THE DEVELOPMENTAL ASSESSMENT OF DEAF CHILDREN USING THE DEVELOPMENTAL ASSESSMENT OF YOUNG CHILDREN AND THE BAYLEY SCALES OF INFANT AND TODDLER DEVELOPMENT (THIRD EDITION)

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Declaration

I hereby declare that this research report is my own independent work, and has not been presented for any other degree at any other academic institution, or published in any form.

It is submitted in partial fulfillment of requirements for the degree of Master of Arts in Educational Psychology by Coursework and Research Report at the University of the Witwatersrand, Johannesburg.

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Abstract

The various aspects of early childhood development are closely interwoven, and thus a delay in any area of development may impact other areas of development. For young deaf or hard-of-hearing children, a difficulty in communication may potentially result in delays in other areas of development, namely cognitive, motor, social-emotional and adaptive behaviour. Early intervention programmes, such as HI HOPES, thus need to conduct regular holistic developmental assessments on children in the programmes to pinpoint areas of weakness so that these can be purposefully addressed so that the child may reach their developmental potential. Two such assessments are the Bayley Scales of Infant and Toddler Development – Third Edition (BSID) and the Developmental Assessment of Young Children (DAYC). HI HOPES had been utilizing the BSID, but hoped to substitute it with the DAYC in the hopes that it would better meet their assessment needs.

This research study examines the use, advantages and disadvantages of both of these developmental meausres within the HI HOPES context, in order to determine whether they meet the programme's needs. This was achieved through a series of individual interviews with the Parent Advisors, which considered various aspects of these assessments. Further, the researcher investigated whether the DAYC would be a suitable substitute for the BSID by determining whether the two measures produce similar results for the same group of young deaf children through running correlations and matched-pairs statistical tests.

Both the DAYC and the BSID were seen to elicit valuable, detailed information that provides guidance for HI HOPES, and thus perceived to useful and applicable for HI HOPES. Finally, it was found that the DAYC could serve as a suitable substitute of the BSID when used with deaf in infants and children, although there was variability in what the Social-Emotional and Adaptive Behaviour scales measured as they were not subject to objective scoring procedures

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CHAPTER ONE: INTRODUCTION

The number of children with hearing loss is increasing dramatically, with the World Health Organisation (WHO) estimating that at least 278 million are impacted by a hearing impairment of more than 40 dB, and at least a quarter of these have had this impairment since early childhood (Swanepoel & Storbeck, 2008). Deafness may either be *congenital* (i.e. present at birth, whether due to genetic factors or prenatal trauma), or *acquired* (i.e. caused by genetic conditions, childhood diseases or trauma) (Brauer, Braden, Pollard & Hardy-Braz, 1998). Children who are hard of hearing or deaf may struggle to develop language and communication skills, which may impact on the child's "developing experiential base" (Mullen, 1999, p. 340). This in turn may impact on a child's socialization, behaviour, emotional development, self-image, sense of identity, emotional development and future academic achievement (Sattler, Hardy-Braz & Willis, 2006), and could result in developmental delays. This is particularly the case for children who have hearing loss before the age of four, as they do not have an established language framework. These children may also have challenges with certain motor skills, such as balance and co-ordination, and as a result motor milestones, such as walking, may be delayed.

These developmental delays may be exacerbated by the fact that, in over 90% of cases where children are diagnosed as having hearing loss, both parents have typical hearing. Consequently, parents are likely to feel overwhelmed and uncertain when interacting with their deaf or hard-of-hearing child, and often do not know how to engage with their child in ways to ensure optimal development. Parents of deaf and hard-of-hearing children thus require a lot of guidance and support from professionals (Andrews, Leigh & Weiner, 2004). Early intervention programmes are necessary to provide this service, as well as a framework

to help the child meet their full potential, despite hearing loss. In order that specialized early intervention can be implemented as early as possible developmental screening is necessary. The underlying principle of developmental screening is to identify a delay in a child, before the effects become serious. The earlier a delay is detected, the sooner a child can be included in an early intervention programme (Gilliam, Miesels & Mayes, 2005). Schorr, Roth and Fox (2009) state that the best prognosis for language development (and for that matter, all other areas of development) exists if hearing loss is detected and intervention has begun before the child is six months old. Only one such programme that currently exists in South Africa is the **H**ome **I**ntervention – **H**earing and Language **O**pportunities **P**arent **E**ducation **S**ervices (HI HOPES), which is situated in Johannesburg but provides services country-wide.

A core component of early intervention programmes is regular development assessments, which serve two primary purposes: pinpointing the child's evolving strengths and weaknesses relative to their peers, and using this understanding of the child to design strategies that allow the child to improve in areas of weakness. Up until the end of 2008, the developmental assessment utilized by HI HOPES was the Bayley Scales of Infant and Toddler Development (BSID), which was felt to meet the core needs of the programme in terms of providing sufficient and appropriate information on the child's development as a basis for the construction of early intervention strategies. However, due to the expansion of HI HOPES it was felt that the BSID no longer optimally met HI HOPES' needs, and another developmental assessment was considered as a possible replacement, namely the Developmental Assessment of Young Children (DAYC). Unfortunately, not much research has been conducted on the latter test, and it was uncertain whether the DAYC could be used as an effective and suitable replacement for the BSID within the HI HOPES context.

This research study therefore addresses this concern, by examining the use, advantages and disadvantages of both of these developmental tools within the HI HOPES context, in an attempt to ascertain whether they meet the programme's needs. The study also examined whether the DAYC would yield similar results to the BSID on the same sample of children and whether it could be considered to be considered to be a suitable replacement.

