorship, and guidance from hearing-impaired individuals.

The HPCSA (2007), concurring with the JCIH (2007) and in view of the economic constraints in South Africa, recommends identification, diagnosis and treatment of newborns and infants with disabling hearing impairments as soon as possible, according to the following principles (HPCSA, 2007, p. 10):

- Hearing impairments should be identified by three months of age and no later than four months of age for infants enrolled in clinic-based screening programmes.
- Early intervention services should commence at six month of age and no later than eight months of age for those children enrolled in clinic-based screening programmes.
- All infants who pass the hearing screening but demonstrate risk factors for progressive or late-onset hearing impairments should receive ongoing monitoring by caregivers informed of the risk factors and the communication developmental milestones.
- All infants with a confirmed permanent hearing impairment receive prompt access to assistive devices and intervention services provided within interdisciplinary programmes that are family-centered. With recognition of and respect for cultural beliefs and traditions of families.

Evidently, there are no fundamental differences in the founding principles of EHDI services in developed countries and those in South Africa. However, there is a vast difference in the way these services are implemented in South Africa in order to ensure that the goals of these EHDI programmes are contextually relevant and achievable in our developing context (SASLHA, 2007). Although EHDI programmes are still largely inadequate, outcomes of these programmes need to be comprehensively investigated if South Africa is to implement widespread and systematic EHDI programmes and subsequently improve the quality of life of a multitude of infants born with a hearing impairment (Swanepoel, 2009).

According to recent reports, the average ages of initial identification of hearing impairments in South Africa ranges from 23 to 41 months (Scheepers et al., 2014). Subsequently, ages at hearing aid fitting have been reported between 28 and 39 months, while initial enrolment into an EI programme was between 31 and 43 months of age (Meyer et al., 2014). These results are in stark contrast to reported results of EHDI programmes in developed contexts. Hence, research endeavours of the outcomes of EHDI programmes in the South African context will unintentionally yield results that are different from those widely reported in literature. However, these results will be unique and relevant to EHDI programmes in the South African context and thus provide a launch pad from which EHDI programmes can be implemented across the country (Petersen & Ramma, 2015).

South Africa's approach to EHDI services.

Although UNHS is a standard procedure internationally, there is great concern that the implementation of extensive neonatal audiological screening drives has mainly been limited to the developed context and implementation has not yet been intensified in developing contexts such as South Africa (Khoza-Shangase & Harbinson, 2015). Thus there is a need for exploring practical and culturally-appropriate options in these countries, for early hearing screening (Olusanya et al., 2006). Given South Africa's inherent cultural and linguistic diversity, the HPCSA has recognised the need for contextual and cultural congruency for EHDI programmes to be effective within the South African context (Petrocchi-Bartal & Khoza-Shangase, 2015). Literature review within sub-Saharan Africa indicates paucity of contextually relevant evidence, only countries such as South Africa and Nigeria have published research aspects of EHDI as they apply in varying contexts within the developing context (Olusanya & Okolo, 2006). The dearth

of available information on EHDI services in sub-Saharan Africa reflects a lack of such services in this region (Swanepoel et al., 2009).

UNHS and the subsequent EI for infant hearing impairments is a new practice in South Africa (Moodley & Storbeck, 2015). EHDI services in the South Africa context were only initiated a decade after implementation of such services in developed contexts. Initiation of EHDI services in South Africa was prompted by the release of the World Development Report in 2006 (World Development Report, 2005). According to the report, evidence supports the views that investing in early childhood has large impacts on children's health and readiness to learn and can bring important economic returns later in life, often greater than investments in formal education and training (World Bank, 2005). The following year, in 2007, South Africa hosted the first EHDI in Africa conference which led to the formation of a working group for EHDI services in South Africa (HPCSA, 2007). The working group, also referred to as EHDI, is an umbrella body for all practices concerning early hearing screening, diagnosis and intervention programmes. EHDI promotes NHS programmes and referral to EI programmes to inform, support and empower families of hearing-impaired children (Storbeck & Moodley, 2011). At this time the HPCSA released its hearing screening position statement, providing valuable direction by setting standards where none existed previously (Swanepoel et al., 2004).

Initially, owing to South Africa's financial and social constraints, implementation of NHS programs was adjusted to include the use of Target-based Newborn Hearing Screening[5] (TNHS) (SASLHA, 2007). TNHS denotes a selective screening method based on the presence of established risk factors (Khoza-Shangase & Harbinson, 2015). With TNHS, hearing screening

[5] TNHS was also implemented initially in developed contexts where NHS was conducted on all infants who had identified risk-factors for a permanent infant hearing impairment.

was applied to a target population based on the presence of risk factors for a congenital or early-onset hearing impairment (SASLHA, 2007; Meyer & Swanepoel, 2011). Target populations included newborns such as those who were born in neonatal intensive care units and high care facilities; suffered from postnatal infections such as bacterial meningitis; had experienced head trauma; or had neonatal conditions such as hyperbilirubinemia requiring exchange transfusion, severe hypoxemia, recurrent or persistent otitis media with effusion for 3 months or more, neurodegenerative disorders such as Hunter's Syndrome, sensory motor neuropathies such as Friedriech's ataxia and syndromes associated with progressive hearing impairments such as osteoporosis, neurofibromatosis and Usher's syndrome (SASLHA, 2007).

TNHS was employed as high-risk indicators are evident in approximately 10% of all newborns and are present in approximately 50% of infants with congenital hearing impairments (Swanepoel et al., 2004). However, both SASLHA and the HPCSA recognised the need for the implementation of UNHS as the gold standard of neonatal care (SASLHA, 2007; HPCSA, 2007). Furthermore, although it is well recognised that TNHS may involve significant initial savings, the long-term benefits of early identification of hearing impairments will be severely compromised if a UNHS model is not applied (Yoshinaga-Itano, 2001). Hence universal hearing screening measures are generally preferred (Flynn et al., 2004).

Since then NHS and UNHS services have been implemented in various hospitals and local communities around South Africa (Moodley & Storbeck, 2015; Storbeck & Young, 2016); however, internationally recognised standards have not yet been achieved (Khoza-Shangase & Michal, 2014). Meyer et al. (2014) conducted a national survey of paediatric audiological services for diagnosis and intervention in the South African healthcare sector. Although servicing a minority of the South African population (Dampisa et al., 2009), the private

healthcare sector was identified as having more resources for the implementation of EHDI services than the public healthcare sector; and hence results from such a study would provide baseline information that is essential to planning and coordination of widespread early hearing detection, diagnosis and interventions studies (Meyer et al., 2014).

Results from Meyer et al.'s (2014) study demonstrated earlier diagnosis of hearing impairments at 11 months, and suboptimal ages at hearing aid fitting when the children were older than 24 months. However, due to South Africa's unequal economy, a discrepancy between the screening coverage and access to early hearing detection services has been reported. Access to NHS services is based on whether the child is born in a public or private hospital (Meyer et al., 2014). In a National survey of NHS services in the public and private healthcare sectors, conducted by Butler et al. (2015), results revealed that only 7.5% of public sector hospitals provide some sort of hearing screening which is selectively applied to high-risk infants and only 1% offers UNHS. In the private sector, however, 53% of the hospitals offer some form of hearing screening and only 15% offer UNHS.

In addition to unequal access to early hearing detection services, early post birth discharge is another significant challenge experienced in an effort to provide EHDI services (van Dyk et al., 2015). The world literature on NHS initiatives comes from countries where practically all births take place in a hospital (Oudesluys-Murphy et al., 1996). However, in the South African context, healthy infants are discharged from public sector hospitals or clinics between 6 and 24 hours after birth, despite WHO recommendations that newborns born in healthcare facilities should not be sent home in the crucial 24 hours of life (Ngunyulu & Mulaudzi, 2009). Research has also shown that hearing screening within the first 24 hours may result in false-positive, whereby infants with normal hearing fail the hearing screening. False-positives may be due to patient and

environment-related factors such as collapsed ear canals, presence of amniotic fluid and mesenchyme in the ear canal, as well as excessive ambient noise in the screening environment (van Dyk et al., 2015). The false-positive results may result in unnecessary further tests, more consequential costs and follow-up defaults, amongst others (Olusanya & Bamigboye, 2010).

In order to improve access to NHS services for all newborn infants the HPCSA recommended that nursing staff, community health care workers or lay volunteers be utilized as screening personnel provided they have been trained adequately. Inclusion of additional personnel in EHDI services would ensure that these programmes are cost-effective as well as to enable the audiologist to resume their role as programme director or diagnostic specialist (Petersen & Ramma, 2015). However, infant hearing screening is still commonly conducted by audiologists in the South African context (Khoza-Shangase & Harbinson, 2015). Furthermore, Research studies have report low coverage rates through these platforms due to already burdened nursing staff (Friederichs et al., 2012). Reports have indicated a general complacency and lack of interest regarding infant hearing impairment amongst nursing personnel at immunisation clinics as well as poor level of maternal knowledge of some of the risk factors associated with congenital and early-onset hearing impairment (Swanepoel & Almec, 2008).

In a related study, Petrocchi-Bartal and Khoza-Shangase (2014) investigated the hearing screening procedures and protocols followed in immunisation clinics by interviewing 30 primary healthcare clinic nurses in charge of immunisation clinics in Gauteng and the North-West province. Results of the study revealed that otoscopes were readily available at each consultation room within all the clinics; however, 76% of the participants reported using the otoscope on some babies and only two participants reported not conducting otoscopic evaluations on children under the age of 5 years. With regards to the use of other evaluative methods or instruments,

96.3% reported to conducting other evaluative methods such as reviewing medical records to assess risk for hearing impairments, interviewing caregivers, and conducting examinations of infant responses to environmental sounds incorporating noisemakers and/or verbal stimuli due to a lack of hearing screening equipment as well as not knowing how to conduct hearing screening tests.

Published literature on early hearing detection NHS programmes have evolved over the years, with UNHS currently being the most widely practiced approach in the South African context (Kanji & Khoza-Shangase, 2016). However, differences still exist in the implementation of these programmes nationally, especially between public and private healthcare sectors (Meyer & Swanepoel, 2011). Hence, contextual research is imperative in guiding clinical and contextually relevant practice (Kanji, Furthermore, there is a need of research studies which explore EHDI services beyond identification of the hearing impairment and provision of amplification devices. According to Yoshinaga-Itano and Thompson (2008), provision of amplification devices is only one of the purposes of early identification. Prompt access to EI services should also be prioritised (Meyer et al., 2014). EI services can be offered through various programs, which vary according to the place, age of the child, and the special support the child and the family may need.

Although EI services are the basis for attaining optimal outcomes in hearing impaired infants, historically, they have not been widely available or accessible in South Africa. There are only a handful of available programs and these are spread around the country, hence very little is available to cater for infants and children with a hearing impairment (Swanepoel, 2009). The EI services currently available in the South African context include hospital-based programmes, home-based programmes and center-based programmes (Ackah & Appiah, 2011). Hospital-

based programmes are the most accessible programmes for infants with a hearing impairment and their families. Home-based programmes in the form of HI HOPES, an acronym for Home Intervention Hearing and language Opportunities Parent Education Services, were initiated for infants aged between 0 and six years with a hearing impairment (Storbeck & Moodley, 2011; Storbeck & Young, 2016). However, the HI HOPES programme is only available in three of the nine provinces; Gauteng, Kwa-Zulu Natal and the Western Cape (Storbeck & Young, 2016).

Centre-based programmes, which are the focus of the current study, provide early intervention services in a special educational setting such as hospital complex, special day care center or preschool (Eriks-Brophy et al., 2012). Centre-based programs are believed to be particularly beneficial, as they provide services which include specialized instruction and activities modified for preschool children, as well as related services as needed (Ackah & Appiah, 2011). The specific professionals on the EI team are individualized on the basis of both the child and family needs. Other team members may include, but are not limited to, the pediatrician, neonatal and pediatric nurses, speech-language therapists, audiologists, Ear-Nose-Throat Specialists, physical therapists, occupational therapists, psychologists, and educators (JCIH, 2007; Yoshinaga-Itano, 2013).

The speech-language therapist and audiologist's[6] role in EI spans from identification of hearing impairments to management. Firstly, this role includes an advocacy function where the

[6] In the South Africa context, the audiologist is either dually qualified as a speech-language pathologist and audiologist or they work closely with a speech –language therapist in the management of congenital or early-onset hearing impairments. The Speech-Language Therapist will be responsible for evaluation and management of the hearing-impaired child's speech and language development (SASLHA, 2007).

audiologist motivates for the establishment of the NHS program in all contexts and ensures prompt referral to EI programmes (JCIH, 2007; SASLHA, 2007). For identification, the primary focus for audiological intervention is to provide and manage NHS programmes, by assuring quality assessment, service co-ordination and referral for audiological diagnosis (SASLHA, 2007). This role is expanded to include, audiological treatment and management in the form of provision of comprehensive audiological diagnostic assessments to confirm the existence of a hearing impairment, ensuring parental understanding of the significance of the hearing impairment, timely fitting and monitoring of amplification devices to optimize infants' auditory experiences and fostering auditory foundations for language learning (Moeller, Hoover, Peterson & Stelmachowicz, 2009).

The primary focus of language intervention is to support families in fostering the communication abilities of their infants and toddlers with a hearing impairment (JCIH, 2007). Language development should be commensurate with the child's age and cognitive abilities and should include acquisition of phonologic, morphologic, semantic, syntactic, and pragmatic skills (JCIH, 2007; SASLHA, 2007; Chute & Nevins, 2009). Families also receive information specific to language development and family-involved activities that facilitate language development (HPCSA, 2007); in a culturally congruent environment, taking into account the cultural-linguistic diversity of the South African population (SASLHA, 2007).

Language intervention is usually in the form of Auditory Verbal Therapy (AVT) (Chute & Nevins, 2009), mostly due to parents' choice of spoken language as the primary mode of communication for their hearing-impaired child (AG Bell Academy, 2012), as approximately 97% of hearing-impaired children have at least one hearing parent (Fulcher et al., 2012). AVT is an approach to intervention that emphasizes using the child's residual hearing, through amplification, to develop spoken language (Simser, 1993; Cole & Flexer, 2007). This approach

advocates for early identification of a hearing impairment and use of appropriate amplification devices and technology (Chute & Nevins, 2009). In addition, stimulation of hearing in order for the child to benefit from the critical periods of neurological and linguistic development is encouraged (Cole & Flexer, 2007). Through education, guidance, advocacy, family support, coaching and demonstrations; parents become primary facilitators of their child's spoken language through listening (Chute & Nevins, 2009; Eriks-Brophy et al., 2012; Jeddi, Jafari, MotasadiZarand, 2012). The speech-language therapist and audiologist plays a key role in EI and the education of children with hearing impairments and thus can contribute greatly to the success life course for these children (Brown, 2010).

The Path to Academic Excellence

The role of EHDI services.

Language delays, often associated with a hearing impairment, have also been viewed as an underlying cause of reduced academic performance (Eriks-Brophy et al., 2012). Thus the goal for EHDI, in addition to developing age-appropriate communication abilities, includes providing an opportunity for children with a hearing impairment to develop appropriate school readiness abilities (Harrington et al., 2012). Success in communication and school readiness abilities provides the foundation for children with a hearing impairment to have the same educational opportunities as their hearing peers (Harrington et al., 2012). This reinforces the urgent need for laying a solid foundation in order to ensure adequate development and growth for children with a hearing impairment (Storbeck & Moodley, 2011), thus alleviating the widely reported risk of these children achieving below grade-level standards (Harrington et al., 2012). If the window of

opportunity presented by the early years is missed, it becomes increasingly difficult, in terms of both time and resources, to create a successful life course (Curtin, Baker, Staines & Perry, 2014).

Early childhood development programmes: Building blocks to academic excellence.

The first few years of an infant's life form the foundation on which all future development is built (Storbeck & Moodley, 2011). Accordingly, Early Childhood Development (ECD) programmes have been initiated in various sectors in order to meet the unique needs of the young children (Albino & Berry, 2013). ECD is an umbrella term that applies to the processes by which children from birth to at least six years grow and thrive, physically, mentally, emotionally, spiritually, morally and socially (Education Department White Paper 5, 2001). Global evidence demonstrates that quality ECD programmes provide both immediate and long-term benefits for children and communities as they promote young children's development and the realization of their full potential (Albino & Berry, 2013).

The benefits of ECD programmes also include enhancement of academic performance. This in turn lessens the drain on national resources by reducing school grade repetition and preventing developmental delays (Reynolds & Wolfe, 1997; Tinajero, 2010). These benefits are once more, not realised in the South African context because of poor funding and lack of uniformity in the implementation of policy (Storbeck & Moodley, 2011). There is a lack of mandated policy for provision of ECD services in South Africa. Consequently, less emphasis has been placed on the need for training ECD teachers, which would ensure that this field remains wanting in sufficient substance with regards to the theoretical advancement of the field and the day-to-day support for the infant and family (Storbeck & Moodley, 2011). The Department of Basic Education spends less than 1% of the total basic education budget on learning for children between zero and four

years (Department of Basic Education, 2010), resulting in more than 80% of South African children in the poorest 40% of the population being entirely excluded from these programmes (Richter et al., 2012). Furthermore, disabled children in South Africa are largely excluded from education, owing to the lack of teacher skills to adapt the curriculum to meet their learning needs (Dalton, McKenzie & Kahonde, 2012).

Given the deleterious effect of an undetected hearing impairment on the child's holistic development, the importance of teaching these children pre-academic skills through ECD programmes becomes apparent (Brown, 2010). This is crucial so as to neutralize the great impact of delays in the ECD phase on the child's future development in terms of education, employment and quality of life (Storbeck & Young, 2011). To forgo a greater investment in ECD interventions means compromising the well-being of the child with a hearing impairment and perpetuating cycles of poor academic attainment and inequality (Albino & Berry, 2013).

School readiness as a basis for academic excellence.

Children need to obtain the necessary skills during early childhood to be ready to learn at school entry. These skills, referred to as school readiness abilities, equip a child to participate successfully on entering school (Carlton & Winsler, 1999; de Jager, 2014) and enable the child to learn easily, effectively and without emotional disturbance (Du Plooy, 2003). Although there is no clear statement of what factors constitute school readiness, most researchers in early childhood education agree that in addition to early spoken language abilities, a solid foundation in early literacy, attention skills, and mathematical concepts, among others, support later academic achievement in children (Harrington et al., 2010; Mukari, Ling & Ghani, 2007). Some researchers have reported that young children with hearing impairment may be at risk for not

achieving the necessary school readiness abilities that would enable them to achieve academic success (Marschark, 2007); however, there are only a few studies that have investigated this area (Eriks-Brophy et al., 2012; Harrington et al., 2014).

Harrington et al. (2010) conducted a longitudinal study in order to examine the relationship between childhood factors and school readiness abilities. Childhood factors that were investigated in the study include age at identification of the hearing impairment, enrolment in early intervention services, as well as spoken language abilities and concept knowledge. A group of eight hearing-impaired preschool children with at least two years' enrolment in an EI programme were included in the study. Standardized tests were used to assess the children's language, cognition, and school readiness abilities. Results from the study revealed that children's spoken language abilities are critical for attaining age-appropriate school readiness abilities.

In a related study, Eriks-Brophy et al. (2012) investigated factors that facilitate the integration of children with hearing impairments into mainstream environments. The study looked at aspects of communicative, academic and social functioning of 43 adolescents and young adults who had been enrolled in an EI programme in Ottawa, Canada. The study examined language abilities, academic functioning and self-perception through questionnaires and standardized measures. Results of the study showed that as a group the participants had appropriate communication skills to participate effectively in mainstream environments and that they used spoken language as their primary mode of communication. Results also indicated that 77.8% of the participants had completed high school and were either attending or had graduated from postsecondary education. The 22.2% that did not complete high school also presented with learning disabilities in addition to their hearing impairment.

With the high incidence of childhood hearing impairments, recognition of human rights for children with disabilities and a move towards inclusive education, there is a growing need to prepare children with hearing impairments for formal school education (Harrington et al., 2012). With a better understanding of the needs of children with hearing impairments relating to school readiness abilities, EI professionals can tailor ECD programmes and instruction so that these children can have the same opportunity as others of being well prepared as they enter formal education (Harrington et al., 2012).

Grade 3: a pivotal point to academic achievement.

The South African education system is divided into five phases: Foundation (Grades R-3), Intermediate (Grades 4-6), Senior (Grades 7-9), Further Education and Training (Grades 10-12), and Higher education phases. Grade R, which is the reception year is not compulsory, therefore in some settings, formal education starts in Grade 1 (Revised National Curriculum Statement, 2003). According to Government Gazette 19377 (1998), the statistical age norm for grade 1 is the grade number plus six, thus the child must be turning seven or older by 30 June of the year they are registered for grade 1. During the foundation phase, children are taught the core skills for later learning (Pearson Southern Africa, 2013). These skills, which form part of the revised national curriculum, consist of three learning areas, which are the fields of knowledge in which learners are required to be competent in, namely languages[7], literacy and numeracy (Revised National Curriculum Statement, 2003).

[7] The language learning area includes all eleven official languages and is presented in three parts, each with its own volume: home language, first additional language and second additional language. In a multilingual country like South Africa, it is important the learners reach high levels of proficiency in at least two languages and that they are able to communicate in other languages (Revised National Curriculum Statement, 2003).

Assessment of learning outcomes is based on a rubric as depicted in Table 1 below. The rubric is a scoring guide that evaluates a learner's performance on a range of criteria rather than as a single numerical score. Learners need to obtain an average rating code of 3 to allow for progression to the next grade (Government Gazette 29626, 2007).

Table 1

Assessment rubric used in the foundation phase (Pearson Southern Africa, 2013).

Achievement level	**Academic description**	**%**
7	Outstanding achievement	80-100
6	Meritorious achievement	70-79
5	Substantial achievement	60-69
4	Adequate achievement	50-59
3	Moderate achievement	40-49
2	Elementary achievement	30-39
1	Not achieved	0-29

Although there is a cumulative effect of schooling, with one year building on the next, researchers have found that grade three stands out as a pivotal year for learners' academic career (Holler, 2012). Not only is grade three the end of the foundation phase, it is also the grade in which reading shifts from being about stories to being about information. At this level, reading becomes the foundation for all future learning, with research showing that grade three literacy results are a good predictor of whether a learner will eventually graduate from high school

(Snow, Burns & Griffin, 1998). Thus, weak readers in grade three were found to fall further and further behind during their schooling, thus demonstrating the 'Matthew effect' (Briggs, 2013).

The term 'Matthew effect' was coined by Robert Merton after the Bible verse found in the gospel of Matthew (25:29, King James Version): 'For unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken away even that which he hath." What the Mathew effect tells us is that EI is much more effective than later intervention or remediation. According to Walberg and Tsai (1983), early success in acquiring reading skills usually leads to later successes in reading as the learner grows, while failing to learn to read before the third or fourth year of schooling may be indicative of lifelong problems in learning new skills (Stanovich, 1986). This is because children who fall behind in reading, read less; increasing the gap between them and their peers. Later, when students need to "read to learn" (where before they were learning to read), their reading difficulty creates difficulty in most other subjects. In this way they fall farther and farther behind in school, dropping out at a much higher rate than their peers (Stanovich, 1986).

The development of vocabulary knowledge substantially facilitates reading comprehension, and reading itself is a major mechanism leading to vocabulary growth, which in turn enables more efficient reading (Shany & Biemiller, 2010). There is hence a reciprocal relationship that will drive further growth through reading throughout a person's development (Stanovich, 1986). This is in accordance with several studies which have shown that children with speech and language difficulties at two-and-a-half to five years of age have increased difficulty reading in the primary school years (McLaughlin, 2011).

Without appropriate language and literacy skills, a learner will clearly struggle at school, which would result in poor academic performance. This situation would be exacerbated in a

learner who presents with a hearing impairment (McLaughlin, 2011). Access to education is one of a range of social citizenship rights that are intended to afford members of a society an opportunity to share in a basic level of social, economic, and cultural well-being and to mitigate inequalities (Hill, Baxen, Craig & Namakula, 2012). EHDI programmes ensure that children with a hearing impairment receive appropriate early childhood education, access to quality education and improved academic outcome (Harrington et al., 2012). There is growing recognition of the importance of evaluating EI services for children with a hearing impairment; this evaluation is seen as providing information on accountability, as well as information about whether the goals of EI programmes are being met (Eriks-Brophy et al., 2012). These studies are becoming particularly relevant and important with the growing interest in developing EHDI programmes on the African continent (Swanepoel & Almec, 2008). The current study accordingly investigated the communication and school readiness abilities of hearing-impaired children who were enrolled in early intervention preschool programmes in Gauteng, South Africa.

CHAPTER THREE:

RESEARCH METHODOLOGY

This chapter outlines the research methodology employed in the current study. The research aim and specific objectives of the current study will be presented. Furthermore, a description of the research process and data analysis methods adopted in the current study will also be provided.

Aim

The purpose of this study was to describe the communication and school readiness abilities of hearing-impaired children who graduated from EI preschool programmes in Gauteng, South Africa.

Research Question

What are the communication and school readiness abilities of hearing-impaired children who graduated from EI preschool programmes in Gauteng, South Africa?

Specific Objectives

The following are the specific objectives of the proposed study:

1. To determine the ages at identification of the hearing impairment and ages at commencement of EI services in a group of hearing-impaired children who were enrolled in EI preschool programmes in Gauteng.
2. To describe the nature of EI services provided to a group of hearing-impaired children at EI preschool programmes.

3. To describe the communication and school readiness abilities of a group of hearing-impaired children at graduation from EI preschool programmes.

4. To describe the schooling profile and academic achievement of a group of hearing-impaired children after 3 years of formal schooling.

5. To determine factors that influenced the attainment of age-appropriate school readiness abilities.

Research Design

For the purposes of the current study, a mixed methods approach was used (Creswell, 2009). A mixed methods approach is defined as the combination of 'elements of quantitative and qualitative approaches for the broad purposes of breadth and depth of understanding and corroboration (Wilkins & Woodgate, 2008). The inception of the mixed methods approach is attributed to the field of Psychology when Campbell and Fiske used multi-methods to study the validity of psychological traits (Creswell, 2009). Since then, researchers have been using mixed method research for decades, but it is only recently that it became a prominent method of enquiry (Leech, 2013). According to Clarke et al. (2008), the ability of scientists to understand complex phenomenon is restricted if they limit themselves to one type of research design. Accordingly, the mixed methods approach is a growing method of research for many academics and researchers across a variety of disciplines (Cameron, 2011), including nursing, behavioural sciences and sociology (Terell, 2012); and has been assigned different names including, multi-methods, multi-strategy, multi-methods, mixed methodology or mixed methods (Hussein, 2009).

The mixed methods approach is a product of a pragmatist paradigm that combines the positivist paradigm[8] of quantitative research that has been the cornerstone of social science research and the constructivist or interpretivist paradigm[9] of qualitative research (Terell, 2012). The pragmatist paradigm is the philosophical underpinning of the mixed methods approach. In this paradigm, the researcher uses all the approaches available to understand the research problem. It is not committed to any one system of philosophy and reality, the researcher draws from quantitative and qualitative assumptions when engaging in research (Creswell, 2009). This paradigm opens the door to different worldviews, assumptions and different forms of data collection and analysis (Creswell, 2009).

There are six major strategies of inquiry within the mixed methods approach (Creswell, 2009). For the current study, the researcher adopted the concurrent embedded approach, depicted in Figure 1 below. The concurrent embedded approach consists of one data collection phase during which both quantitative and qualitative data are collected simultaneously (Sukamolson, 2007). During data analysis, one primary method guides the research project and the secondary database provides a supporting role in the procedures as it seeks information at a different level of analysis (Creswell, 2009). For the purpose of this study, qualitative data was embedded within the numerical data obtained from the quantitative aspect of the study (Sukamolson, 2007). The qualitative data yielded a deeper and richer description of the research results and enabled the

[8] The positivist paradigm represents the traditional form of research and represents the traditional notion of the absolute of the absolute truth of knowledge. This paradigm holds a deterministic philosophy in which causes probably determine effects or outcomes. It is also reductionistic in that the intent is to reduce the ideas into a small, discrete set of ideas to test (Creswell, 2009).

[9] Constructivist or interpretivist paradigm is typically seen as an approach to qualitative research. This paradigm relies as much as possible on the participants' views of the situation being studied. The research questions are broad and general so that the participants can construct the meaning of a situation (Creswell, 2009).

researcher to form a robust conclusion and enhance validity through triangulation of various forms and sources of data (Wilkins & Woodgate, 2008).

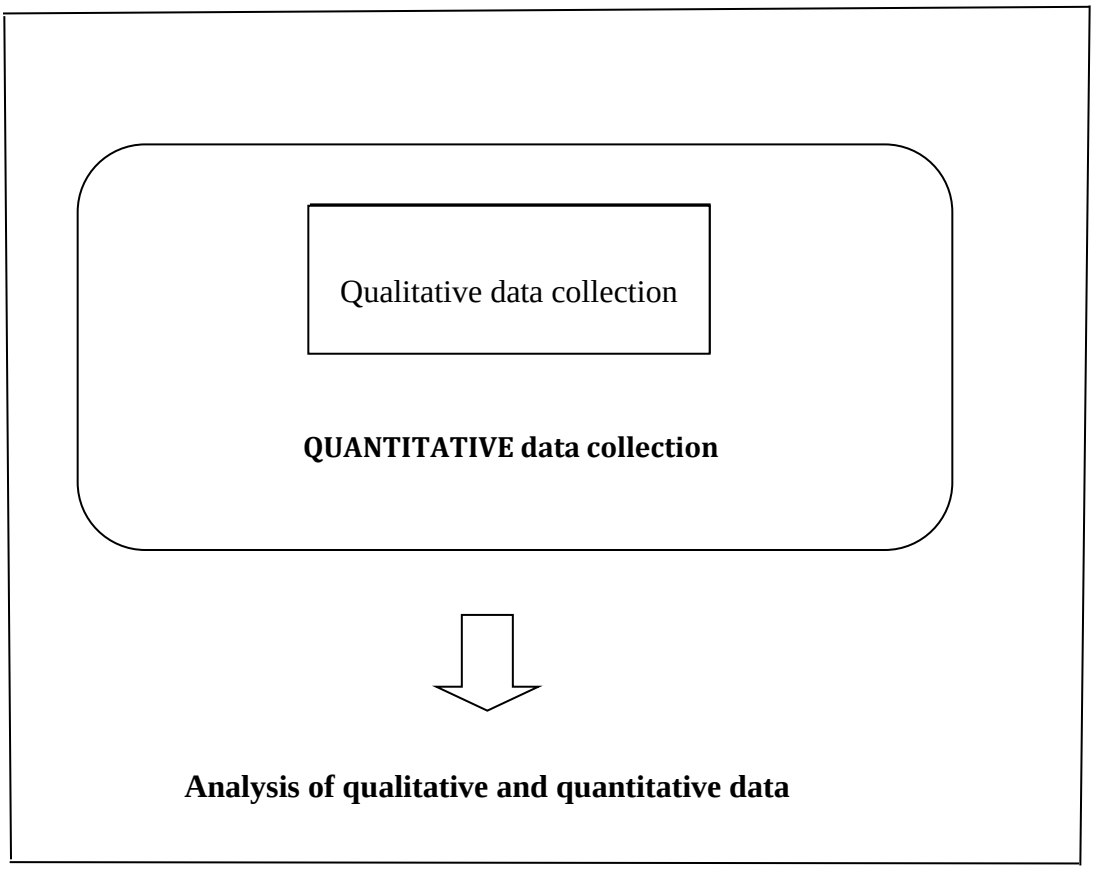

Figure 1. Concurrent embedded mixed methods design.
SOURCE: Adapted from Creswell, 2009

The concurrent embedded mixed methods design enabled the researcher to have the quantitative and qualitative data reside side by side as two different pictures that provide an overall composite assessment of the research phenomenon (Creswell, 2009). On this basis, the research study was descriptive in nature. Descriptive research is a type of non-experimental, observational research which involves the systematic gathering of information about participants for the purpose of understanding some aspects of the characteristics of the phenomenon of interest (Mack, Woodsong, MacQueen, Guest & Namey, 2005). During this type of research,

data is collected about the research participants, but there is no attempt to manipulate the variables being investigated (Seers & Crichton, 2001); thus the researcher achieves a more realistic understanding of the research phenomena (Polit & Beck, 2004). Descriptive research studies are a good way of describing the size of a research phenomenon, and the characteristics of people with the particular research phenomenon being investigated (Seers & Crichton, 2001). These studies also allow investigation of relationships between characteristics of the participants and the research phenomenon (Seers & Crichton, 2001).

Research Context

Two EI preschool centres participated in the current study, The Children's Communication Centre and Whispers Speech and Hearing Centre.

Data was first collected at The Children's Communication Centre in Johannesburg. The Children's Communication Centre is a private preschool that caters for English first-language children who are language and/or hearing-impaired. Its philosophy is that language development is the single best predictor of later school success, hence its focus is on:

> Effectively developing speech, language and communication while promoting the child's development in all other areas. The Children's Communication Centre offers a specialised preschool program to children with hearing impairments and/or language delay with the belief that early intervention, small classes, an in-depth understanding of each child's difficulties and needs, and a close team-based approach are critical to maximising the learning potential of each child. (Annual report, 2011, p. 4).

The preschool also conducted hearing evaluations, hearing aid fitting or cochlear implantation and speech-language services on an out-patient basis. Thus, children are seen from the time the hearing impairment is identified until they enter the full-time preschool programme at the age of three. At the preschool, they are placed in a classroom with a maximum of eight children, except in the case of the advanced group, which may have up to ten children in each class. Classroom placement is in accordance with language ability, while age and other skills, as well as social and emotional development, also serve as guiding factors (Annual report, 2011).

The second EI preschool centre where data was collected was Whispers Speech and Hearing Centre (formerly Carel du Toit Centre) was established in May 1996 in order to offer habilitation services to children with an identified hearing impairment. Whispers Speech and Hearing Centre uses an 'auditory-oral program' and no sign language. The children, who are mainly diagnosed with a moderate to profound hearing impairment, are taught to listen and speak in preparation to entering mainstream education with their peers. The children are taught to gain the optimum use their hearing aids and/or cochlear implants, in order for them to speak and integrate into the world of their hearing peers (Annual report, 2013).

Whispers Speech and Hearing Centre is divided into six classes according to age and spoken language abilities, and each class follows an appropriate nursery school programme. Children enrolled at Whispers Speech and Hearing Centre receive speech-language, occupational therapy, music therapy, as well as gross motor and ball skills therapy on the basis of need. The centre also offers habilitation services to children who live far away from the school and are unable to attend on a daily basis. In these instances, an individualized programme is prepared for each child to be used at home or by the educators at the child's school. A home program is also prepared for parents and caregivers to use as part of their daily interaction with their child.

Parents and caregivers, thus take responsibility along with the speech therapist for teaching the child to speak. The family receives a weekly session with the parent guidance therapist and goes home to continue with the home programme (Annual report, 2013).

Both preschools advocate the use of residual hearing for the development of spoken language. The children receive individual audiological intervention throughout the year as well as speech and language therapy where parental attendance is compulsory.

Participants

Sampling strategy and sample size.