In Chapter 2 the pertinent literature related to the topic is presented. The chapter begins by offering an explanation of developmental screening, its importance in detecting early childhood deafness, as well as some of the difficulties experienced in the South African context. The literature then continues with a discussion on how deafness may impact on early childhood development, through examining how each area of development is interlinked and thus affected by the child's deafness. Early intervention programmes and the role that developmental assessments may play in these programmes are examined, with the BSID and the DAYC detailed as the assessments of interests in this study.

The mixed method approach used for this research is detailed in Chapter 3. This includes an outline of the research questions, an explanation of the research design and an overview of the theoretical considerations that were relevant for this research.

Chapter 4 presents the quantitative and qualitative results of the research, as well as an integrated discussion of the findings which are linked back to the relevant themes in the literature. The quantitative analyses and discussion are presented first, followed by the qualitative component. The two components are then drawn together in the chapter's conclusion.

The conclusions of the research are summarized in Chapter 5, by relating them back to the original research questions. The limitations of the current study are discussed, and recommendations for future research in this area are provided.

CHAPTER TWO: THEORETICAL AND LITERATURE REVIEW

2.1 *Developmental screening*

There are three different hearing screening tests that can be used on babies and toddlers (Storbeck, 2005). The first test, oto-acoustic emissions (OAEs), can be conducted before the infant is released from hospital after birth. A more accurate test is the measurement of the auditory nerve's response to sounds, a process known as the auditory brainstem response (ABR test). The third screener is usually performed by a paediatrician at the baby's six-week developmental examination, where the doctor will make a noise behind the baby's head (such as shaking a rattle), and note the baby's reaction to the noise. However, this test is not very reliable, as the baby may respond to the doctor's visual cues rather than to the noise itself, or the baby may not respond due to the fact that the sound of the rattle is only at one frequency.

The importance of infant screening is reported in a study conducted by Yoshinaga-Itano, Coulter and Thomson (2000), who examined children aged between 9 – 61 months. Half of the children who comprised the sample were born in hospitals in Colorado where hearing screening tests were mandatory, while the other half were born in hospitals in Colorado where these tests were not performed. The purpose of the study was to compare language development between children who were diagnosed at birth as being deaf or hard-of-hearing to children who were diagnosed at a later point. The children were matched into pairs and it found that the children who were born in hospitals requiring the screening tests and were thus provided with early intervention where needed, performed significantly better in expressive and receptive language, vocabulary, and speech intelligibility. This study is empirical evidence of a relationship between early detection and intervention, and language

development for children who are deaf or hard-of-hearing. Unfortunately, the study did not assess other developmental domains, and the impact these have on language and communication.

Further evidence for the value of infant screening is provided by a 1999 American study conducted by Van Naarden, Decoufle and Caldwell, which found that the average age at which children were being diagnosed with severe hearing loss was 2.9 years. Although these children were 2.9-years-old, their language ability was below that of a two-year-old, and yet their hearing difficulty had not been identified earlier (Nathani Iyer & Oller, 2008). In an attempt to address this issue, an aggressive newborn hearing screening campaign was implemented in American hospitals, and as a result 92% of infants are now being screened (Van Naarden, Decoufle & Caldwell, 1999). The average age for the diagnosis of hearing loss has subsequently dropped to 3 months, and as a result intervention could begin earlier.

Early intervention is particularly important if the parents are not deaf or hard-of-hearing themselves. When a deaf child is born to deaf parents, the parents generally know how to interact and engage with their child, whether they choose to teach their child to communicate orally or through sign language. Essentially, the parents present a "viable model for language acquisition, so that the deaf child is able to reach naturally and easily the milestones of language development essential to effective social interaction" (Lane, Hoffmeister & Bahan, 1996, p. 26). This is critical as deaf children do not progress through the typical language and communication building blocks that hearing children do, such as cooing and babbling. If for example, parents choose to teach their child sign language, the deaf baby learns by observing sign language used by others, storing these signs in memory, and is eventually able to make sense of the signs and use them to communicate. Deaf parents are able to understand their

child and can encourage the child to express himself. Lane, Hoffmeister and Bahan (1996) write that in this way deaf children are able to be active participants in discussions regarding a wide array of topics, from the more concrete, such as why they need to go to sleep, to the more abstract, for example, how to play in a fair way with other children. This then informs their general cognitive development

Deaf parents have the personal knowledge, understanding and experience to provide their child with a visually rich and stimulating environment that allows the child to explore their world and build their knowledge schemas (Meadow-Orlans, 1990). Often the environment teaches children how to search for visual instead of auditory cues from the environment, such as having a flashing light when the doorbell is pressed (Lane, Hoffmeister & Bahan, 1996). Deaf parents also use strategies that teach their deaf child how to engage with their world, such as physically guiding the baby's hands around the environment, and helping the baby become more visually aware of the environment (Meadow-Orlans, 1990). In addition, deaf parents of deaf children have often accepted their situation, and are able to pass this attitude along to their child (Lane, Hoffmeister & Bahan, 1996). They also tend to have a social network and support structures in place, and as a result the child is able to receive support from a variety of sources as they learn to navigate their world (Meadow-Orlans, 1990).

However, in South Africa, there is very little public information available that details issues of deafness. The media tends to focus on 'cures' to deafness, such as cochlear implants, without educating the public about more pertinent issues such as early screening, the impact on development that early intervention may have on the deaf or hard-of-hearing child, etc. (Aarons & Reynolds, 2003). As a result, the attitude of hearing South Africans towards the Deaf community has historically been one of ignorance. This has led to some misconceptions

about deafness. This is seen somewhat in the belief of parents with typical hearing that "sound is life and the lack of sound is the death of human connection" (Andrews, Leigh & Weiner, 2004, p. 38). Further, hearing parents may even mistakenly assume co-morbidity with another disorder, such as mental retardation (Meadow-Orlans, 1990), and it is not uncommon for hearing parents of deaf children to enter a form of mourning (Sheridan, 2001). Parents may also report feeling a sense of powerlessness or incompetence upon learning the diagnosis, or even an irrational sense of guilt upon hearing the diagnosis (Meadow-Orlans, 1990; Noorbhai, 2002).

Thus, these parents require a lot of guidance and support to enable them to learn ways to communicate with their child in the "absence of a common (that is, a spoken) linguistic system" (Meadow-Orlans, 1990, p. 285). They also need guidance on how to interact with their child. For example, parents can be so absorbed in adjusting to their own reactions to their child's diagnosis, that they are not really present when interacting with their child (Meadow-Orlans, 1990). She cites a study by Nienhuys and Tikotin (1983), which indicated that hearing mothers played less with their deaf children than hearing mothers played with their hearing children, and, and engaged less with their children overall. Such parents may also underestimate their child's capabilities, and protect them to such an extent that they inadvertently prevent them from exploring their world and developing appropriately.

2.2 *Development of deaf and hard-of-hearing children*

From infanthood, children learn to navigate their world and develop relationships with caregivers, siblings, peers, and others in their environment. Through interacting with their environment, they develop skills and abilities in a number of different areas, such as *physical*

movement (both gross motor and fine motor), *cognition*, *language* (both receptive and expressive), *socio-emotional functioning*, and *adaptive behaviour*. De Witt and Booysen (1995) explain how all of these areas are interlinked, and that a delay or deficit in one area will impact development in all the other areas. This interwoven aspect of child development is depicted below in Figure 1.

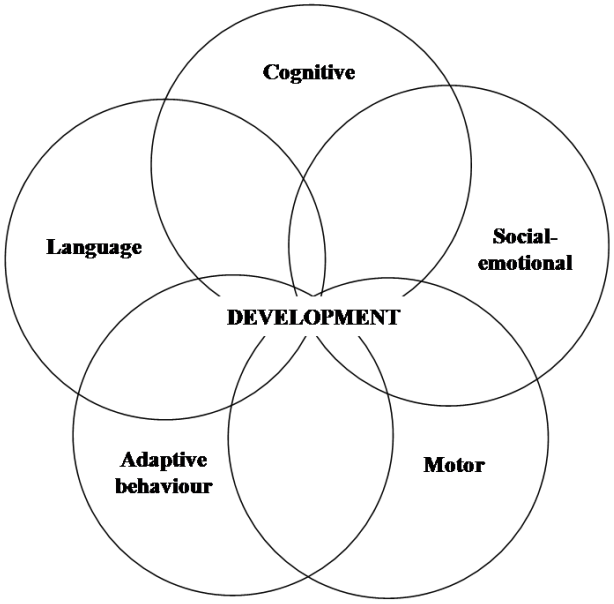

Figure 1. **The interwovenness of the various aspects of the child's development**

Adapted from M. W. De Witt & M. I. Booysen (1995). *Focusing on the small child: Insights from psychology of education*. Hatfield: Acacia, p. 4

Since this study focuses on the relationship between two developmental assessments that cover the aforementioned developmental domains, each domain will be explored in detail below with particular emphasis placed on how deaf and hard-of-hearing children are likely to experience challenges in each area. An in-depth understanding of developmental milestones is critical for early intervention, as the overarching principle of early intervention programmes is to prevent delays in all areas of development. Professionals working with these children need to have an understanding, not only of the different stages that the child goes through, but also how each area of development impacts the others. Examples of

possible intervention strategies that could be employed by an early intervention programme will be provide throughout.

2.2.1 Motor development

Motor development refers to the physical growth that occurs to the body, and the way that the body moves. There are two forms of motor movement, namely gross motor and fine motor. *Gross motor skills* involve the larger muscles of the body, and include activities such as crawling and walking. *Fine motor skills* use the smaller muscles, and involve the more complex motor skills, such as threading or cutting with a pair of scissors. Further studies investigating dynamic fine motor co-ordination, such as skipping, or visual-motor tasks, such as lacing or threading string through a board, have suggested that deaf or hard-of-hearing children may experience some delay in mastering the more complex fine motor tasks (Lewis, 2003).

Lieberman, Volding and Winnick (2004) have identified four stages of motor development, namely *reflexive*, *rudimentary*, *fundamental* and *specialized*. These authors stress that these stages are sequential, with the child acquiring new skills by building on the existing skills. For example, a two-year-old child will climb up stairs by putting both feet on each step, but at the age of three will learn to walk up the stairs one foot at a time (De Witt & Booysen, 1995). As the child grows, their motor movements become "more localized and specialized" (Fabes & Martin, 2003), with the authors providing the example of tickling a baby's foot. At birth, the baby will react to the tickling by moving their entire body (reflexive), but by the age of three the child will only move their leg in response. Basic, purposeful motions such as rolling over are termed rudimentary movements, movements such as sitting and crawling are

fundamental movements, and movements like skipping are considered to be specialized. If the child has delayed motor milestones, motor difficulties may emerge, and unless they are addressed the child may never fully acquire the skills they need. In addition, delayed motor development can impact the child's self-esteem and social development (Lieberman, Volding & Winnick, 2004).