Sampling refers to various strategies for selecting the population for possible observation (Hultsch et al., 2002). Sampling methods fall into two broad categories: probability sampling methods or non-probability sampling methods (Seers & Crichton, 2001). The essential characteristic of probability sampling is that the likelihood that each person will be included in the sample can be specified (Field, Pruchno, Bewley, Lemay & Levinsky, 2006). However, non-probability sampling is a catch-all method of sampling used on the basis of availability of participants and financial constraints that render probability sampling not appropriate (Field et al., 2006; Sink & Mvududu, 2010). In order to obtain a representative sample of hearing-impaired preschool graduates in Gauteng, the researcher utilised a non-probability sampling method, namely, purposive sampling.

Purposive sampling is based entirely on the judgement of the researcher, in that a sample is composed of elements which contain the most characteristics, representative or typical attributes of a population (Strydom & De Vos, 2011). This sampling strategy is optimal when the goal is to

recruit a sample with a relatively low prevalence rate in the general population (Field et al., 2006), and allows the researcher to choose participants that are easily accessible (Jackson, 2009). The researcher deliberately chooses participants based on the characteristics they possess which are relevant to the research study (Jackson, 2009). Due to the fact that purposive sampling is criterion-based, participants of the current study had to meet certain criteria to participate in the study (Patton, 1990).

In purposive sampling, the sample size may not be fixed prior to data collection as it is dependent on the resources and time available (Mack et al., 2005). The sample size is also dependant on theoretical saturation, whereby new data no longer brings additional insight to the research question (Mack et al., 2005). Only 12 of the possible 25 participants identified as possible candidates for the study satisfied the inclusion/exclusion criteria and were thus selected to participate in the current study. Two participants did not consent to take part in the study, thus only ten participants formed part of the study participants. Two of the ten participants were used for the pilot study and the remainder of the eight participants participated in the main study.

Participant recruitment.

The three EI preschool centres available in the Gauteng province were approached for potential inclusion of their former preschool graduates in the current study. In order to gain access to the participants, the researcher obtained written consent from two of the three EI preschool centres, allowing the researcher access to the preschool files such that potential participants for the current study could be identified. Subsequently, a list of all possible participants and their caregivers' contact details was compiled by the researcher. Primary Caregivers of all possible participants were recruited telephonically, subsequent to which informed consent forms were

emailed to them after they had indicated that they were willing to allow the researcher to review their child's preschool records and partake in the research study. Once caregiver consent was obtained, the participants' grade 3 teachers were also recruited telephonically. The researcher emailed informed consent firms to the teachers once they indicated willingness to partake in the research study. The researcher initially contacted the principals of the primary schools the participants were enrolled in. This was done in order to obtain consent to involve the grade 3 teachers in the study. However, the first three principals indicated that the researcher only needed to obtain the consent from the relevant grade 3 teacher as they had no reservations with the study being conducted. Hence the researcher only obtained consent from the grade 3 teachers and not from the principals of the various schools. The researcher, did however, determine the need to obtain consent from the remainder of the five grade 3 teachers, who all indicated that their informed consent was sufficient for them to complete the questionnaires.

All data collection was done in 2013.

Selection of participant files.

Once informed consent had been obtained from the primary caregivers, the researcher conducted a retrospective review of the preschool files to identify all the participants meeting the criteria prior to obtaining informed consent from the prior to obtained informed consent from the grade 3 teachers. The inclusion criteria is outlined below.

Inclusion criteria.

Participants had to meet the following criteria in order to be suitable candidates for the current study:

- Participants had to present with a diagnosis of a bilateral, moderate hearing impairment or greater, unaided.

  Children with a congenital, bilateral hearing impairment are at an increased risk of speech and language delays compared to their hearing peers extending from early childhood to school age (Vohr et al., 2012); studies of children with a permanent hearing impairment have also reported that moderate or greater degrees of hearing impairments can have significant effects on language, speech, academic, social-emotional development and social inclusion (JCIH, 2007; Eriks-Brophy et al., 2012).

- Participants had to be fitted with amplification devices such as, hearing aids and/or cochlear implants, in order to compensate for the hearing impairment. This criterion is based suggestion by researchers that children enrolled in EI programmes who use amplification devices have the potential to receive the necessary linguistic information to reach speech and language competencies similar to their hearing peers (Harrington et al., 2010).

- Participants had to have graduated from the EI preschool centre between 2008 and 2009 to be included in the current study. The year of graduation was chosen based on the assumption that through normal progression through the schooling system, participants would have completed the foundation phase level of formal schooling, which would have allowed the researcher to obtain data related to the participants academic achievement during the first three years of formal schooling, thus providing a comprehensive picture of thee outcomes being investigated.

The foundation phase of formal schooling, grades1-3, lays the groundwork for all future, formal learning. It's a structured, systematic arrangement of activities that promote the attainment of literacy, communication skills, numeracy/mathematical development and life skills (Revised National Curriculum Statement, 2003).

Exclusion criteria.

Participants with the following factors were excluded from the current study:

- Participants who presented with co-morbidities such as a cognitive impairment in addition to the hearing impairment.

  A cognitive impairment was viewed by the researcher as a risk condition because it is associated with learning difficulties (Strasheim, Kritzinger & Louw, 2011; Woodfield, 1999).

  The presence of a cognitive impairment was determined by reviewing the preschool files of potential participants. These files contained an admission form with a designated section where the presences of co-morbidities such as a cognitive impairment were recorded.

Ethical Considerations

Research ethics deals primarily with the interaction between researchers and the participants (Mack et al., 2005). Ethical principles were employed in the current study in order to ensure appropriate conduct of the researcher, as well as to establish a basis for trust between the

researcher and the respondents of the current study (Mack et al., 2005). In addition to obtaining ethical clearance from the University of Witwatersrand Research Ethics Committee prior to commencement of the study (Appendix A: Protocol number: M130240), ethical principles such as respect for communities and persons, and participants' right to confidentiality and privacy were observed when the study was conducted.

Respect for communities and persons requires a commitment to ensuring the autonomy of research participants (British Psychological Society, 2010). This aspect was achieved through informed consent. Information letters and consent forms were formulated for the participants' EI preschool centres, primary caregivers and grade 3 teachers in order for the researcher to ensure that participants had an understanding of what participating in the study entailed so they could decide in a conscious, deliberate way whether they wanted to participate (Mack et al., 2005). All the information letters outlined the topic, objectives, potential benefits and risks of the study. Informed consent was obtained in the following manner:

- Permission to conduct research at the two EI preschool centres was obtained. Written consent to conduct the research study at The Children's Communication Centre was obtained from the governing body, which is responsible for overseeing all activities at the preschool. Written consent to conduct the research study at the Carel Du Toit Centre was obtained from the preschool's principal. Consent to conduct the research study was obtained from both preschool centres prior to commencement of the pilot study (Appendix B).

- Informed consent to review participants' school files and participate in the study was obtained from the primary caregivers (Appendix C).

- Informed consent to participate in the study was also obtained from participant's school principal (Appendix E) and grade 3 teachers (Appendix D).

In order to uphold participant's rights to confidentiality and privacy, the participant's identity was kept anonymous. The researcher was able to keep participants anonymous by ensuring that data recording forms and questionnaires did not include any identifying information and are kept in a secure area with limited access, in the researcher's possession. Anonymity essentially means that participants will remain anonymous throughout the study, even to the researcher (APA, 2003). Anonymity was ensured by using a participant reference number instead of the participant's names. Furthermore, principles of beneficence and justice as informed by bioethics were adhered to throughout the conduction of the current study (SASLHA, 2010). Beneficence requires a commitment to minimizing the risks associated with research and maximizing the benefits that accrue to research participants and the wider community. The researcher utilized a research design that minimized the possibility of harm to the patients and obtained approval from the University of Witwatersrand Research Ethics Committee prior to commencement of the study. In addition, the research was conducted in a field where there is limited research available in the South African context, thus ensuring that the research is beneficial to the wider community of children with congenital or early-onset hearing impairments. Justice, on the other hand, requires fairness and equity in research. Justice requires inclusiveness of individuals or groups in the research studies and ensures that individuals or groups are not excluded on the basis of attributes such as culture, language, gender, race, ethnicity, age and disability; unless there is a basis for such an exclusion. For the purpose of the current study, the researcher ensured justice through the use of non-probability sampling.

Methods of Data Collection

Due to the mixed methods approach of the current research study, the researcher collected both forms of quantitative and qualitative data for the purpose of integrating the information in the interpretation of the overall results (Creswell, 2009). Thus, the researcher employed three methods of enquiry; retrospective file review, self-administered caregiver questionnaire and teacher questionnaire.

Retrospective file review.

A retrospective file review allows the researcher to use existing data that has been recorded for reasons other than research (Hess, 2004). It is a relatively inexpensive way to research the rich, readily accessible existing data; allowing the study of rare occurrences (Hess, 2004; Zampi et al., 2012). Retrospective file reviews are valuable in research studies with a limited population and for clinical questions that are difficult to answer (Zampi et al., 2012). A retrospective review of preschool files consisting of written and printed material was undertaken to gather demographic, audiological, communication abilities, school readiness abilities and early intervention service information that were analysed in this study. Communication abilities included the receptive and expressive language, and speech intelligibility scores recorded in the EI preschool files. The communication abilities recorded for the purpose of the current study were the last available speech-language assessment results recorded prior to the participants' graduation from the EI preschool programme. Retrospective file review was attractive to the researcher as a method of enquiry because it is largely unobtrusive and it provided the researcher with larger amounts of existing data for analysis (Berger et al., 2009). However, the researcher experienced some

limitations with this method of enquiry. The limitations included accuracy of the data recorded in the files as well as incomplete or missing entries of data in the files (Zampi et al., 2012).

Self-administered caregiver and teacher questionnaires.

Newly constructed questionnaires that were to be self-administered were used in the current study. Self-administered questionnaires are characterised by respondents filling out the questionnaires themselves (Mack et al, 2005). This method of data collection was chosen as it enabled the researcher to reach people who are spread across a wide geographical area and enabled the respondents to complete the questionnaires in their own time (Munn & Drever, 1999). The disadvantage of using questionnaires was the low response rate, which required follow-up from the researcher for the respondents to complete the questionnaires (Mack et al., 2005). According to literature, another disadvantage of questionnaires is that the researcher cannot ascertain if the respondents understood the questions being asked (Oppenheim, 1992; Munn & Drever, 1999); however, this disadvantage was reduced to some degree by the researcher providing carefully worded prescriptions at the level of understanding of the target population to be reached (Fouche, 2011). Furthermore, the researcher conducted a pilot study using both questionnaires. According to Fouche (2011), it is essential that newly constructed questionnaires be thoroughly pilot tested before being utilized in the main investigation. This ensures that errors of whatever nature can be rectified immediately, before presenting the questionnaire to the full sample.

The information obtained from questionnaires can also be limited (Oppenheim, 1992), thus the researcher employed a variety of response systems in order to obtain the desired information (Mack et al., 2005). The response systems employed included closed-ended, open-ended,

multiple choice and matrix-type questions. Closed-ended question give the respondent an opportunity of selecting one or more response choices from a number provided to them. An advantage of closed-ended questions is that respondents understand the meaning of the question better (Fouche, 2011). With open-ended questions, the respondent is given an opportunity of writing any answer in the open spaces. This enables the researcher to explore the research phenomenon better (Fouche, 2011). Multiple choice questions were used to obtain information which can be logically divide into hard and fast categories. With multiple choice questions, the respondent is offered two or more options to choose from (Fouche, 2011). Lastly, matrix-type questions were used, which allowed the researcher to obtain related information simultaneously through a single question (Fouche, 2011). The researcher included the various sections in both the caregiver and teacher questionnaire based on the information required to answer the research question as well as the research study's objectives.

The Caregiver questionnaire was worded in English and comprised of three sections. Section A was related to family demographics. This section was made up of multiple-choice questions pertaining to ethnicity, caregiver's highest qualification, economic status and the size of the household that the participant lived in. Open-ended questions were used to probe the relationship of the different family members within the household as well as family history of hearing impairments, speech-language difficulties and other disabilities. Section B was related to the participant's background information. Multiple-choice questions were used to obtain information pertaining to ethnicity and gender; while open-ended questions were used to obtain information pertaining to home and additional languages, neonatal details, developmental milestones as well as information pertaining to the hearing impairment such as age at identification and provision of amplification devices as well as age at commencement of EI services. Matrix-type questions were also used to obtain information pertaining to the

participant's medical history. Finally, section C was related to participant's schooling history. Both matrix-type and open-ended questions were used in this section. Matrix-type questions were used to obtain information pertaining to the schools (including preschools) that the participant had been enrolled in, the year, grade and reasons for leaving the school, where applicable. While the open-ended questions were related to the participant's general academic performance.

The grade 3 teacher questionnaire was also worded in English and only comprised of two sections. Section A pertained to the participant's academic record at the end of grade 3, which was obtained through matrix-style questions. While section B included open-ended questions also pertaining to the participant's academic performance.

Data collection procedures.

The researcher conducted retrospective file reviews over a period of three weeks at both EI preschool centres. The researcher was not permitted to remove the files form the preschool facilities, thus the desired data was recorded at the preschools in an Excel spreadsheet in such a way that the participants could not be identified by using participant reference numbers. Information obtained from the files include case history, information pertaining to identification, provision of amplification devices and EI services; assessment reports and therapy progress by EI professionals, academic achievement and general performance at the preschool. The information obtained in the files was recorded in English; however there were three assessment and progress reports that were recorded in Afrikaans for which the researcher made use of Google Translate to translate the Afrikaans entries into English.

During the retrospective file review, the researcher emailed the Caregiver questionnaires to participants' caregivers and obtained the grade 3 teacher's contact details. Subsequent to which the grade 3 teacher questionnaire was emailed to them for completion. Both caregivers and teachers were given a period of a month to complete the questionnaires and email them back to the researcher. The researcher did not receive any completed questionnaires after a month of the questionnaire being sent to both caregivers and teachers, thus the researcher sent an email with the questionnaire attached to remind them to complete the questionnaire and email it back to the researcher. Subsequent to this the researcher received completed questionnaires from five caregivers and six teachers after two weeks of the reminder being sent. When the researcher had not received the remainder of the questionnaires after a month of sending the reminder, the researcher contacted the caregivers and teachers telephonically to again remind them to complete the questionnaires and email them back to the researcher. This resulted in the researcher receiving the completed questionnaires from two of the three caregivers and both teachers within the stipulated two-week period. Once the two-week period had lapsed, the researcher contacted the remaining caregiver telephonically to once again remind her to complete the questionnaire and email it back to the researcher.

The caregiver indicated her inability to complete the questionnaire due to her busy schedule and proposed a date and time whereby the researcher could contact her and she would be able to complete the questionnaire telephonically. The researcher contacted the caregiver as agreed on Saturday, 12 October 2013 at 19:00 whereby the caregiver provided information pertaining to the questionnaire over a duration of a 30 minute telephone call.

Pilot Study

A pilot study is defined as a 'small study' used to help design a further confirmatory study (Arain, Campbell, Cooper & Lancaster, 2010). It is a version of the main study that is run on a smaller scale to test whether the components of the main study can all work together (Thabane et al., 2010). Thus, a pilot study was conducted using participants and participant files that were excluded from the main study. Participants presented with similar characteristics to the main study sample; this was done in order to validate the techniques that were to be used in the main study as well as to identify modifications or additions that needed to be made in the design of the study prior commencement of the main research study (Arain et al., 2010).

The pilot study was conducted on two participants who met the inclusion criteria, with the exception that they graduated from the EI preschool centres in 2010 and would not have completed grade 3 during data collection.

Pilot study participant one.

Participant description.

Pilot study participant one was diagnosed with a bilateral, profound hearing impairment at 12 months of age, following suspicion by her grandmother that she may present with a hearing impairment. Her grandmother suspected that she had difficulty with hearing, as she did not respond when called or spoken to. Subsequent to the diagnosis, she was fitted with hearing aids bilaterally at two years of age and received a cochlear implant in the right ear within a few months of receiving the hearing aids.

Pilot study participant one was enrolled at the EI preschool programme for two years, until graduation from the preschool centre. She was enrolled in grade 1 at St Vincent's School for the

Deaf in 2013. However, she repeated grade R at St Vincent School for the Deaf “so she could learn Sign Language”.

Procedures.

The Caregiver and grade R teacher completed the caregiver questionnaire and teacher questionnaires respectively. The caregiver completed the questionnaire over a telephonic interview with the researcher as she found it easier than completing the questionnaire and sending it back to the researcher at a later stage. The telephonic interview lasted for twenty minutes. The grade R teacher completed the questionnaire and emailed it back to the researcher in a period of two weeks.

Findings and research alterations.

The mother of pilot study participant one did not experience any difficulties answering the questions in the questionnaire and therefore did not require re-phrasing or elaboration of the questions. However, she had difficulty providing specific dates or times for occasions such as the day of the cochlear implantation, and information pertaining to the childhood illnesses that the participant had suffered from, stating that she could not remember. The only reservation she expressed was answering the question related to her occupation, stating that it was highly personal and that she did not see how it was relevant to the research study. The researcher indicated the relevance in this context of the education level, occupation and socio-economic of the caregiver or caregivers, and she responded by giving the field in which she worked in instead of her occupation.

The researcher concluded that, on the basis of the results of pilot study participant one, it was not necessary to alter the questions in the questionnaire; however, a provision was made in the research study that should participants express reservations about providing specific details about their occupation; the field in which they work in conjunction with the highest educational qualification is sufficient for the purpose of this current research study.

Due to pilot study participant one's mother having difficulty with finding time to complete the questionnaire and sending it back to the researcher, the researcher decided to provide an option for caregivers to be contacted at a convenient time in order to complete the questionnaire telephonically. Pilot study participant one's teacher; however, was able to complete the questionnaire and send it back to the researcher via electronic mail without any difficulties. The questions in the questionnaire were therefore not altered.

Pilot study participant two.