Both hearing and deaf babies should have basic reflexes, which are automatic movements that the baby has no control over, such as blinking and sucking. As the baby ages, certain reflexes are replaced with more voluntary movements. For example, when the baby is around four months old, he or she will no longer suck automatically when offered food, but will voluntarily begin to chew and eat. There does not appear to be any difference between hearing and deaf babies with regard to the development from automatic to voluntary behaviour. During infancy, the baby will gradually acquire a number of motor skills, such as rolling around, sitting, crawling, standing, walking, grasping and climbing (Mwamwenda, 2004). Deaf babies also typically follow the same patterns of sensori-motor development as hearing babies (Lane, Hoffmeister & Bahan, 1996). For example, they will imitate facial expressions, stick out their tongues, mimic hand gestures, etc. However, Ittyerah and Sharma (1997) have shown that some deaf children may experience problems with balance and general co-ordination due to an inner ear problem that originates in the vestibular system (the sensory system housed in the inner ear that integrates all the sensory information required for balance and equilibrium). This may impact a child's balance, general co-ordination and overall motor development.

The most effective way for the child to develop their gross and fine motor skills is for them to have the freedom to explore their world (De Witt & Booysen, 1995). Children who feel

secure in this freedom tend to learn their world, the people in it, and develop an understanding of the objects in it sooner than children who are overly-protected. These children gain a sense of mastery or control over not only their movements, but also their world. This contributes greatly to the child's developing self-image (De Witt & Booysen, 1995).

Motor development is also important for speech production, as speech requires fine motor control (De Witt and Booysen, 1995). Whether deaf children are taught to speak orally or through sign language, this may be an area where parents need to help their children strengthen muscles, and in the case of sign language, improve finger dexterity.

2.2.2 Communication

Language serves at least three primary purposes (Schaffer, 2004). Firstly, it serves as a device for *communication*, a means of sharing ideas, thoughts and feelings with others. Language thus provides a foundation for forming relationships with others. The second purpose of language is to aid *thought processes*. It enables us to organize and label objects, experiences and concepts. It also allows children to develop symbolism, for example, children can remember an experience that occurred in the past, and can use a word to represent an object (Gonzalez-Mena & Widmeyer Eyer, 1997). Finally, language also serves as a means of *self-regulation*. Schaffer (2004) notes how studies such as that of Furrow (1984) observed how children would give themselves instructions in order to inhibit any impulses or restlessness in order to focus on the tasks at hand. This indicates that even young children are able to monitor and regulate their behaviour through language. This ability becomes more

pronounced as the child ages. Irrespective of the direction of the relationship between language and thought, their interaction is generally considered important.

Communication is a complex area of development, due to the many purposes it serves. Children use language to connect with other people, as a soothing mechanism, and as a means of expressing a wide range of emotions, from joy to distress. However Bee and Boyd (2004) note that even hearing children experience intense frustration when communicating with others, as they simply do not have the necessary range of words to communicate their thoughts. Fabes and Martin (2003) also note that some young hearing children struggle to distinguish sounds, and that they frequently struggle to reproduce sounds.

From birth, babies demonstrate an innate potential for language, and could be described as "language ready" (Schaffer, 2004, p. 274). All babies make gurgling and cooing sounds (recurring vowel sounds), such as *'uuuuuu'* (Bee & Boyd, 2004). At around the age of five or six months, the baby's facial muscles are developed enough to allow them to produce consonant sounds, which enables them to make consonant-vowel sounds, or babbling, such as *'dadada.'* Deaf babies follow the same pattern as hearing babies, making the same gurgling and cooing noises, and even produce babbling sounds (Lewis, 2003). Bee and Boyd (2004) write that babies make sounds that are not a part of the language they are hearing, which indicates a more innate linguistic ability. Therefore these early sounds and gestures are not necessary the result of the environmental influence. However, at around nine months, this changes, with hearing babies starting to concentrate their babbling sounds on sounds that are specially heard around their environment, and slowly abandon the "nonheard sounds" (Bee & Boyd, 2004, p. 211). At around this age, hearing babies also begin to communicate with those around them in a purposeful manner, using simple gestures and basic sounds to communicate

their meaning. This is when they begin to communicate meaningfully with those around them. This is the first observable difference in language development between deaf and hearing babies, as from around six months, babies with hearing loss start to decrease their verbal babbling (Gallagher, Easterbrooks & Malone, 2006). However, studies have shown that if a deaf child is exposed to sign language from birth, they "babble with their hands" (p. 242), in a similar way that hearing babies do vocally (Berk, 1999). Deaf children of deaf parents will begin to sign their first words at around the time that hearing children of hearing parents begin to utter their first words.

From around the age of two, hearing children are comforted through words, and also learn to comfort others through words, which is a result of their increased empathy towards others (Berk, 2004). Spoken language thus becomes a means of engaging with others, which aids social-emotional development. Brauer et al. (1998) cite Vernon and Andrews (1990) as stating that a four-year-old deaf or hard-of-hearing child (without any form of intervention) is likely to have a vocabulary of approximately 25 words or signs, while a hearing child is likely to have a vocabulary pool of between 2 000 – 3 000 words. At this age, a hearing child is also able to develop a sense of rhyme and an understanding of how to break words up into syllables, which are key phonological awareness strategies not only for language development, but also for reading and spelling at a later stage (Easterbrooks, Ledeberg, Miller, Bergeron & McDonald Conner, 2009).

Young, hearing children develop their vocabulary and understanding of language at a rapid rate, with the period from birth until five years being considered the critical period for language acquisition, whether it is spoken language or sign language (Schaffer, 2004). By the age of 6, hearing children usually have a vocabulary of 10 000 words (Fabes & Martin,

2003). They have an understanding of both semantics (the meaning of words) and pragmatics (the appropriate use of language within a social context), and also have an understanding of basic grammar, such as using different tenses. However, it should be noted that vocabulary range and understanding of language is dependent on the child's cognitive development and environment, as the more the child is exposed to and learns, the greater and richer their linguistic knowledge will be.

The greater the delay in developing a solid linguistic framework, the more far-reaching and serious the effects are likely to be. If a child is not exposed to such a framework during early childhood, they are likely to underperform academically, struggle to communicate their thoughts with others and find it difficult to maintain attention (Tharpe, Sladen, Dodd-Murphy & Boney, 2009).

Deaf children of deaf parents will begin to communicate with two-sign combinations at the same time that hearing children begin to speak their first two word combinations (Schaffer, 2002). Schaffer stresses that the sole distinction between sign and spoken language is the *modality*, in other words whether the person communicates manually (and in sign language) or orally (as in spoken language).There have been numerous studies that have confirmed that deaf children who are exposed to sign language from birth can develop language at the same rate as hearing children (e.g. Bonvillian, 1999 in Lewis, 2003).

Parents of deaf children often struggle to make a decision regarding which language to use when communicating with their children (Storbeck, 2005). This is an issue of great debate in the literature, with authors either advocating the *manual* approach (i.e. sign language) or the *oral* approach. The oral approach uses a combination of any residual hearing the child may

have together with lip reading. Many professionals encourage parents to use the oral approach, believing that in the long-term “good spoken language skills afford hearing-impaired children many personal, social and educational advantages and are seen as an asset in many areas of employment in adult life” (Ling, 1984, p. 12). However, for parents this can be a very emotional decision, and they are likely to require a tremendous amount of support, guidance and information on both modalities before making their choice.

Through meaningful communication with parents, siblings, teachers, peers, etc, “deaf children not only gain facts; they gain behavioural and cognitive strategies, knowledge of self and others, and a sense of being part of the world" (Vaccari & Marschark, 1997, p. 793, in Lieberman, Volding and Winnick, 2004). This relationship between a child’s communicative ability and other developmental domains is demonstrated by a study conducted by Schorr et al. (2009). The study investigated the effects of cochlear implants on children’s quality of life, where the children where asked to rate their quality of life in a number of different areas on a five-point likert scale after receiving a cochlear implant. The children reported that in addition to finding it much easier to communicate with others, they also reported improved social interactions with their peers, that they found it easier to make friends, and had improved academic performance. While this study was conducted on an older group of children (5 – 14 years of age), it indicates a correlation between communication and other areas of development.

Early intervention should focus on improving communication and interaction between the child and parents. Lane, Hoffmeister and Bahan (1996) state that approximately only 10% of hearing parents report that they feel that they can communicate effectively with their deaf

child. This can be addressed by teaching parents means of communicating either orally or through sign, and using communication to facilitate growth in other areas of development.

2.2.3 Cognitive

Currently there is no single theory that completely accounts for the complexities of cognitive development. The two most prominent theories are those of Jean Piaget and Lev Vygotsky.

Piaget (1959) believed that *self-discovery* was the fundamental tenet underlying cognitive development. As the child learns through experience, they acquire knowledge of their world and themselves. He theorized that there are two crucial factors which enable children to build knowledge (Bee & Boyd, 2004). The first factor is *social transmission*, where the child learns from information passed on by parents, teachers, etc. This is the way in which the child acquires knowledge of names and characteristics of objects, and learns to develop and manipulate knowledge schemas. Mwamwenda (2004) writes that the role of the adult is to provide the child with information about objects, actions, etc., whilst ensuring that the child actively engages with that information.

However, the deaf or hard-of-hearing child may find it difficult to pick up this knowledge, unless the people around him specifically use different strategies to meet this need in the child. Children learn well through non-verbal forms of social transmissions, such as imitation, with studies showing that from birth, babies can imitate facial expressions and gestures. As the child grows older, they begin to imitate behaviour. This would therefore be a key area of focus for parents of deaf children, as the modelling of actions, behaviours, and

sign language is the primary means of communicating knowledge to their child (Meltzoff & Moore, 1977, in Bee & Boyd, 2004).

The second factor that impacts self-discovery is *experience*, where the child learns through his interactions with his environment. In other words, children learn as they "touch, manipulate and experiment with various objects in their environment, as well as interact with others" (Mwamwenda, 2004, p. 49), and "if children can't experience by seeing, touching, feeling, smelling, tasting, or hearing, in all probability they will not 'get it'" (p. 49). This is particularly the case during the first two years of a child's life, a period that Piaget termed the sensori-motor period. This period emphasizes the child's exploration of their world, with Whitehead (1997) citing Wood (1988) as stating that the child learns through "an active doing [i.e.] the motor element and the seeing, touching, tasting and listening [i.e.] the sensory element" (p. 57). However, if parents do restrict their child's movements, they prevent their child from experiencing their full environment, and thus hinder their cognitive development.