Participant description.

Pilot study participant two was diagnosed with a bilateral, profound hearing impairment at 18 months of age, after his paediatrician recommended that he undergo a hearing evaluation because he presented with a family history of hearing impairments. His older brother, who is part of the main study, also presents with a hearing impairment. Pilot study participant two started receiving speech-language therapy and occupational therapy services soon thereafter and was fitted with hearing aids, bilaterally.

He was enrolled at the Carel du Toit Centre until graduation in 2011. He was placed in a remedial school where he repeated grade 1 in 2013.

Procedures.

Pilot study participant two's mother and grade 1 teacher completed the caregiver and teacher questionnaires, respectively.

Pilot study participant two's mother also completed the questionnaire over a telephonic interview with the researcher due to time constraints on her side. The telephonic interview lasted for twenty five minutes. However, the teacher completed the questionnaire and the researcher collected it at the school.

Findings and research alterations.

The findings for pilot study participant two were the same as those obtained from pilot study participant one with the exception that pilot study participant two's mother did not have any reservations with disclosing her occupation.

Thus, the questions in both the caregiver and teacher questionnaires were therefore not altered. However, participants were given an option to complete the questionnaire via a telephone interview at a convenient time or having the researcher collect the questionnaires after caregivers or teachers had completed them.

Reliability and Validity

Evaluating the quality of research is essential if findings are to be utilised in practice and incorporated into care delivery (Noble & Smith, 2015). This is achieved through detailing the reliability and validity procedures used in the study (Noble & Smith, 2015). Reliability refers to the repeatability of the research findings, it examines the stability or consistency of the responses obtained in the study (Creswell, 2009). While, validity denotes the extent to which a measurement is well founded and corresponds accurately to the real life. It determines whether the research study truly measured what it was intended to measure, or how truthful the research results are to the real world (Golafshani, 2003). Validity refers to the trustworthiness, authenticity or credibility of the study's findings (Creswell, 2009).

Reliability and validity do not carry the same connotations in quantitative research as they do in qualitative research, thus it is the researcher obligation to attend to the reliability and validity aspects in both the quantitative and qualitative aspects of the study (Creswell, 2009). Hence, reliability and validity were explored separately for the quantitative and qualitative aspects of the current study.

Reliability and validity for quantitative aspects of the study.

Reliability.

Reliability entails a discussion pertaining to the repeatability of the study's findings. Whether there was consistency in the manner in which the instruments were administered and interpreted (Creswell, 2009). The researcher ensured reliability for the quantitative aspect of the current

study by conducting the main study in the same manner as the pilot study which was used to ensure that the findings of the current study were reliable (Van der Riet & Durrheim, 2006).

Validity.

Validity for quantitative aspects of the study was also established through conduction of a pilot study in order to determine whether the items in the questionnaires measured the content they intended to measure (Creswell, 2009). After conducting the pilot study, the researcher made alterations to the questionnaires as necessary. Minor alterations were made to the questionnaires on the basis of the results of the pilot study as outlined in the "pilot study" section above.

Reliability and validity for qualitative aspects of the study.

Dependability.

Reliability in qualitative research indicates that the researcher's approach is consistent across different researchers and different projects (Gibbs, 2007), it refers to the authenticity or credibility of the findings (Creswell, 2009). Although it is not possible to give an exact calculation of reliability for the data collection methods utilised in the current study, an estimate of reliability was achieved through the following reliability procedures as outlined by Gibbs (2007). The researcher employed the following two reliability procedures. Firstly, the researcher checked the information obtained from the file review to make sure that there were no obvious mistakes made during data collection. Secondly, the researcher ensured that there was no shift in

the meaning of the codes used during the process of coding the qualitative data. The researcher achieved this by constantly comparing the data with the pre-determined codes (Creswell, 2009).

Trustworthiness.

Validity in qualitative research means that the researcher checks for the accuracy of the findings (Gibbs, 2007). It is based on the application of the research methods and the precision with which the findings accurately reflect the data (Noble & Smith, 2015). Validity in qualitative research is commonly referred to as trustworthiness and is the most widely used criteria for evaluating qualitative content and aims to support the argument that the researcher's findings are "worth paying attention to" (Elo et al., 2014). The researcher ensured trustworthiness of the study's findings through the use of multiple strategies.

Firstly, the researcher triangulated data from different sources and used it to build a coherent justification when interpreting data (Creswell, 2009). Triangulation is broadly referred to as the use of multiple methods in studying the same phenomenon for the purpose of increasing study credibility (Hussein, 2009). Through triangulation, the researcher reveals the complementarity, convergence and dissonance among the study's findings (Hussein, 2009). Secondly, the researcher used rich, thick descriptions of the qualitative data in order to provide many perspectives about the research phenomenon, thus providing a richer and more realistic description of the research findings (Creswell, 2009). In addition, the researcher used verbatim citations to increase the trustworthiness of the study (Elo & Kyngas, 2007), thus reflecting the participants' voices and not the researcher's bias, motivations or perspective (Elo et al., 2014).

Furthermore, the researcher provided clarity of the bias the researcher may have brought to the research study. According to Creswell (2009), reflectivity is a core characteristic of qualitative research. Good qualitative research contains comments by the researcher about how their background such as gender, culture and history may have shaped their interpretation of the findings of the study. At the beginning of the dissertation, in chapter one, the researcher provides a self-reflection of the motivation to conduct a research study in the field of EHDI programmes in the South African context.

Data Analysis

Since the current study employed a mixed methods approach, both qualitative and quantitative measures were used to analyse the data (Creswell, 2009). Data analysis for the quantitative and qualitative aspects of the current study are discussed below.

Quantitative data analysis.

Due to the descriptive nature of the current study, the quantitative data was analysed using descriptive statistics. Descriptive statistics are simply the numerical procedures or graphical techniques used to organise and describe the characteristics of a given sample (Fisher & Marshall, 2009; Marshall & Jonker, 2010). Descriptive statistics do not involve generalizing the study's findings beyond the data at hand and are used to present quantitative descriptions in a manageable form, thus reducing lots of data into a simpler summary (Turnstall, 2016). Data was analysed according to two major characteristics, namely, measures of dispersion and measures of central tendency (Creswell, 2009).

Measures of dispersion indicate the distribution of the individual values or range of values of a data set (Thompson, 2009). The measure of dispersion used in the current study was frequency distribution. Frequency distribution is based on the distribution of the data (Shi & McLarty, 2009). It involves organising raw data into ungrouped and grouped data and offering a description of the number of participants in each possible option (Thompson, 2009).

In addition, measures of central tendency were used to analyse the quantitative data. Measures of central tendency indicate the middle and commonly occurring points in a data set. The three main measure of central tendency, mode, median and mean were used (Shi & McLarty, 2009). The mode is the value most frequently occurring within the data set. The mode is important for describing a data set when one value occurs frequently, and it is not affected by extreme values (Spriestersbach, Rohrig, du Prel, Gerhold-Ay & Blettner, 2009). On the other hand, the median is the value that is in the exact middle of the sample when the measurements are arranged in order of magnitude and the mean is the average of the dataset (Thompson, 2009).

Qualitative data analysis.

Data analysis for the qualitative data was conducted in two ways. Firstly, the researcher recognized that each of the participants were unique and had had unique experiences within the EI programme. The researcher therefore incorporated these unique experiences of the participants to explain the quantitative data (Driscoll, Apiah-Yeboah, Salib & Rupert, 2007). The researcher employed this approach in order to identify what works and under what circumstances (Creswell, 2009). Also taking into account the pragmatism paradigm under which the study was conducted, the researcher used the respondents' words verbatim where applicable (Driscoll et al., 2007).

Secondly, the researcher used content analysis, which is one of the methods available for analysing qualitative data and its meaning (Elo et al., 2014). Content analysis is defined as a systematic, replicable technique for compressing many words of text into fewer content categories based on explicit rules of coding (Stemler, 2001). Its aim is to attain a condensed and broad description of the phenomenon, and the outcome of the analysis is concepts or categories describing the phenomenon (Elo & Kyngas, 2007). Content analysis can be used inductively or deductively (Stemler, 2001). During inductive content analysis, there is not enough former knowledge about the phenomenon, thus categories are derived from the data. However, deductive content analysis is based on an earlier theory or model and therefore it moves from the general to the specific (Elo & Kyngas, 2007). For the purpose of the current study, deductive content analysis was used. During deductive content analysis, predetermine codes and categories were developed based on existing theory. These codes were then applied to the data (Creswell, 2009). Revisions were made where necessary, and the categories tightened to the point that maximised mutual exclusivity and exhaustiveness (Stemler, 2001). Codes are words or short phrases that symbolically assign a summative, salient, essence-capturing, attribute for a portion of language-based data (Saldana, 2008). These codes are then arranged according to categories, which are groups of words with similar meanings or connotations (Stemler, 2001).

Deductive content analysis was conducted according to the following steps as outlined in Elo and Kyngas (2007):

Step 1: Organizing and preparing the data for analysis. This involved sorting and arranging the data into different types according to the source of the data.

Step 2: Reading through the data. This was done in order to obtain a general sense of the information and to reflect on its overall meaning

Step 3: Developing a categorisation matrix and coding the data according to the categories. The categorisation matrix used for the current study is depicted in Table 2 below.

Step 4: This step is also referred to as testing categories, concepts, models or hypotheses. This involves reviewing the data for content and code for correspondence with the identified categories. Only aspects that fit the matrix of analysis are chosen from the data.

Step 5: The final step in data analysis involved interpreting or making meaning of the data.

Table 2

Categorisation matrix

	Early access to EHDI services	Age-appropriate school readiness abilities
What factors influenced the attainment of age-appropriate school readiness abilities?		

CHAPTER FOUR:

RESULTS

This chapter reports on the findings of the current study. The results are presented in relation to the specific aims of the study; with a discussion of the findings offered in the next chapter. Results pertaining to age of identification of the hearing impairment and age at which EI services commenced are presented first. These are then followed by descriptions of the nature of EI services received by the participants; communication and school readiness abilities of the participants; and the description of their schooling profile and academic achievement after three years of formal schooling. Finally, factors that influenced the attainment of school readiness abilities for participants in the current study will be shared.

Demographic Information

Demographic profile of participants.

Eight children, identified with a hearing impairment, and enrolled in an EI preschool programme participated in the current study. Initially a list of 25 possible participants who had graduated from the EI preschool programmes between 2008 and 2009 was obtained from the EI preschool centres. A file review of all possible participants was conducted and subsequently invited to participate in the study. Once informed consent was obtained, the researcher identified participants who met the inclusion criteria, following which ten participants were identified and included in the main study. However, only eight participants met the inclusion criteria, thus reducing the sample size. The sample comprised of four males and four females, ranging in age from 9.7 to 12.7 years, with a median age of 11.1 years. Six of the participants were white and two were coloured. Four of the participants had been enrolled at The Children's Communication Centre and the other four had been enrolled at Whispers Hearing and Communication Centre for their preschool education.

Table 3 outlines participants' profiles. Participants' ages at graduation from the EI preschool centres ranged from 5.2 to 7.7 years, with a median age of 6.4 years. Participants had been enrolled in the EI preschool programmes for periods ranging between two and five years, with a mean of three years. The participants were enrolled in grades 3, 4 and 5 in 2013 when data collection was conducted.

Table 3

Participant profile

Participant No.	**Gender**	**Age (years. months)**	**Grade**	**No. of years at EI preschool**	**Age at graduation from EI preschool (years. months)**
1	Female	9.9	4	3	5.2
2	Male	10.8	3	2	6.3
3	Male	11.7	3	3	7.0
4	Female	10.9	3	4	6.2
5	Male	9.7	4	2	5.0
6	Female	12.7	5	5	7.0
7	Female	10.3	4	1	6.8
8	Male	12.5	5	5	7.7

Detailed description of participants.

Participant 1.

D.O.B: 15/09/2004 **Age:** 9.9 years

Gender: Female **Race:** Coloured

Participant 1 lives with both her parents and her home language is Afrikaans. Her medical history was significant for gastro-enteritis at the age of four months for which she was hospitalized for five days. She reportedly said her first word at nine months; however she only produced two-word utterances at seven years of age. No significant case history information was provided to explain the delayed speech development milestones following age-appropriate production of the participant's first word.

In 2013, she was in grade 4 at a School for the Deaf in Cape Town. Participant 1 and her family relocated to Cape Town at the end of her preschool years. Her parents were reportedly advised to enrol her at a School for Deaf.

Participant 1's caregiver questionnaire was completed by her mother who is a studying full time and has a post-matric certificate/diploma.

Participant 2.

D.O.B: 15/08/2003 **Age:** 10.8 years

Gender: Male **Race:** White

Participant 2 lives with his adoptive grandmother and two siblings. His home language is English. His medical history is significant for drug exposure in-utero. After his birth, he stayed in

hospital for a period of a week while waiting for his grandmother to fetch him, because it had been decided that his mother was not fit to take care of him.

Participant 2 was diagnosed with mumps at three years of age, and recurrent ear infections once or twice annually, especially if he had been swimming. His speech-language development was reportedly delayed, as he produced his first word at two years. In addition to the hearing impairment, he was diagnosed with Oppositional Defiance Disorder (ODD). ODD is defined as a persistent pattern of negative, hostile, defiant and disobedient behaviour towards others (Lindheim, Bennett, Hipwell & Pardini, 2015). His older sister and younger brother were also reported to present with behavioural difficulties. His sister is reported to suffer from moodiness and defiance while his younger brother is reported to suffer from anxiety and depression. Drug abuse in-utero is also suspected in their cases.

Upon identification of his hearing impairment, participant 2 was taken out of the preschool he was enrolled in and was enrolled in a preschool programme at a School for the Deaf for three months. While at school, he was referred to an EI preschool centre because he “had too much speech and thus needed an ‘oral’ school.

In 2013, he was in grade 3 in a school that caters to children with special needs in Johannesburg. He repeated grade 1 in 2011 because “he was not coping academically”.

Participant 2’s caregiver questionnaire was completed by his grandmother who is a customer relations officer at a bank and has a post-matric certificate/diploma.

Participant 3.

D.O.B: 15/09/2004 **Age:** 11.7

Gender: Male **Race:** White

Participant 3 lives with his parents, younger brother and helper, and his home language is English. He was intubated at birth because he swallowed the amniotic fluid and his lungs had to be drained. As a result, he spent two days in the Neonatal Intensive Care Unit (NICU). His medical history is also significant for bronchitis and whooping cough. Speech milestones were reportedly age-appropriate.

In 2013, he was in grade 3 at a remedial school in Pretoria. He repeated grade R in 2008 due to his speech delay.

Participant 3's caregiver questionnaire was completed by his mother who is a merchandiser and has a baccalaureate degree.

Participant 4.

D.O.B: 19/09/2003 **Age:** 10.9

Gender: Female **Race:** White

Participant 4 lives with her mother and step-father, and her home language is English. Her medical history is significant for Pneumococcal (Streptococcus) meningitis at 15 months of age for which she was hospitalised for four weeks. She also suffered from bronchitis, croup and pneumonia. Her speech development was reported to be age-appropriate until the age of 15 months when she contracted meningitis.

In 2013, she was in grade 3 at a mainstream school in Johannesburg. After graduating from the EI preschool centre, she was enrolled in grade 1 at a remedial school in 2010. On the basis of her academic performance, it was then recommended that she be enrolled in a mainstream school. In 2011 she was enrolled in a mainstream school where she repeated grade 1 because her mother felt that "it was important to ensure that she obtained proper grounding".

Participant 4's caregiver questionnaire was completed by her mother who is a "house-wife and has a post-matric certificate/diploma.

Participant 5.

D.O.B: 03/11/2004 **Age:** 9.7

Gender: Male **Race:** White

Participant 5 lives with his parents and paternal aunt, his home language is English; however, his mother speaks Bulgarian. His speech development was reportedly delayed as he only said his first word at two years and started putting two words together at 3.2 years of age.

In 2013, she was in grade 4 at remedial school in Johannesburg. "

Participant 5's caregiver questionnaire was completed by his mother who is a "house-wife" and has a post-matric certificate/diploma.

Participant 6.

D.O.B: 20/11/2001 **Age:** 12.7

Gender: Female **Race:** White

Participant 6 lives with her parents and younger sister, her home language is Afrikaans. Her medical history is significant for tonsillitis and chronic ear infections for which grommets were inserted. Speech development milestones were not obtained from the parent questionnaire as the mother could not remember the details.

In 2013, she was in grade 5 at a mainstream school in Pretoria.

Participant 6's caregiver questionnaire was completed by her mother who is a lecturer manager and has a post-graduate degree.

Participant 7.

D.O.B: 06/03/2003 **Age:** 10.3

Gender: Female **Race:** Coloured

Participant 7 lives with her parents and two younger siblings, her home language is English. She was born prematurely at 30 weeks with a very low birth weight of 1.5 kg. A week after her birth she was diagnosed with an infection in her left shoulder, elbow and knee for which intubation and high doses of intravenous medication were prescribed. She has reportedly on more than six courses of antibiotics during infancy. Her speech development was reportedly age-appropriate.

In 2013, she was in grade 4 at a mainstream school in Johannesburg.

Participant 7's caregiver questionnaire was completed by her mother who is an artist and has a post-graduate degree.

Participant 8.

D.O.B: 16/09/2001 **Age:** 12.5

Gender: Male **Race:** White

Participant 8 lives with both his parents and two younger siblings, and his home language is Afrikaans. His medical history is significant for premature birth at 34 weeks via emergency caesarean section due to premature rupture of membranes (PROM). He was subsequently incubated for ten days because of difficulties with regulating his body temperature. He also had no sucking reflex at birth. Speech-language developmental milestones were not obtained from the caregiver questionnaire. Participant 8's mother reported that she could not remember the details.

In 2013, he was in grade 5 at a mainstream school in Pretoria.