Piaget believed that the reason why both social transmission and experience are such powerful tools in cognitive development is the sense of wonder learning instils in the child, which supports the emphasis Erikson placed on allowing the child to develop autonomy and a sense of initiative, which will be discussed later. He writes that even in the case of social transmission when the child has something explained or demonstrated to them, they "invariably imagine that they have discovered it by themselves" (Piaget, 1959, p. 12), which not only allows for cognitive development, but also fuels their autonomy and sense of initiative.

Piaget (1959) believed that language was interwoven with cognitive development, observing that while he learns, the child is often "impelled, even when he is able, to speak as he acts, to accompany his movements with a play of shouts and words" (p. 14). However, he argued that language was merely a tool to enhance cognitive development. He believed that personal experience was the primary and most effective means of cognitive development. It did not matter whether the child gained this experience through imitating a model, through communication or through self-initiative, the critical thing was for the child to *experience* the task personally.

Vygotsky supported Piaget's view that social interaction and personal experience were important components of cognitive development. However, he believed that language played a far more critical role in cognitive development, stating that children use language for "self-guidance and self-direction" (Berk, 1999, p. 337). Much research supports this view, with studies demonstrating how children between the ages of two and five will use this ego-centric speech as a means of working through tasks, providing themselves with instructions on how best to approach and complete a task (ibid).

Behrend, Rosengren and Perlmutter (1992) examined how young children use ego-centric speech when performing novel tasks. They found that children who use ego-centric speech while completing a task are more likely to perform well on the task than children who do not use such speech. The children who used egocentric speech were able to pay sustained attention when performing the task and were more likely to show improvement when subsequently performing the task than children who did not use this technique. Clearly, deaf children would need to be encouraged to develop this self-directed speech, particularly given that they may have a fairly limited vocabulary range.

Language is thus an important tool, through which children learn cognitive strategies to approach the cognitive tasks. As the child grows up, this self-directed speech gradually evolves into an internal dialogue, which enables children to reason silently. There is thus a clear link between language and knowledge acquisition. Early intervention programmes can ensure that families learn strategies to teach the young deaf child the language for the objects in their environment. An example of such a strategy would be signing or mouthing the name of the object to the child while the child is examining the object, taking great care to line up the signing with the child's line of vision. Deaf children also need to be taught different means of reasoning and problem-solving. As they will not be able to pick up verbal reasoning through incidental learning, this needs to be modelled, either orally or through sign language.

Early intervention programmes could also enable the family members to provide the child with as many opportunities to explore their world as possible. Given that families often tend to be protective over their deaf child, this may be an area where the programme can provide some support and guidance, in teaching the families how to provide barriers for their child, whilst still enabling the child the experience of exploring their world, and developing their cognitive skills through self-discovery.

In his research on the effects of early intervention on cognitive development during the child's first five years, Guralnick (1998) found that declines in cognitive development were significantly decreased. In other words, the gap between the child's ability and the target ability decreased as a result of the early intervention.

2.2.4 Social-Emotional

Communication plays a pivotal role in socio-emotional development. It may affect the child's attachment style, development of peer interactions and understanding of social rules, as well as the child's sense of identity. These areas shall be discussed below, together with possible areas in which deaf and hard-of-hearing children may benefit from early interaction.

A warm, reciprocal relationship between parent and child enables the child to develop a secure attachment. Attachment is defined as the "outcome of the response of the parents to the absolute dependency of the infant at the beginning, and of the baby's propensity to relate" (Joyce, 2005, p. 6). This dependency is both *physical*, in terms of being kept warm, nurtured and healthy, and *emotional*, in terms of creating a sense of security within the baby. Erik Erikson viewed the emotional sense of comfort and security as the primary developmental task of infancy, where the child learns a basic sense of trust towards others. This early relationship thus sets the mould for future relationships, and a child with a more secure relationship is likely to be more "prosocial, empathic and socially competent" (Andrews, Leigh & Weiner, 2004, p. 159) than a child with an insecure attachment. Attachment also influences the baby's overall sense of safety and security, his sense of self and self-esteem, and the capacity in which he feels free to explore his world (Joyce, 2005). Secure attachment also serves as a context for an understanding of communication to develop (Andrews, Leigh & Weiner, 2004), and as a space where the infant begins to discriminate between acceptable and unacceptable behaviour (Mwamwenda, 2004).

However, with deaf babies and young children, parents often tend to be more directive in their interactions which will impact on the child's sense of freedom and ability to explore

their world. This may be due to a certain amount of frustration of the mother's part, as the mother-child interaction and bond with a hearing baby would rely substantially on the child's communication skills (Price & Bochner, 1991). However, with a deaf baby, the mother-child interaction relies more heavily on visual and tactile cues. Further, both mother and child need to engage actively in order for the child to develop socially and emotionally. If the parent is too caught up in their own feelings of loss, confusion, etc., then they may have not have the "psychological energy to fully connect or communicate with their child" (Noorbhai, 2002, p. 1). It is therefore critical for early intervention programmes to be cognizant of the parent-child interaction, and facilitate its growth through the early intervention programme. This is of vital importance, as Tharpe, Sladen, Dodd-Murphy and Boney (2009) cite studies such as that conducted by Bess (1998) which suggest that unless social-emotional development is purposefully addressed and the child develops good attachment to the people around them, and a sense of trust towards them, deaf and hard-of-hearing children may begin to develop low self-esteem, show increased signs of stress and may even develop behavioural problems during middle to late childhood.