Participant 8's caregiver questionnaire was completed by her mother who is a works in the science sector and has a baccalaureate degree.

Ages at Identification and Commencement of EI Services

The first objective of the current study was two-fold: to determine the age at identification of the hearing impairment as well as the age at commencement of EI services in a group of children identified with a hearing impairment who were enrolled in EI preschool programmes in Gauteng. Current results revealed that ages at identification ranged from seven to 49 months, with a mean age at identification of 27 months, and the median age was 24 months. The ages at commencement of EI services ranged between 17 to 50 months, with a mean age at

commencement of 29.9 months, and the median age was 24 months. These results are discussed further in the following sections.

Age at identification of the hearing impairment.

In addressing the first objective, the first aspect was to determine ages at identification of the hearing impairment. None of the participants received NHS, thus all participants of the current study were identified late following maternal suspicion of the hearing impairment. These results are reflected in Table 4 below.

Table 4

Ages at identification and suspicion of the hearing impairment

Participant no.	**Age at suspicion (in months)**	**Age at identification (in months)**	**Suspicion-identification interval**	**Cause for suspicion**	**Team member to suspect hearing impairment**
1	31	31	0	Not talking.	Mother
2	24	25	1	Not performing at the same level as his peers	Teacher
3	48	49	1	Ill-discipline, not listening during story time and constantly asking for repetitions.	Teacher
4	16	16	0	After spending a month in hospital subsequent to contracting Pneumococcal (Streptococcus) meningitis, mother suspected hearing impairment because she was not reacting to sounds as she had prior to the hospitalization, but was told by two Paediatricians that she was overreacting	Mother
5	14	15	1	Not talking	Mother
6	7	7	0	Not reacting to loud noises	Mother
7	48	49	1	She was taken to speech-language due to delayed language development and a hearing evaluation was scheduled	Mother

8	18	24	6	Not talking.	Mother

Participant 6's hearing impairment was identified at seven months of age, immediately following her mother's concern that she was "not reacting to loud noises". The hearing impairments of participants 4 and 5 were both identified after the age of one year. Participant 4's hearing impairment was identified at the age of 16 months, following recovery from Pneumococcal (Streptococcus) meningitis. After spending a month in hospital subsequent to contracting meningitis, participant 4's mother noted that her daughter was not reacting to sounds as she had prior to hospitalization, but was told by two paediatricians that she was overreacting. Following her discharge from the hospital, participant 4's hearing was evaluated, and her hearing impairment identified. Participant 5's hearing impairment was identified at the age of 15 months, a month after his mother suspected that he may present with a hearing impairment as "he was not yet talking."

Three of the participants' hearing impairments were identified after the age of two years. Participant 1's hearing impairment was identified at 31 months, immediately following her mother's suspicion of the hearing impairment because she was "not talking yet". Participant 2's hearing impairment was identified at the age of 25 months, a month after his preschool teacher reported to his mother that she suspected he might present with a hearing impairment because he was "not performing at the same level as his peers". Participant 8's hearing impairment was identified at the age of 24 months. However, participant 8's hearing impairment had been suspected four months earlier by his mother when he was 18 months old. His mother; however, reported denial as the reason for the delay in identification of his hearing impairment following its suspicion.

Two participants were diagnosed at the age of four years; participants 3's and participant 7's hearing impairments were both identified at 49 months of age. Participant 3's hearing

impairment was identified one month after his preschool teacher raised concerns that he might present with a hearing impairment because of his “ill-discipline, not listening during story time and constantly asking for repetitions”. Participant 7’s hearing impairment was also identified one month following its suspicion. Participant 7’s mother took her to a speech-language therapist because her speech-language development was delayed, the speech-language therapist referred her for a hearing evaluation and her hearing impairment was then identified.

It is worth noting that two of the participants presented with risk-factors for a late-onset hearing impairment (Swanepoel et al., 2004). Participant 7 was born prematurely at 30 weeks and diagnosed with an infection in her left shoulder, elbow and knee for which she had to be intubated and high doses of intravenous medications were prescribed. Participant 8 was also born prematurely at 34 weeks and intubated for ten days due to hypoventilation. Furthermore, participants 2 and 6 presented with a history of otitis media which may result in speech and language impairments (Owens, 2004). The remaining five participants did not present with significant risk factors.

Ages at commencement of EI services.

The second aspect of the first objective was to determine the age at commencement of EI services for which both provision of amplification devices and provision of habitation services such as aural habilitation and/or speech-language were investigated. Results of the current study revealed a significant delay in commencement of EI services following identification of the hearing impairment. In addition to the late-identified hearing impairment, the ages at which participants commenced with EI services preclude optimal benefit from the earliest possible hearing detection and intervention. These results are discussed further below.

Ages at provision of amplification devices.

Ages at provision of amplification devices ranged between 18 and 52 months, with the median age at provision of amplification devices being 32.25 months and the mode, 30 months; as depicted in Table 5 below.

Table 5

Ages at provision of amplification devices and the type provided

Participant no.	**Age at identification (months)**	**Age at amplification (months)**	**Identification-amplification interval (months)**	**Type of amplification device**
1	31	36	5	Hearing aids
2	25	35	10	Hearing aids
3	49	49	0	Hearing aids
4	16	20	4	Cochlear implants
5	15	18	3	Hearing aids
6	7	18	11	Hearing aids
7	49	52	3	Hearing aids
8	24	30	6	Hearing aids

Only participant 3 was provided with bilateral hearing aids immediately following identification of the hearing impairment at 49 months of age. For the remaining seven participants, amplification was provided after the recommended one month delay following identification of the hearing impairment (HPCSA, 2007). Participants 5 was fitted with bilateral hearing aids at 18 months. Participant 7 was also fitted with bilateral hearing aids at 52 months.

Both participants received amplification devices three months after their hearing impairments were identified.

Three participants were fitted with amplification devices within six months of being identified with the hearing impairment. Participant 1 was fitted with bilateral hearing aids at 36 months, five months after his hearing impairment was identified. Participant 4 was implanted bilaterally at the age of 20 months, four months after her hearing impairment was identified. Participant 8 was also fitted with bilateral hearing aids, six months following identification of his hearing impairment, at the age of 30 months.

Participants 2 and 6 were fitted with bilateral hearing aids at 35 and 18 months, respectively. Participant 2 received amplification devices ten months following identification of the hearing impairment, and participant 6 received amplification devices at 11 months after identification of the hearing impairment.

Reasons for delays in provision of amplification devices were not investigated as part of the current study; and are implications for future studies.

Ages at commencement of EI services.

Commencement of EI services was also investigated. As reflected in Table 6, none of the participants received timely access to EI services owing to late identification of their hearing impairments. Participants commenced with EI services at ages ranging between 17 and 50 months of age, with a median age at commencement of EI services being 29.88 months and the mode was 24 months. This precludes optimal benefit from the earliest possible hearing detection and intervention.

Table 6

Ages at commencement of EI services

Participant	Age at identification (months) of HI	Age at commencement of EI services (months) of HI	Identification-intervention (months)
1	31	38	7
2	25	26	1
3	49	49	0
4	16	17	1
5	15	17	2
6	7	18	11
7	49	50	1
8	24	24	0

Five of the participants commenced with EI services within the first three years of life. Participants 2, 4, 5, 6 and 8 commenced with early intervention services at 26, 17, 17, 18 and 24 months respectively. However, three of the participants commenced with EI services after three years of age. Participants 1, 3 and 7 commenced with EI services at 38, 49 and 50 months respectively.

Participants 3 and 8 both commenced with EI services immediately following identification of their hearing impairments. Participants 2, 4 and 7 commenced with EI services a month following identification of their hearing impairments. Participant 5 commenced with EI services two months after his hearing impairment was identified. Participant 1 only commenced with EI services seven months following identification of her hearing impairment; while participant 6 commenced with these services 11 months following identification of the hearing impairment.

Nature of EI Services

The second objective of the current study was to describe the nature of the EI services received by the participants. As reflected in Table 7, all eight participants received aural habilitation and/or speech-language therapy. In addition, Participant 2 received intervention from a psychologist because of behavioural problems. This participant was diagnosed with defiant and oppositional behaviour, which is suspected to be due to intrauterine exposure to drugs. Participant 3 and 8 both received occupational therapy to improve their attention and fine motor skills. These services were accessed on a weekly basis with the exception of the psychologist who saw the participant on an ad hoc basis.

Table 7

EI services received by participants

Participant no.	**EI services received at the EI preschool centres**		
	Speech-Language Therapy	***Occupational Therapy***	***Psychology***
1	Yes	No	No
2	Yes	No	Yes
3	Yes	Yes	No
4	Yes	No	No
5	Yes	No	No
6	Yes	No	No
7	Yes	No	No
8	Yes	Yes	No

Participants received speech-language therapy services from private speech-language therapists or following enrolment at the EI preschool. Participants 1, 3, 4 and 8 commenced with

speech-language therapy services when they were enrolled in an EI preschool programme. However, participants 2, 5, 6 and 7 commenced with speech-language therapy services with a speech-language therapist in the private sector and were subsequently referred to the EI preschools.

Communication and School Readiness Abilities

Through file reviews, the researcher obtained results pertaining to the third objective of the current study, which was participants' communication and school readiness abilities at graduation from the EI preschool programmes. Communication abilities reported as part of this research project were the last speech and language assessment results available prior to participants' graduation from the EI preschool centres.

Communication abilities.

Figure 2 depicts the participant's communication abilities in terms of receptive and expressive language compared to their chronological age.

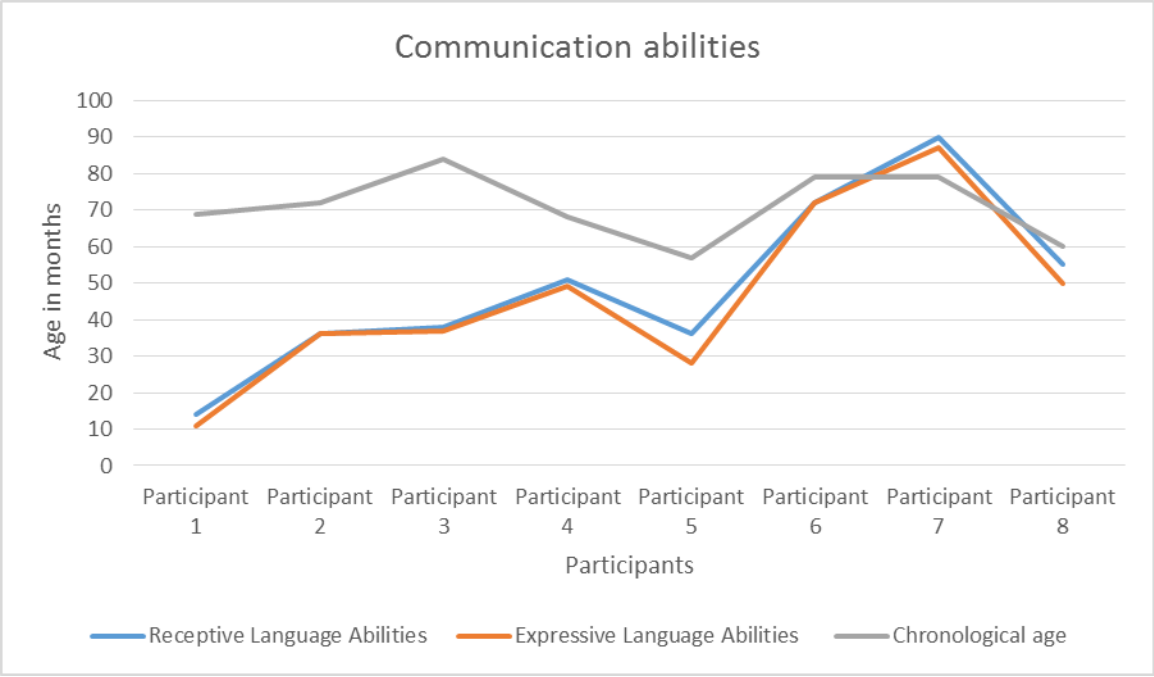

Figure 2. Participants' communication abilities versus chronological age.

As can be seen from Figure 2, one participant presented with above average communication abilities, two participants' communication abilities approximated age-appropriate norms; while five participants presented with delayed communication abilities. Participant 7 presented with above average communication abilities as measured by the Test of Auditory Comprehension of Language- edition 3 (TACL-3) and Expressive One Word Picture Vocabulary Test (EOWPVT). Participant 6 and 8's communication abilities approximated age-appropriate norms. Participant 6 presented with receptive and expressive language skills at a 72-month-old level at the age of 79 months as measured by the Developmental Assessment Scale (DAS). Participant 8 presented with receptive and expressive language abilities at a 50-month and 55-month old level at the age of 60 months as measured by the DAS.

Participants 1, 2, 3, 4, and 5 presented with delayed communication abilities. According to the DAS, Participant 1 presented with receptive language abilities at a 14-month old level and expressive language abilities at an 11-months-old level at the age of 69 months. Participant 2 presented with receptive and expressive language abilities at less than 36 months as measured by the DAS when he was 72 months old. Participant 3 presented with receptive and expressive language abilities at 38 months and 37 months respectively, at the age of 84 months. At 68 months, participant 4 presented with receptive and expressive language abilities which were at a 49-month-old and 51-month-old level respectively according to the TACL-3 and EOWPVT. While at the age of 57 months, participant 5 presented with receptive language skills at a 28-month-old level and expressive language skills at a 36-month-old level as measured by the Preschool Language Scale-4th edition (PLS-4).

Table 8 shows participant's communication abilities relative to degree of unaided hearing impairment and ages at which they accessed EHDI services. Essentially, participants with longer amplification device use and those who received EI services for a longer period had better communication abilities irrespective of the degree of the hearing impairment, age at identification of the hearing impairment or age at provision of amplification devices. However, participants 7 and 8 were the exception. Participant 7 used hearing aids for 27 months and had been receiving EI services for 29 months when her communication abilities were assessed.

Further analysis of this participant revealed that this participant was enrolled in EI services after one month after her hearing impairment was and had received her hearing aids three months post identification of the hearing impairment. Furthermore, participant 7's mother has a background in early childhood education and reported providing additional lesson for her at home. In participant 8's case, he commenced with EI services immediately following

identification of his hearing impairment and received his hearing aids within a period of six months. The minimal delays between ages at identification, amplification and commencement of EI services may account for these participants' communication abilities in contrast with the length of hearing aid use and period in EI therapy as observed with the other participants.

Table 8

Participants' access to EHDI services and communication abilities

	Participant 1	**Participant 2**	**Participant 3**	**Participant 4**	**Participant 5**	**Participant 6**	**Participant 7**	**Participant 8**
Degree of HI	Moderate	Moderate to severe	Severe	Profound	Moderate	Profound	Severe	Moderate
Chronological age	69	72	84	68	57	79	79	60
Identification	31	25	49	16	15	7	49	24
Amplification	36	35	49	20	18	18	52	30
EI services	38	38	49	17	17	18	50	24
Length of amplification use	33	37	35	48	39	61	27	30
Period of EI services	31	46	35	51	40	61	29	36
Communication abilities	R=14 E=11	R= 36 E= 36	R= 38 E= 38	R= 51 E= 49	R= 14 E= 11	R= 72 E= 72	R= 90 E= 87	R= 55 E= 50

Note: R=Receptive language; E= Expressive language

School readiness abilities.

Table 9 represents the participants' school readiness abilities based on attention/listening skills, communication abilities, mathematical concept knowledge and early literacy skills (Harrington et al., 2010). A 'yes' indicates that the participant presented with age-appropriate skills for the area, while a 'no' indicates that the participant's abilities for that area were not age-appropriate.

Table 9

Participant's school readiness abilities

Expected abilities school readiness abilities	**Participant 1**	**Participant 2**	**Participant 3**	**Participant 4**	**Participant 5**	**Participant 6**	**Participant 7**	**Participant 8**
Attention skills *Concentrates on a task for at least 11 minutes?*	No	No	No	Yes	No	Yes	Yes	No
Spoken language abilities *- Has a command of the language?* *- Use sentences to express ideas and needs?*	No	No	No	No	No	Yes	Yes	Yes
Mathematical concepts *- Count up to at least 10?* *- Understands the concept of counting, sorting and grouping?* *- Understand the concept of size* *- writes numbers?*	No	No	Yes	Yes	No	Yes	Yes	Yes
Early literacy *- Names basic colours?* *- Know the letters of the alphabet?* *- Know the name and sounds of letters?* *- Reads and writes the alphabet?*	No	No	Yes	No	No	Yes	Yes	Yes

Only three participants attained age-appropriate school readiness abilities. Participants 6, 7 and 8 attained age-appropriate school readiness abilities as exhibited by their attention, communication abilities, mathematical concept knowledge and early literacy skills. Significantly, the three participants who had attained school readiness abilities were also the participants that presented with above age-appropriate and marginally below average communication abilities.

Participant 6 presented with "good" attention skills, marginally below age-appropriate communication abilities, she was able to rote count as well as touch count from one to ten, knew shapes and could differentiate between big and small. She was also able to read and write at age-appropriate levels. Participant 7 presented with age-appropriate attention skills as she was able to focus on the task at hand and complete her work in the given time. Her communication abilities were age-appropriate. She was also able to count beyond 100, touch count more than 50 objects with ease, identify simple and complex objects and arrange objects in sizes big to small. Participant 7's early literacy abilities also exceeded expectation. She was able to write numbers beyond 40, independently write her name as well as forming letters correctly. Participant 8's attention abilities were an area of weakness, however, and he presented with marginally below-average communication abilities. He was also able to rote count from one to ten, knew simple shapes and was able to differentiate between big and small. Moreover, he was able to write his name with minimal assistance.

The remaining participants (participants 1, 2, 3, 4 and 5) did not attain age-appropriate school readiness abilities. This was demonstrated by below average attention, communication abilities, concept knowledge and early literacy abilities. Participant 1 presented with poor attention/listening skills, as she was reportedly still adjusting to her cochlear implant; limited

knowledge of mathematical concepts, as she was still learning the names of shapes; and limited early literacy skills, as she was still learning how to write her name. Similarly Participant 2's attention/listening skills were reported as an area of weakness; he also experienced difficulty with naming shapes; however, he was able to rote count from one to five, touch count and differentiate between big and small; his early literacy abilities were also poor, as he was still learning to write his name. Participant 5 also presented with poor school readiness abilities as evidenced by his short attention span and below average communication abilities; he was able to rote count one to seven and identify shapes, as well as copy simple forms.

Participants 3 and 4 also presented with below average school readiness abilities. Participant 3's attention/listening abilities were reportedly "fair", but needing improvement; he also presented with below average communication abilities, his mathematical concept knowledge and early literacy abilities were age-appropriate as he was able to count from one to ten with minimal assistance, identify basic shapes and touch count one to six. He was also able to write his name, independently. Participant 4 presented with "good" attention/listening skills, but her communication abilities were below average. She was able to count from one to ten, touch count odd numbers, identify simple shapes and differentiate between big and small; she was also able to copy numbers.

Schooling Profile and Academic Achievement

The fourth objective of the current study was to describe the schooling profile and academic achievement of a group of children with a hearing impairment after three years of formal schooling. This information was obtained by means of the caregiver questionnaires and grade 3 teacher questionnaires; the researcher obtained information pertaining to the participants'

schooling profile and scholastic achievement at the end of the foundation phase. The findings are discussed below.

Schooling profile.

Participants are currently enrolled in three categories of schools. Four of the participants are currently enrolled in mainstream schools, two are enrolled in remedial schools and two participants are enrolled in schools for Learners with Special Educational Needs (LSEN). Current results will be presented further according the three categories of schools participants were enrolled in.

Participants 4, 6, 7 and 8 were enrolled in mainstream schools. Characteristically, these participants had attained age-appropriate school readiness abilities at the end of their preschool years except for participant 4. Participant 4 had not attained age-appropriate school readiness abilities and had initially been enrolled in a remedial school; however, she was enrolled in a mainstream school the following year due to excellent academic performance.

Only two participants, participant 3 and participant 5, were placed in remedial schools. Both these participants had not attained age-appropriate school readiness abilities. Similarly, only two participants, participant 1 and participant 2, were enrolled in LSEN schools. Both participants had not attained age-appropriate school readiness abilities. Moreover, these participants presented with the lowest communication ability scores as recorded in their preschool files. Participant 1 was placed in a School for the Deaf where she uses South African Sign Language (SASL). Initially, participant 2 was placed in a remedial school; however, he experienced academic difficulties and was subsequently placed in an LSEN school.

Academic achievement.

As part of the fourth objective, information pertaining to the participants' academic achievement at the end of grade three was obtained from the teacher questionnaires. As illustrated in Figure 3, results obtained demonstrate successful completion of grade 3 by all participants.

Participants 1, 3, 5, 6, 7 and 8 successfully completed the foundation phase in the prescribed three years. However, participant 2 and participant 4 completed the foundation phase in four years, as they both repeated grade 1. Participant 2 repeated grade 1 as he was initially placed within a remedial school where he was not able to cope academically and was subsequently placed in a LSEN school where he repeated grade 1. Participant 4; however, was initially placed in a remedial school and it was recommended that she attend a mainstream school. Her mother insisted that she repeat grade 1 in the mainstream school in order to ensure that she had "obtained a good grounding".

Although they completed grade 3 successfully, participants 4 and participant 5 obtained an elementary achievement in language use. Participant 5 also obtained an elementary achievement for language comprehension. This poorer performance on language comprehension and use may be attributed to the persistent delayed communication abilities exhibited by these participants. Participant 1 also presented with persistent delayed communication abilities; however, she was placed in a School for the Deaf where she does not rely on auditory information for communication. The different use of communication mode may have attributed to this participant's obtaining a meritorious achievement for both language comprehension and use, irrespective of her delayed communication abilities for spoken language. No differences in achievement level were observed among participants according to the category of school they were enrolled in.

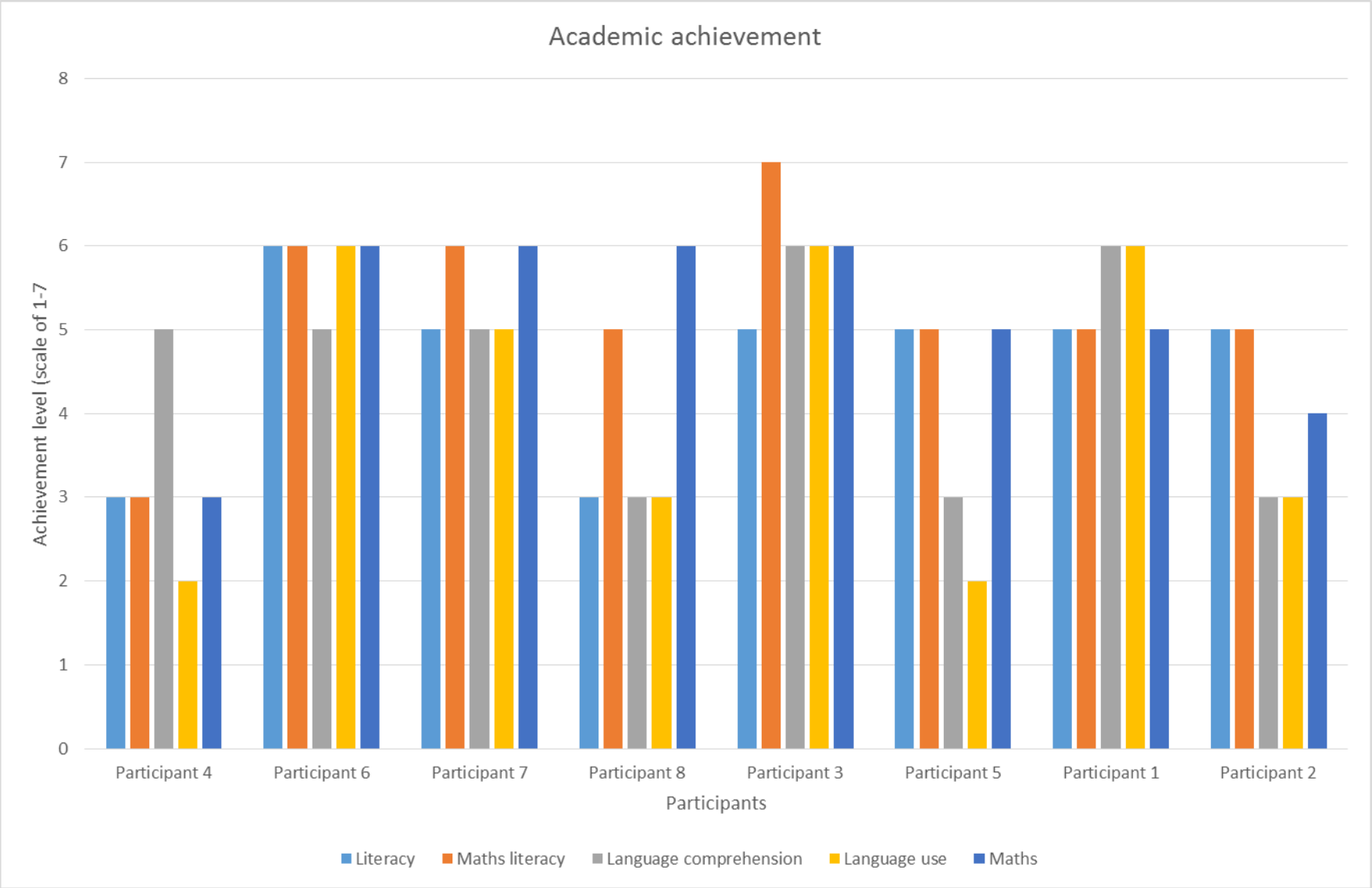

Figure 3. Participants' academic performance according to school placement.

Factors that Influenced Attainment of School Readiness Abilities

The final objective of the study was to determine factors that influenced the attainment of school readiness abilities. Deductive content analysis was employed to determine the influence of pre-determined factors on school readiness abilities. The pre-determined factors were arranged in a category matrix as depicted in Table 10 below, which was then used to code the data according to the categories.

The pre-determined factors investigated were namely early access to EHDI services (i.e. age at identification, age at provision of amplification devices and age at commencement of EI services), and age-appropriate communication abilities.

Table 10

Category matrix for pre-determined factors influencing attainment of school readiness abilities

What factors influence the attainment of school readiness abilities?		
Participant no.	**Early access to EHDI services**	**Age-appropriate Communication abilities**
1	No	No
2	No	No
3	No	No
4	No	No
5	No	No
6	No	Yes
7	No	Yes
8	No	Yes

Early access to EHDI services.

None of the participants received NHS services resulting in late identification of their hearing impairments. Five participants (participants 1,2,3,4, and 5) did not attain age-appropriate school readiness abilities; thus later access to EHDI may have influenced these participants' failure to attain age-appropriate school readiness abilities. Conversely, three participants (participants 6, 7 and 8) attained age-appropriate school readiness abilities. These participants also presented with later access to EHDI services. However, further exploration of the data revealed that these participants presented with longer use of hearing aids and enrolment in EI services. In addition, there were shorter delays between identification of the hearing impairment and provision of amplification devices, as well as identification of the hearing impairment and commencement in EI services. These factors may have influenced these participants' attainment of age-appropriate school readiness abilities.

Age-appropriate communication abilities.

Participants' communication abilities were discussed extensively in section above. Participant 7 presented with above-average communication abilities and had attained age-appropriate school readiness abilities. Both participant 6 and participant 8 presented with marginally age-appropriate communication abilities and had attained age-appropriate school readiness abilities. The remaining five participants presented with below average communication abilities and had not attained age-appropriate school readiness abilities. These findings suggest a positive influence of age-appropriate communication abilities on the attainment of age-appropriate school readiness abilities. Thus age-appropriate communication abilities are associated with age-appropriate school readiness abilities and vice versa.

CHAPTER FIVE:

DISCUSSION

This chapter presents a discussion of the results outlined in the previous chapter and offers important factors that need to be considered in the implementation of EHDI programmes. The discussion is presented in accordance with the objectives; following the same sequence as that adopted for presentation of results.

Developed countries have invested in UNHS, early identification and comprehensive EI services based on evidence of the major linguistic, cognitive and socio-emotional advantages that result (JCIH, 2007). In the South African context, awareness of the importance of early detection of hearing impairments, followed by appropriate intervention has grown over the last decade (Moodley & Storbeck, 2015). Consequently research in this field has also shown considerable growth (Moodley & Storbeck, 2015). However, current studies on EI are scarce and do not focus on the broader outcomes of early hearing detection services. In the current study, the researcher investigated communication and school readiness abilities of hearing-impaired children who graduated from EI preschool programmes in Gauteng. Specifically, the researcher investigated ages at identification of the hearing impairment and ages at commencement of EI services. Descriptions of the nature of EI services received by the participants; their communication and school readiness abilities were provided and their schooling profile and academic achievement at the end of grade 3 were presented. Furthermore, factors that influenced the attainment of age-appropriate school readiness abilities were discussed. Although the current findings should be interpreted within limitations such as a small sample size, these findings have relevance and value for EHDI efforts within a developing context.

Eight participants were included in the current study, four males and four females. Six of the participants were white and the remaining two participants were coloured. The current study's sample is small and not representative of the general South African population, and

more especially the racial make-up of the Gauteng province where the study was conducted. According to the Census 2011, the population of the Gauteng province has the following racial characteristics: 77.4% Black, 15.6% White, 3.5% Coloured, and 2.9% Indian (Statistics South African, 2012).

Although the study sample is not representative of the general population, it is representative of the context in which the study was conducted. Firstly, the link between affluence and education in South Africa can partially explain the racial makeup of the study sample (Spaull, 2013). The enduring impact of apartheid's legacy on access to healthcare and education in the post-apartheid democracy is still evident (Hill et al., 2012; Donohue & Bornman, 2014, Swanepoel, 2009). After 22 years of political transition, race and socio-economic status remain the sharpest distinguishing factors between the haves and the have-nots (Leibbrandt, Wegner & Finn, 2011; Nkonki et al., 2011). Participants of the current study were all from average to above-average income families and were enrolled in private preschools located in affluent communities in Lynwood Glen, Pretoria and Houghton, Johannesburg. Sending a child with a disability to such schools would not be economically feasible for 90% of South Africa's poor, who are predominantly black (Donohue & Bornman, 2014).

Secondly, the number of EI programmes that cater for the needs of hearing-impaired children is limited. There are currently only three centre-based programmes in Gauteng (one of which did not consent to take part in the current study). Meyer et al. (2014) conducted a national survey of paediatric audiological services for diagnosis and intervention in the private healthcare sector. Results of the study indicated that only 50% of speech-language therapists and audiologists provided speech-language intervention and 6% provided auditory training to children with an identified hearing impairment. However, in some instances

speech-language therapists and audiologists referred children to neighbouring provinces because of a lack of EI services in the area.

Lastly, the application of inclusion and exclusion criteria in the current study significantly reduced the sample size. One of the exclusion criteria in the study was the presence of co-morbidities in addition to the hearing impairment. According to Vohr et al. (2012), 40-50% of children with a congenital hearing impairment reportedly have co-morbidities associated with learning disabilities. The presence of co-morbidities has been shown to negatively influence general language ability, receptive vocabulary, expressive vocabulary, overall speech intelligibility, school readiness abilities and academic achievement (Mayne et al, 2000; Pipp-Siegel et al, 2003; Yoshinaga-Itano & Sedey, 2000). Thus, the application of this exclusion criteria significantly reduced the sample size, as potential participants who presented with Down's syndrome, autism and cerebral palsy were not recruited. The small sample in the current study prevents generalizability of the findings to the general population; however, in the absence of research in this field, the researcher maintains that these findings can be used as a foundation to facilitate more research.

The first major finding of the current study revealed that participants were identified late at ages ranging between seven and 49 months. These findings far exceed the target of earliest possible identification of the hearing impairment at no later than four months, as recommended by the HPCSA (2007). However, these results are not unique to the current study. Butler et al. (2015) investigated the age of identification of congenital hearing impairments in the private and public healthcare sectors in the Free State Province in South Africa. Results of the study revealed that the age of identification of congenital hearing impairments in the public sector was 3.71 years and 3.01 years in the private sector. Similarly, Khoza-Shangase and Michal (2014) examined the current audiological management protocols for children with hearing impairments in the public hospitals of

Gauteng, South African. In their results, Khoza-Shangase and Michal (2014) reported a mean age at identification of 23.65 months.

It is widely reported that children identified with a hearing impairment after the age of six months might fall considerably behind their early-identified peers and could show delayed speech and language throughout childhood (Abdala & Visser-Dumont, 2001). Hence, this finding pertaining to age at identification highlights the need to establish effective and viable UNHS across the geographically varied hospitals (Khoza-Shangase & Harbinson, 2015) and clinic settings (Petersen & Ramma, 2015). In addition, establishing a national data management system to track young children as they progress through the system is essential (Meyer et al., 2014). Without UNHS, identification of a hearing impairment may be as late as two years of age until as late as adolescence (Khoza-Shangase & Michal, 2014), following suspicion of the hearing impairment. Only one participant in the current study was suspected of presenting with a hearing impairment at seven months old, while the rest of the participants were suspected of presenting with a hearing impairment after the age of 12 months and as late as four years of age. The finding on age for maternal suspicion is consistent with reports by Storbeck and Young (2016), where the median age for maternal suspicion of the presence of a hearing impairment in both the South African public and private healthcare sectors was 18 months. According to Swanepoel et al. (2013), limited NHS programmes result in passive detection of hearing impairments through maternal suspicion, which only occurs after critical periods of language development milestones have passed.

Mothers were primarily the ones who suspected participants' hearing impairments, because of delayed speech and language development. A study by Rout and Singh (2010) also reported that mothers are commonly the ones to suspect that their child may present with a hearing impairment owing to their not responding to their name when called, not responding to clapping, lack of speech development, and not responding to a vehicle's hooter

or the sound of thunder. It is the current researcher's opinion that maternal awareness of infant and childhood hearing impairments may prompt earlier suspicion of the hearing impairment, thus potentially decreasing the ages at identification of the hearing impairment.

Notably, participant 6 was suspected of presenting with a hearing impairment at seven months of age following early identification of her cousin's hearing impairment at birth. These findings highlight the potential prospect for effective trans-disciplinary teamwork with mothers as the primary agents in the process of earlier identification of hearing impairments and subsequent intervention (Moodley, Louw & Hugo, 2000), until effective implementation of UNHS is realised. This can be achieved by broadening the health education given to mothers during antenatal care, especially to include awareness of developmental milestones, infant hearing impairment and its impact on speech and language developmental (Swanepoel, 2009; Swanepoel et al., 2005).

The interval between age at suspicion and age at identification of the hearing impairment also demonstrates the potential for decreasing age at identification through maternal suspicion. Suspicion-identification intervals demonstrated prompt action by mothers upon suspicion of the hearing impairment. Seven of the eight participants were identified within a month of suspicion of the hearing impairment. The findings of the current study reflect an improvement in the interval between suspicion and identification from previous results reported by Swanepoel et al. (2013) of an average delay of 22 months from age at suspicion of the hearing impairment to age at identification. Storbeck and Young's (2016) study also found that earlier age of suspicion of the hearing impairment did not lead to earlier age of identification. The discrepancy between the current study's findings from previously reported results may be attributed to the difference in the population and context in which the studies were conducted. The current study included a smaller population of children with hearing impairments who had been enrolled in EI preschool programmes in Gauteng. Therefore the

study sample is predisposed to be from more developed socio-economic settings with better access to services (Swanepoel et al., 2013) compared to the population used in Storbeck and Young's (2016) which included 532 children with hearing impairments from both private and public health care sectors in Gauteng, Kwa-Zulu Natal and the Western Cape. Swanepoel et al.'s (2013) study was also conducted in Pretoria, Gauteng. However, it was conducted on 100 children with hearing impairments seen at a referral paediatric auditory evoked potential clinic with a waiting list exceeding six months.