Hearing children learn to listen for when their mother is present, even though she is not within their visual field, for example by listening for her footsteps, etc. If, for example, his mother is out of his visual field, he has no way of knowing whether his mother is present or not. It is therefore important for the mother to provide the baby with increased "tactile sensations, direct contact, and visual input for communication" (Andrews, Leigh & Weiner, 2004, p. 160) as a means of compensating for the lack or auditory cues.

From the age of 2 years, children begin to feel a gamut of new feelings, which are fuelled by a series of emotions that stem from their increasing sense of self, such as embarrassment,

guilt and pride. During this stage, the child learns to be a discrete individual in control of themselves and to interact with the surrounding environment in a purposeful and independent manner. In order to accomplish this, the child needs to be provided with space and freedom to engage with the world. During these formative years, the child is exposed to "family-orchestrated child experiences" (Guralnick, 2005a, p. 315), where the family, and the parents in particular, determine which familial and environmental experiences the child is exposed to. Parents enable the child to explore these surroundings safely through providing rules and shaping boundaries through the use of language. Erikson believed that if this is done successfully, the child will have mastered the second developmental task, namely gaining a sense of autonomy. If this is not successfully resolved, the child is likely to feel a sense of doubt, and will become increasingly inhibited in their interaction with their world.

During this stage, the child is very much a product of familial attitudes and behaviour. If the child is over-protected then the child will not develop this sense of autonomy For example, if the family believes that the child is vulnerable and as a result overprotects and constantly supervises the child, the child is unlikely to gain that feeling of autonomy (Meadow-Orlans, 1990). Mwamwenda (2004) cautions that there is a correlation between parental restrictiveness and aggressive and frustrated feelings within the child. In such cases, the child may even attempt to show their autonomy forcefully, which may be misinterpreted by the family as rebellion (Andrews, Leigh & Weiner, 2004). Moreover, if children are not allowed to explore their world freely, or feel overly dependent on others (such as their parents) then their "self-confidence is shattered, and they approach the world timidly and fearfully" (Berk, 2004, p. 367). According to Erikson, this results in a sense of shame or doubt in the child, which prohibits exploration and the sense of discovery in the child. This not only has

repercussions for the child's cognitive development, but also the way in which they engage with others around them.

If deaf children are not encouraged to develop a sense of independence, they are also likely to experience tremendous anxiety at being separated from their parents (Lane, Hoffmeister & Bahan, 1996). It is particularly difficult for deaf children to assert their need for autonomy as they cannot easily communicate this need. Parents may thus need to be shown ways in which to allow their children the freedom to explore their world, so as to develop this sense of autonomy. For example, they could be taught how to relax certain rules and allow their child more freedom when appropriate. They may require some guidance in terms of explaining and clarifying the boundaries to their child.

In working with families of deaf children, early intervention programmes could explore means of enhancing the socio-emotional interaction between the child and family. Some of these intervention strategies can be relatively simple. For example, children need interactive support when modelling learned behaviour and language, such as a child between the ages of 18 – 24 months, who witnesses people around her saying goodbye to each other and waving. If the child imitates this, she may do so in the incorrect social context. Parents of hearing children are likely to correct this, and explain the social context in which this would be appropriate (i.e. when people are leaving). The parents of deaf children could be taught how to demonstrate socially appropriate behaviour in meaningful ways to their children. The families could also be taught how to engage with their child, so as to facilitate feelings of trust, autonomy and initiative through creating channels of communication and social connections (Whitehead, 1997).

2.2.4.1 Play

Sheridan (2001) conducted a number of one-on-one, in-depth interviews with deaf children. When analyzing these interviews, she found that their stories contained a number of common themes, most noticeably that of play. The children reported that the most crucial aspect of play is communication, with one child stating that "It's not whether you are deaf or learning, it's how you communicate" (p. 218). Andrews, Leigh and Weiner (2004) write that play is also affected by the child's socio-emotional ability, which stems from the earliest social relationships, as well as cognitive abilities. They argue that play blends both the child's grasp of reality and their imagination. It therefore requires a sufficient understanding of reality, as well as cognitive flexibility and the ability to think abstractly and creatively. Play allows the child to explore their own self, and their self in interaction with other people (Berk, 2004). Berk cites Vygotsky as stating that play teaches children to follow social rules and their own internal thoughts, rather than merely acting out their impulses.

Play combines social skills, imagination, language and attention, and requires a certain amount of flexibility from the child. It teaches children to interact co-operatively with each other, and serves as a platform for children to solve social conflicts. Children use play to learn about the effect that their actions have on others (Gonzales & Widmeyer Eyer, 1997). It provides a space for young children to be active and thus develop their motor skills. Fantasy play also involves a number of cognitive skills, such as memory, imagination, the ability to abstract and apply knowledge, logical thought and reasoning (Fabes & Martin, 2003). Children, in fact, use more advanced cognitive skills during pretend play than when performing any other activity (Schaffer, 2002). Numerous studies have indicated that children who often engage in fantasy play tend to perform better in a myriad of testing areas, such as

cognitive ability, language, and even creativity (Schaffer, 2002). Play also enables the child to plan and execute motor movements. Through play, they also develop an understanding of space around them, and how to move through their environment. Play could be considered a driving force of development, as it incorporates all areas of development, and it is through play that children experience the freedom to attempt new and challenging activities.