In addition to increasing maternal awareness of infant hearing impairment, awareness of healthcare professionals involved in paediatric management relating to infant hearing impairments is also essential. This is particularly so in view of the fact that three of the participants presented with risk factors associated with permanent congenital, delayed-onset, or progressive hearing impairment in childhood (JCIH, 2007). According to Watkin and Baldwin (2011), the prevalence of permanent hearing impairments increases after the newborn period. The fact that these participants were not referred to a speech-language therapist and audiologist for hearing screening is of concern. This implies poor awareness of the risk factors for infant hearing impairments as well as the importance of early identification among paediatric health care practitioners. This can be remedied by establishing closer working relationships between paediatric health care practitioners and audiologists. Through collaborative work, children with high-risk factors for hearing impairments can be early identified (Khoza-Shangase et al., 2010) through recommended diagnostic audiology assessments by 24 to 30 months of age (JCIH, 2007). Furthermore, if UNHS is mandated for every newborn in South Africa (Petersen & Ramma, 2015), it will facilitate support and education of these health care practitioners, thus ensuring best practice (Scheepers et al., 2014). In addition, more work needs to be done in sensitising medical aid

schemes to the importance of UNHS and advocating that they cover this cost (Butler et al., 2015).

The second major finding revealed suboptimal provision of amplification devices and commencement of EI services. Owing to delayed ages at identification of hearing impairments in the current study, a delayed age at provision of amplification devices was to be expected (Swanepoel et al., 2013). In a national survey of paediatric audiology services conducted by Meyer et al. (2014) similar suboptimal provision of amplification devices at ages older than 24 months was reported. Another study by van der Spuy and Pottas (2008) reported an average age of 39 months at hearing aid fitting in Gauteng; whilst Venter and Viljoen (2008) reported hearing aid fitting at 28 months in the Western Cape.

An average delay of 5.25 months between identification of the hearing impairment and provision of amplification devices was found in the current study. This report is similar with Theunissen and Swanepoel's (2008) report of an average five month period between identification and hearing aid fitting. Current findings of suboptimal provision of amplification devices demonstrate poor adherence to the HPCSA (2007) guidelines for best practice, which recommend provision of amplification devices within one month of identification of the hearing impairment. Evidence also suggests that provision of amplification devices as soon as possible after a child has been identified with a hearing impairment is of crucial importance as lack of auditory stimulation has an effect on the development of the child's speech and language skills (Olusanya et al., 2005). In addition to mandated NHS, necessary budget provisions are required to ensure that children identified with a hearing impairment in South Africa are promptly provided with amplification devices. The limitation of the current study is that contributing factors for delays between identification of the hearing impairment and provision of amplification devices were not investigated. Possible factors contributing to delayed amplification that have been previously

identified include financial constraints, administration and medical factors (Theunissen & Swanepoel, 2008).

In addition to suboptimal provision of amplification devices, late commencement of EI services was reported in the current study. The average age for commencement of EI services was 29.88 months. These results reveal that participants commenced with EI services later than the recommended age of six months (JCIH, 2007) and outside the widely postulated six to18 months period of optimal development (Petersen & Ramma, 2015; Fulcher et al., 2015; Olusanya, 2001). Hence, the findings of the current study on EI services for children with hearing impairments are a cause of great concern, highlighting a lack of established EI programmes in South Africa; hence the small sample size.

There are no reports of studies in the South African context that have investigated the age at commencement of EI services. However, result of the current study are consistent with results obtained by Alyami, Soer, Swanepoel and Pottas (2016) who reported a mean age of 32.7 months for initiating speech-language services for children with hearing impairments in two main public hospitals in Saudi Arabia. However, in their study, Ching et al. (2013) reported a mean age of 5.3 months for enrolment in educational intervention services in Australia. The discrepancy between the findings of the current study and those of Alyami et al.'s (2016) on one hand and those reported by Ching et al. (2013) on the other may be contributed to the context in which the studies were conducted. Ching et al.'s (2013) study was conducted in a developed context with well-established EDHI programmes whereas, Alyami et al.'s (2016) study and the current study were both conducted in semi-developed contexts with similar first and third world contexts.

The findings of the current study on late commencement of EI services are evidence for the need for systematic EHDI programmes that adhere to the JCIH's (2007) guidelines for

early detection and intervention programmes. These services need to be culturally and linguistically-congruent as recommended by the HPCSA (2007), in order to ensure optimal benefit from the intervention. Moreover, there is a need for further research to be conducted in order to evaluate the feasibility, effectiveness and best practice of such EI programmes.

Once ages at commencement of EI services were established, the researcher sought to describe the nature of EI services that participants received. All eight participants had received speech-language therapy and audiology services. In addition, two participants had received occupational therapy and only one participant received psychological intervention. The current study's finding of all participants having received speech-language therapy and audiology services reinforces the significant role of speech-language therapist and audiologist in the management of children with a hearing impairment. It is also in agreement with the EHDI programme goal of ensuring that children with hearing impairments maintain age-appropriate development with regards to language abilities (Storbeck & Pittman, 2008), thus alleviating the communication difficulties associated with childhood hearing impairments (Tye-Murray, 2009). In addition, other EI specialists must be included in meeting the communication needs of the hearing-impaired child, taking into account both the child's and family's needs (Yoshinaga-Itano, 2013). Team management of the hearing-impaired child is essential, considering that an estimated 35-40% of hearing impaired children present with additional disabilities which affect the child's ability to access and use language (Gallaudet Research Institute, 2008).

The third major finding relates to participants' communication and school readiness abilities. Results pertaining to participants' communication abilities revealed that these abilities were delayed. Only one participant presented with above-average communication abilities and two participants approximated age-appropriate communication abilities. Because of the dearth of research in this area, there was a lack of results in the South African context

to compare with the findings of the current study. However, the delayed communication abilities demonstrated by some of the participants were expected, on account of the late identification of hearing impairments and subsequent late commencement of EI services reported in the current study.

The findings of the current study are consistent with reports by Fulcher et al. (2012) who investigated whether early-identified hearing impaired children with no other diagnosed conditions would outperform similar children later-identified , as well as achieve and maintain age-appropriate speech and language outcomes by three, four and five years of age. Results of the study demonstrated that early-identified children significantly outperformed the late-identified children at all ages. Children identified before the age of 12 months achieved age-appropriate scores for speech as well as receptive and expressive language abilities. By the age of five years, all the children had achieved typical vocabulary and language development and 96% typical speech.

This finding once again highlights the need for comprehensive EHDI infrastructure. Through such EHDI programmes, hearing-impaired children can experience the optimal benefits from the earliest possible hearing identification and intervention (Meyer et al., 2014). It is possible for children with hearing impairments to achieve age-appropriate speech and language outcomes (Fulcher et al., 2012). However, late identification and intervention, as demonstrated in the current study, misses the crucial two years of the language development period that will enable these children to develop age-appropriate language abilities (Storbeck & Young, 2016). Access to timely intervention services in accordance with HPCSA (2007) guidelines will ensure that children with hearing impairments can develop and maintain normal language abilities (Swanepoel et al., 2004).

Various researchers have investigated the factors influencing speech and language outcomes for children. EI before three months of age, early provision of amplification devices, and commencement of EI services prior to six months of age have been widely reported as facilitators for age-appropriate communication outcomes (Fulcher et al., 2013; Vohr et al., 2012). Participants in the current study were late-identified, provided with amplification devices at suboptimal ages and commenced late with EI services; hence the effect of the above-mentioned factors on participants' communication outcomes could not be determined.

However, at a glance, results of the current study indicate that participants with longer amplification use and longer enrolment in EI services presented with better communication abilities. Better communication outcomes for participants with milder hearing impairments compared to participants with more severe hearing impairments were also not observed in the current study. This is in contrast to Wake et al. (2004), who reported that hearing-impaired children with mild to moderate hearing impairments would outperform EI participants with severe to profound hearing impairments in measures of speech and language following timely access to EI services. The discrepancy between the current study and Wake et al.'s (2004) study may be due to the reported lack of timely access to EI services for the current study's participants.

The second aspect of the third objective was to determine participants' school readiness abilities. Only three participants had attained age-appropriate school readiness abilities. The remaining five participants had not attained age-appropriate school readiness abilities as demonstrated by poor attention, communication abilities, concept knowledge and early literacy skills. The participants who had attained age-appropriate school readiness abilities also presented with communication abilities that were age-appropriate or approximated age-appropriate norms. This finding is consistent with Harrington et al.'s (2010) study, which

reported that children who were identified with the hearing impairment and received EI at a later date demonstrated lower language scores which were related to lower school readiness scores.

This finding supports the belief that communication abilities are crucial in the development of age-appropriate school readiness abilities (Zaidman-Zait & Young, 2008). Presumably, children who have a solid foundation in communication abilities have the ability to apply their linguistic knowledge to concepts such as alphabet knowledge, colour recognition, number identification, time and sequence, which are part of the aspects of school readiness abilities (Harrington et al., 2010). The findings of the current study further highlights the need for comprehensive EHDI programmes which will meet the unique needs of children with hearing impairments and their families (Albino & Berry, 2013). According to Albino and Berry (2013) to forgo greater investment in ECD interventions means compromising the well-being of South Africa's communities, perpetuating cycles of poverty, poor educational attainment, inequality and socio-economic challenges. Without such programmes, infant and childhood hearing impairments are identified after critical language development periods have passed, resulting in limited opportunities to develop age-appropriate communication and school readiness abilities. According to Hanafi (2007), below-average communication and school readiness abilities when entering school affects academic achievement and progress negatively.

Once the participants' school readiness abilities were established, the current study sought to describe the participants' schooling profile and academic achievement at the end of the foundation phase. Participants were enrolled in three school settings, namely mainstream schools, remedial schools and LSEN schools. Four participants had been placed in mainstream schools, two in remedial schools and two in LSEN schools. Participants enrolled in mainstream schools presented with communication abilities that were age-appropriate or

approximated age-appropriate norms. The current study's findings are consistent with Plaster's (1980) assertion that communication abilities were central in determining the "appropriateness" of mainstream education for hearing-impaired learners.

These findings are positive, particularly for the South African context where there is a scarcity of schools that cater for hearing impaired children (Butler et al., 2015). It also demonstrates South Africa's response to the international drive for inclusive education. Literature reports a substantial 65% to 85% increase in inclusive education for children with hearing impairments in mainstream public school settings in North America (Eriks-Brophy et al., 2012). Prior to this, 80% of hearing impaired children were attending schools for the deaf (Shaver, Marschark, Newman & Marder, 2013). The principal assumption to mainstream education for hearing impaired children is that placing a child with a hearing impairment in a mainstream classroom results in increased social interaction, increased social acceptance of children with hearing impairments by peers, as well as appropriate language models for the development of adequate communication skills (Schwartz, 1990).

To date, no available research in the current context has focused on this aspect. Participants in the current study were identified late and received EI services at ages far exceeding the recommended ages by the HPCSA (2007) position statement. The researcher maintains that with improved and timely access to EHDI services, more favourable findings may be observed. This can be achieved through an increase in EI programmes that will ensure that hearing-impaired children reach age-appropriate outcomes (Fulcher et al., 2012) and are adequately positioned for future education and employment prospects (Storbeck & Young, 2016).

According to Bodner-Jihnson and Sass-Laher (2003), the purpose of EI is for hearing-impaired children to receive the necessary instruction to develop appropriate communication

and school readiness abilities. These skills may provide the hearing-impaired child with a foundation for entrance into mainstream education, affording them the same educational and social opportunities as their hearing peers (Harrington et al., 2013). It is against this backdrop that the current study investigated participants' academic achievement at the end of grade 3. All eight participants successfully completed grade 3. In contrast to reports of higher levels of academic achievement in mainstream schools when compared to special school education (Eriks-Brophy et al. 2012), there was not difference in the participants' level of academic achievement across the three categories of schools. This finding may suggest that academic achievement may be associated with match/mismatch with school placement as opposed to the type of school placement (Stinson & Kluwin, 2011), thus offering us significant insight into ways of addressing the need to educate children with hearing impairments in ways appropriate to their strengths and needs (Shaver et al., 2013). Through systematic EHDI programmes and appropriate school placement, children with hearing impairments can receive intervention, additional stimulation and teaching that will enable them to achieve their full potential for both immediate and long-term prospects (Taylor, 1999).

Six of the participants completed the foundation phase in the prescribed three years, with only two participants completing in four years, after repeating grade 1. One participant repeated grade 1 because of poor academic performance while, the second participant repeated grade 1 when she was moved from a remedial school to a mainstream school. Her parents made the decision for her to repeat in order to ensure that she had a solid foundation. This finding is a positive outcome as it highlights the cycle of positive behaviour gained from enrolment in EI services as evidenced by the reported academic outcomes (Conyers et al., 2003); it also highlights the possible minimizing of grade repetition, school dropout rates and increased prospects of independent, economically empowered individuals (Campbell & Ramey, 1995). According to the Committee on Children with Disabilities (1994, p. 863), EI

of children with developmental disabilities leads to an effective therapy of conditions which definitive treatment is available. However, even in those instances in which the condition cannot be fully reversed, EI improves children's outcomes and enables families to develop the strategies and obtain the resources for successful functioning.

Finally, factors that influenced the attainment of age-appropriate school readiness abilities were explored in the current study. Through deductive content analysis, the researcher explored the influence of early access to EHDI services and age-appropriate communication abilities on school readiness abilities.

Results of the current study revealed that none of the participants had early access to EHDI services, hence the influence of early access to EHDI services on school readiness abilities could not be established. According to Harrington et al.'s (2010) study a significant negative relationships exists between age at identification, age at EI and age at sensory device provision, and participants' total school readiness standard scores. In the current study, attainment of age-appropriate school readiness abilities was associated with length of amplification device use and length of enrolment in EI services. The discrepancy between results of the current study and those reported by Harrington et al. (2010) may be due to the late access to EHDI services which was characteristic of the current study's participants.

The influence of communication abilities on the attainment of age-appropriate school readiness abilities was also explored. Only three participants had attained age-appropriate school readiness abilities, while the remaining five participants had not. Significantly, participants who attained age-appropriate school readiness abilities presented with age-appropriate communication abilities. This finding suggests a significant relationship between communication abilities and school readiness abilities. Similarly, Fulcher, Purcell and

Tucker (2016) reported a significantly positive correlation between communication abilities and school readiness abilities.

Findings of the current study emphasize the significant influence that communication abilities have on school readiness abilities. Similarly, Harrington et al (2010) reported that children who were identified with a hearing impairment and received EI at a later date demonstrated lower language scores which were related to lower school readiness abilities. Hence the call for systematic EHDI programmes that will facilitate the development of age-appropriate communication abilities and enable children with hearing impairments to acquire the necessary school readiness abilities (Rvachew, 2006) that will in turn position them for future academic success (Meizen-Derr et al., 2011; Harrington et al., 2010; Albino & Berry, 2013).

CHAPTER SIX:

CONCLUSION & IMPLICATIONS

This chapter will present the conclusion of the current study; while offering implications for future directions. Identified strengths and limitations of the study will also be detailed in this chapter, including recommendations for future research.

Conclusion

Improving the quality of life for the child with a hearing impairment is the ultimate benefit of early identification (Watkin, 2010). South Africa has made great strides in growing the knowledge base in the field of EHDI (Moodley & Storbeck, 2015); however, gaps still exist that can inform the implementation of EHDI services that are relevant to the South African context. The current study accordingly investigated communication and school readiness abilities of hearing-impaired EI preschool graduates in Gauteng. Findings of the current study were based on the following objectives; determining ages at identification of the hearing impairment and commencement of EI services, nature of EI services, participants' communication and school readiness abilities, participants' schooling profile and academic achievement at the end of grade 3. Furthermore factors that influenced the attainment of school readiness abilities were investigated.

From the results obtained in the study, it is evident that hearing impaired children enrolled in EI preschool programmes in Gauteng were identified late; and that identification was only prompted by maternal suspicion of the hearing impairment and not through NHS programmes. Consequently, ages at provision with amplification devices and enrolment in EI programmes were also delayed at ages later than international benchmarks and HPCSA (2007) guidelines. Consequently, participants presented with below average communication and school readiness abilities characteristic of hearing impairments that were late identified, and commenced with EI services at ages which preclude optimal development. Following

graduation from the EI preschool centres, four participants were enrolled in mainstream schools, two participants were enrolled in remedial schools and another two participants were enrolled in LSEN schools. All participants successfully completed the foundation phase, with six participants completing in the prescribed three years and two completing the foundation phase in four years on account of repeating grade one. Lastly, length of amplification device use, length of enrolment in EI services and age-appropriate communication abilities were found to influence the attainment of age-appropriate school readiness abilities.

These findings indicate an urgent need for systematic planning at various levels of service delivery, in both the Department of Health and the Department of Basic Education, of the implementation of wide spread EHDI services on par with international gold standards. This would lead to earlier identification of infant and childhood hearing impairments. Through early identification of hearing impairments, EI may also be achieved, resulting in better communication and school readiness outcomes that will enable hearing impaired children to perform on par with their hearing counterparts. Furthermore, urgent implementation of wide spread EHDI services would serve as a concrete step to equalise opportunities for vocational and societal contexts for children with hearing impairments. These services would also result in important long term economic returns, which may be significantly higher that investing in formal education for these children (Friderichs et al., 2012).

In addition, broadening of the health education given to mothers during antenatal care to include awareness of developmental milestones, hearing impairments in the paediatric population and their impact on speech and language developmental may be a possible way of lowering the age at identification of infant hearing impairments. Furthermore, collaboration with paediatric health care workers is essential in ensuring prompt identification of late-onset hearing impairments preceded by established risk-factors.

Strengths of the study

This study may possibly be the first to look at a combination of the communication and school readiness abilities for EI preschool graduates in the South African context. Therefore it will address the dearth of research in this area.

Furthermore, the current study was conducted using a mixed methods, descriptive research. This allowed the researcher to obtain rich information pertaining to the research objectives.

Study Limitations

The findings of the current study are reported and interpreted within identified limitations. Firstly, self-administered questionnaires were employed to obtain participants' background information as well as academic achievement. The use of self-administered questionnaires based on findings of the pilot study may have skewed the participants' responses to the questions. In addition, participants' caregivers omitted some significant information while completing the questionnaire. Researcher-administered questionnaires would have allowed the researcher to probe some of the participants' responses in order to obtain more details and to expand on the information obtained.

Secondly, a small sample size of eight participants from similar average to above-average socio-economic backgrounds was used for the current study. Although not representative of the demographic profile of the country, it was representative of the context in which the study was conducted. The sample size and demographic profile of the study highlights the link between affluence and access to healthcare and education and the high

prevalence of co-morbidities in children with hearing impairment. Using a larger sample size with participants from varied backgrounds would have allowed for generalizability of the findings to the general population. Moreover, participants of the current study were all from the Gauteng province. Extending the research study to the rest of the eight provinces would have allowed the researcher to establish EHDI outcomes in South Africa as a whole.

Thirdly, the researcher's use of retrospective file review to determine the participants' communication abilities, which were assessed using various standardized measures, is another limitation. Assessment of communication abilities using the same assessment measure would have enabled the researcher to comment on the improved language outcomes among the participants. In addition the participants' language scores on enrolment into the EI preschool centres were absent, which if present would have enabled the researcher to ascertain participants' communication abilities improvement from enrolment at the EI preschool to graduation.

Recommendations for Future Research

Future research in this field could explore similar objectives to the current study with a larger, more diverse sample for improved generalizability of research findings. Conducting the study across the nine provinces would also allow for verification of the true nature of outcomes of EI programmes in the South African context. In addition, reasons for delays in the provision of amplification devices following identification of the child's hearing impairment need to be explored.

Furthermore, a longitudinal study, tracking the communication development of hearing impaired children through the infant, preschool and foundation phase; using the same assessment measures; would enable the researcher to present a better reflection of the outcomes of EI services as well as suggest guidelines for best practice for the South African

context. A feasibility study on the establishment of more EI preschool centres would alleviate the dearth of research in this field and would provide advice for policy makers and inform budget allocations for such EHDI programmes.

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Appendix A: Ethical Clearance certificate

Appendix B: Letter of Consent (The Children's Communication Centre)

Appendix C: Letter of Consent (Whispers Speech and Hearing Centre)

Appendix D: Information letter for EI preschool programmes

March 2013

Good day,

My name is Precious Maluleke and I am doing a Master of Arts in Audiology at the University of the Witwatersrand. In fulfilment of my degree I am conducting a study on the communication and school readiness abilities of hearing-impaired preschool graduates who were enrolled in early intervention preschool programmes.

The study is relevant to the area of audiology because the results may contribute towards the limited literature in the field of early intervention in South Africa as well as establish a benchmark for a successful early intervention program in a South African context. With a better understanding of the communication and school readiness abilities of hearing-impaired children, professionals in the field can better prepare families and their young children before entering preschool for improved academic achievement.

The study will involve the following:

- The researcher will review school records of hearing-impaired children who graduated from your preschool programme in 2009 in order to determine candidacy for participation in the study.
- Review of participant's school records in order to obtain demographic and audiological information, as well as communication and school readiness abilities.
- A questionnaire to be completed by the participant's grade 3 teacher in order to determine the participant's general performance during the foundation phase of formal schooling.
- A questionnaire to be completed by the participant's care givers in order to obtain the participants family demographics, social experience and history of the hearing loss.

- Before commencement of the study, the researcher would like to first conduct a pilot study, which is a miniature version of the research project. The pilot study will help the researcher refinement of the research design based on findings from the pilot study.

The study will be conducted over 2-3 weeks, with the researcher visiting your facility to collect data from the files, distribute teacher questionnaires and collecting teacher questionnaires on completion.

Should you decide to participate in the study, all information gained from your facility will be treated as highly confidential, no individuals' names or personal details will be stated in the study or in the discussion thereof. In addition, should you agree to participate but with time choose to withdraw, you are welcome to do so without any negative consequences.

If you have any queries regarding the matter above, please do not hesitate to contact me on 079 954 4279 or precious.slp@gmail.com

Yours faithfully

_____

Precious Maluleke

MA (Audiology) Student

University of the Witwatersrand

Consent form

I, _____ in my capacity as the Director at Whispers Speech and Hearing Centre hereby grant Precious Maluleke permission to carry out a pilot study and conduct the research study at our facility.

I have read the information letter and understand the nature of the study.

Signed:_____ Witness: _____

Date: _____

Consent form

I, _____ in my capacity as the chairman of The society at The Children's Communication Centre hereby grant Precious Maluleke permission to carry out a pilot study and conduct the research study at our facility.

I have read the information letter and understand the nature of the study.

Signed:_____ Witness: _____

Date: _____

Appendix E: Information letter for Primary Caregivers

March 2013

Dear Caregiver/Parent

My name is Precious Maluleke and I am doing a Master of Arts in Audiology at the University of the Witwatersrand. In fulfilment of my degree I am conducting a study on the communication and school readiness abilities of hearing-impaired preschool graduates who were enrolled in early intervention preschool programmes.

I would like to invite you to participate in this study. The study will involve the following:

- Allowing me, as the researcher to access your child's school and therapy records in order to record information about your child's background information (i.e. date of birth, age, etc.), information related to their hearing loss, communication and school readiness abilities.
- Allowing me to ask your child's grade 3 teachers to fill in a questionnaire about your child's performance in the classroom in general and on curriculum-based activities.
- Completing a questionnaire about your family's background information (i.e. number of children, where you live, etc.), your child's background information including his/her hearing loss and schooling. I can send the questionnaires from school with your child and you can return them to me in the same way.

Possible risks

Some of the questions in the questionnaire are of a sensitive nature and you may be uncomfortable with sharing the information with a stranger, but the information is quite important and will offer us a better understanding of the factors that influence results of the study.

Possible benefits

You will be contributing to research in order to improve speech-language and audiology services offered to children with hearing loss.

You should not feel under any pressure to participate in this study. If you decide that you would like to participate, all information will remain confidential and neither you nor any of your child's names or personal details will be mentioned in the research.

If you have any questions, please do not hesitate to contact me on 079 954 4279 or precious.slp@gmail.com

Yours faithfully

_____

Precious Maluleke

MA (Audiology) Student

University of the Witwatersrand

Consent form

I, _____ in my capacity as _____'s

Caregiver agree to participate in the study and give Precious Maluleke permission to access my child's school and therapy records as well as invite my child's grade 3 teacher to fill in the questionnaires that are part of the study.

I have read/understand the information letter and understand what is required of me.

I understand that participation is voluntary and should I wish to withdraw I may do so with no negative consequences.

I understand that all information gathered during the study is confidential and no mention will be made of the mine or my child's personal details.

Signed:_____ Witness: _____

Date: _____

Appendix F: Information letter for Primary Schools

March 2013

Good day,

My name is Precious Maluleke and I am doing a Master of Arts in Audiology at the University of the Witwatersrand. In fulfilment of my degree I am conducting a study on the communication and school readiness abilities of hearing-impaired preschool graduates who were enrolled in early intervention preschool programmes.

The study will involve completion of a questionnaire by the participant's grade 3 teacher in order to determine the participant's general performance during the foundation phase of formal schooling.

Should you decide to participate in the study, all information gained from the participating teacher/s will be treated as highly confidential, no individuals' names or personal details will be stated in the study or in the discussion thereof. In addition, should you agree to participate but with time choose to withdraw, you are welcome to do so without any negative consequences.

If you have any queries regarding the matter above, please do not hesitate to contact me on 079 954 4279 or precious.slp@gmail.com

Yours faithfully

_____

Precious Maluleke

MA (Audiology) Student

University of the Witwatersrand

Consent form

I, _____ in my capacity as the principal at _____

_____ hereby grant Precious Maluleke permission to conduct the research study at our facility.

I have read the information letter and understand the nature of the study.

Signed:_____ Witness: _____

Date: _____

Appendix G: Information letter for grade 3 teachers

March 2013

Good day,

My name is Precious Maluleke and I am doing a Master of Arts in Audiology at the University of the Witwatersrand. In fulfilment of my degree I am conducting a study on the communication and school readiness abilities of hearing-impaired preschool graduates who were enrolled in early intervention preschool programmes.

I would like to invite you to participate in my study by completing a questionnaire related to the learner's general performance in the classroom setting as well as in curriculum-based activities. The questionnaire will only take 20 minutes of your time to complete.

There are no risks associated with participating in the study.

You should not feel under any pressure to participate in this study. If you decide that you would like to participate, all information will remain confidential and your name or personal details will not be mentioned in the research.

If you have any questions, please do not hesitate to contact me on 079 954 4279 or precious.slp@gmail.com

Yours faithfully

_____

Precious Maluleke

MA (Audiology) Student

University of the Witwatersrand

Consent form

I, _____ in my capacity as _____'s

Former grade 3 teacher agree to participate in the study by completing the questionnaire. I have read/understand the information letter and understand what is required of me.

I understand that participation is voluntary and should I wish to withdraw I may do so with no negative consequences.

I understand that all information gathered during the study is confidential and no mention will be made of the mine or the learner's personal details.

Signed:_____ Witness: _____

Date: _____

Appendix H: Primary Caregiver Questionnaire

May 2013

Dear Caregiver/Parent

As indicated in the information letter, I am conducting a study entitled: **Communication and school readiness abilities of hearing-impaired preschool graduates: exploring outcomes of early intervention preschool programmes in Gauteng.** To do this I kindly request that you complete the following questionnaire which will take you no longer than 20 minutes of your time to complete it.

The questionnaire is made up of 3 sections (A-C). Please ensure that you complete all the sections. Although I am aware of the sensitivity of the questions in this questionnaire, the information will allow me to get am in-depth understanding of your child, their hearing loss, progress and the environment in which they function in.

Kindly return the completed questionnaire as discussed with the researcher on or before **1 June 2013.**

Should you have any questions or comments regarding this questionnaire or the research project, you are welcome to contact me telephonically at 079 954 4279 or e-mail me at precious.slp@gmail.com

Yours sincerely

_____

Precious Maluleke

Speech Therapist & Audiologist

PLEASE ANSWER THE FOLLOWING QUESTIONS BY PUTTING A TICK IN THE RELEVANT BLOCK OR WRITING DOWN YOUR ANSWER IN THE SPACE PROVIDED.

SECTION A: Family demographics

This section of the questionnaire refers to you and your family's demographical information as well as mother's medical history for the duration of the pregnancy.

1. Ethnicity?

Black	White	Coloured	Indian	Asian

2. Your highest education qualification?

Grade 11 or lower (std 9 or	Grade 12 (Matric)	Post-Matric Diploma or	Baccalaureate Degree(s)	Post Graduate Degree(s)

3. Occupation?

_____

4. How would you describe your economic status?

Poor	Below average	Average	Above average	Affluent

5. Size of your household i.e. the number of people, including yourself who live in your house/dwelling for at least three months of the year?

2	3	4	5	6	More than 6

Please specify their relation to you (e.g. spouse, son, etc.)

_____

_____

_____

_____

6. Is there any known family history of hearing loss, speech language problems, learning problems, epilepsy, cleft palate, mental retardation, or any other disability? Please provide details for immediate as well as extended family members

   e.g. His maternal aunt was diagnosed with epilepsy when she was 10 years old and has been on medication for the past 15 years.

   _____

   _____

   _____

   _____

   _____

   _____

SECTION B: Child's background information

This section of the questionnaire refers to your child's background or biographical information and medical history.

1. Gender?

Female	Male

2. Age (years, months)

_____

3. Date of birth? (CCYY-MM-DD)

				-			-		

4. Ethnicity?

Black	White	Coloured	Indian	Asian

5. Home language?

_____

6. Is your child exposed to any other languages? (How often?)

_____

_____

_____

7. How well does your child express him/herself at home?

_____

_____

_____

_____

Neonatal details:

This section refers to the birth of your child and general health thereafter.

1. Birth weight? _____

2. APGAR score? _____

3. Was the baby in ICU? (Please provide details)

_____

_____

_____

4. If any problems at birth, please provide details (e.g. incubation, jaundice, blood transfusion etc.)

_____

_____

_____

_____

Developmental milestones

This section of the questionnaire refers to your child's general development.

Speech development:

When did your child produce:

1. Babbles that sounded like speech? _____
2. First words? _____
3. First two-word utterances? _____
4. First sentences? _____
5. First long, correct sentences? _____

Motor development:

When did the child first:

1. Hold head up? _____

2. Sit alone? _____

3. Walk alone? _____

Hearing loss:

This section of the questionnaire refers to your child's hearing loss.

1. When was the hearing loss identified? (Please provide details)

   _____

   _____

2. When was the hearing loss diagnosed? (Please provide details)

   _____

   _____

3. When did your child start receiving intervention services? (Please provide details)

   _____

   _____

   _____

4. When was your child fitted with an amplification device? (Please provide details)

   _____

5. What type of amplification device is your child currently fitted with?

   _____

   _____

6. Has your child changed amplification devices? (please provide details)

_____

_____

_____

Medical history:

Has the child had any of the following illnesses?

Illness	✓	***Age***	***Any hospitalisation? (please provide details)***
Asthma			
Bronchitis			
Cardiac disease			
Chicken pox			
Coma			
Croup			
Diabetes			
Diphtheria			
Encephalitis			
Epilepsy, convulsions or seizures			
Gastro-enteritis			
German measles (Rubella)			
Hepatitis			
Malaria			
Measles			
Meningitis			
Mumps			
Pneumonia			
Poliomyelitis			
Rheumatic fever			
Scarlet fever			
Tonsillitis			
Whooping cough			
Earache (provide details)			
Ear infections (provide details)			
Discharge from ears (provide			
Allergies			
High temperature			
Other			

Any surgeries? (provide details)			

SECTION C: Schooling history

This section of the questionnaire refers to your child's schooling history.

1. Please list the schools the child has attended

Name of school	When?		Grade	Reason for leaving the school
	From	To		

2. What grade is your child currently in? _____

3. Has your child ever repeated a grade? (please provide details)

   _____

   _____

   _____

4. Does your child experience any difficulties at school? (provide details)

   _____

   _____

_____

_____

5. Is your child currently receiving any services (e.g. speech-language)

_____

_____

_____

_____

_____

_____

_____

_____

Thank you for your co-operation in completing this questionnaire. Kindly return the questionnaire as specified in the cover letter.

Appendix I: Grade 3 teacher Questionnaire

May 2013

Good day

As indicated in the information letter, I am conducting a study entitled: **Communication and school readiness abilities of hearing-impaired preschool graduates: exploring outcomes of early intervention preschool programmes in Gauteng.** To do this I kindly request that you complete the following questionnaire which will take you no longer than 20 minutes of your time to complete it.

The questionnaire is made up of 2 sections (A & B). Please ensure that you complete all the sections.

Kindly return the completed questionnaire as discussed with the researcher on or before **1 June 2013.**

Should you have any questions or comments regarding this questionnaire or the research project, you are welcome to contact me telephonically at 079 954 4279 or e-mail me at precious.slp@gmail.com

Yours sincerely

_____

Precious Maluleke

Speech Therapist & Audiologist

PLEASE ANSWER THE FOLLOWING QUESTIONS BY PUTTING A TICK IN THE RELEVANT BLOCK OR WRITING DOWN YOUR ANSWER IN THE SPACE PROVIDED.

SECTION A: academic record

This section refers to the learner's performance in curriculum-based activities according to the following scale:

1	Not achieved (0-29%)
2	Elementary achievement (30-39%)
3	Moderate achievement (40-49%)
4	Adequate achievement (50-59%)
5	Substantial achievement (60-69%)
6	Meritorious achievement (70-79%)
7	Outstanding achievement (80-100%)

Literacy:

	1	2	3	4	5	6	7
Oral							
Prepared reading							
Unprepared reading							
Comprehension							
Spelling/phonics							
Language							
Written work							
Afrikaans							
Letter formation (hand writing)							

Neatness (handwriting)							

Maths:

	1	2	3	4	5	6	7
Counting							
Counting in groups to 1000							
Mental sums							
Calculations HTU							
Place value Th, H, T, U							
Problem sums							
Fractions							
Time							
Money							
Length							
Shapes							
Graphs							
Capacity							

SECTION B: General performance

This section refers to the learner's general performance in the classroom

1. Has the learner repeated a grade/year? Please provide details.

   _____

   _____

_____

_____

_____

_____

2. What difficulties did the learner present with in the classroom setting?

_____

_____

_____

_____

3. How was the learner different from his/her peers in the classroom setting?

_____

_____

_____

_____

4. What were the learner's strengths in the classroom?

_____

_____

_____

_____

5. What support did the learner need in the classroom in order to complete academic-based activities?

_____

_____

_____

_____

6. Describe parental involvement with the learner's school work

_____

_____

_____

_____

_____

_____

_____

_____

_____

7. Number of days absent?

_____

8. General comments:

_____

_____

_____

_____

_____

_____

Thank you for your co-operation in completing this questionnaire. Kindly return the questionnaire as specified in the cover letter.