Spenser and Meadow-Orlans (1996) examined deaf children's play at three-month intervals from 9 – 18 months. They included three samples in their study, namely deaf children with deaf parents, deaf children with hearing parents, and hearing children with hearing parents. They found that from the age of 18 months, deaf babies with deaf parents and hearing babies with hearing parents played in similar ways, with children in both samples showed similar patterns in how they manipulated toys and planned their play. However, approximately only half of the deaf children of hearing parents showed these patterns. Spenser and Meadow-Orlans indicated that this suggests a relationship between language (whether oral or sign) and play, where the more extensive the language base and richer the communication, the more sophisticated the play is likely to be. This finding was further substantiated by a later study conducted by Spenser, with a sample of children aged between 24 – 28 months, which elicited a similar result.

If deaf children have access to other deaf children, their social interaction is likely to be similar to the interaction of hearing children. They are more likely to develop friendships with their peers, due to a sense of acceptance from the deaf children and their parents (Sheridan, 2001). However, as Lewis (2003) notes, the deaf children of hearing parents often do not have such a social circle, and may not have the opportunity to interact with other deaf children.

Deaf toddlers and young children of hearing parents tend to engage in more solitary play than hearing children. They also tend to engage in less pretend and fantasy play, where children have the chance to create stories, characters and share ideas. As a result of the solitary play and lack of fantasy play, deaf children have less opportunity to develop effective communication and understanding of language, which this makes it increasingly difficult to engage with their peers (Lewis, 2003). This also makes it difficult for deaf children to learn to model their play and behaviour on the play and behaviour of others. Sheridan (2001) writes that deaf children may experience a sense of isolation from people they perceive as being different from them, and may this be constantly aware of and feel uneasy towards such people.

Early intervention programmes should work with the parents towards instilling a sense of autonomy within the child. If the deaf child is able to develop a sense of autonomy, they are able to initiate strategies that enable them to assert themselves and integrate themselves with their peers. For example, they may direct play towards more active play (rather than focusing on more verbal play such as story-telling) or even take the initiate to teach their peers rudimentary sign language to promote peer communication (Sheridan 2004).

2.2.4.2 Theory of Mind

From the age of four, children begin to gain an understanding that people have their own minds, thoughts and feelings that may be very different from their own thoughts and feelings. This is termed '*Theory of Mind*' (ToM). This social understanding of others and their resultant behaviour stems from the child's ability to form mental representations of other

people's mental states and have an understanding of their needs and feelings. It is this understanding that enables the child to develop a sense of empathy towards others (Edmondson, 2006). However, as Lewis (2003) points out, most of this understanding stems from children being exposed to conversations taking place around them, whether the conversations are signed or spoken. However, deaf children of hearing parents who are not exposed to such conversations may find it more difficult to develop the understanding that underpins ToM, as they do not have incidental evidence of it (Schick, de Villiers, de Villiers & Hoffmeister, 2007).

It is difficult to identify the exact relationship between language and ToM in deaf children, as many studies utilize verbal tests as part of their methodology (Schick, de Villiers, de Villiers & Hoffmeister, 2007). For example, Russell, Hosie, Gray, Scott, Hunter, Banks and Macauley (1998) hypothesized that a delay in language acquisition and communication would result in a delay in the development of ToM, and that, as the child's language and communication skills improve, so will their understanding of ToM. Their sample consisted of 32 children in Aberdeen School for the Deaf, who were divided into three age groups, namely 4 years 9 months to 7 years 11 months (youngest group), 8 years 9 months – 12 years 6 months (middle group) and 13 years 6 months – 16 years 11 months (oldest group). The researchers used an unseen change-in-location task to assess the children's ToM. The task entails the child being told a story (both orally and through sign language) about a character who places an object in a container before leaving the room (for example, inside a box). Another character enters and moves the object to a different location (such as a basket) and then leaves. The first character reappears, and the child has to determine where that character would look for the object. The study found age to be a factor in ToM, with three-fifths (60%) of the oldest group passing the test, compared to only 17% of the youngest sample. However,

the authors noted that despite the signification difference between the age groups, two-fifths (40%) of the oldest group still experienced difficulties in understanding ToM. A possible reason for this may be the verbal nature of the ToM task (Schick, de Villiers, de Villiers & Hoffmeister, 2007).

With this in mind, a study was designed to investigate the relationship between language and ToM, using both verbal and non-verbal ToM tasks, in order to determine whether removing the verbal aspect of the ToM tasks would affect the child's understanding of ToM (Schick et al, 2007). The question driving the study was whether language affected the results of ToM research because of the verbal nature of the tasks, or whether language delay affects other areas of cognitive development. The sample consisted of young children aged between four and seven years. There were four groups in the study, namely hearing children, deaf children with deaf parents who spoke American Sign Language (ASL), deaf children of hearing parents who spoke ASL and deaf children of hearing parents who communicated orally. There were four ToM tasks in the study. The first two tasks were verbal ToM tasks. There were three hidden change-in-location tasks, along with two unexpected contents tasks. This consisted of unexpected objects being hidden inside two different containers (a plastic spoon inside a Crayola crayon box and a small toy car inside a milk carton). The children looked inside the boxes and were asked whether they had expected those objects to be inside the box and what their friend who had not looked inside the box would expect to find in it. The researchers also included two non-verbal ToM tasks, namely the hidden sticker game and the surprise face game. In the hidden sticker game a child has to correctly guess which of four identical white boxes has a sticker underneath. At first the child was alone with a researcher (who took the role of 'knower'), who would point at the correct box. Once the child understood the task a second researcher (who took on the role of guesser) would enter the

room with a blindfold. Blindfolded, the guesser would point at an incorrect box while the knower pointed at the correct box. The researchers would alternate roles in order every time. The object of the game was for the child to learn to follow the researcher who had "visual access" (p. 383) to the boxes. The surprise face game entailed the child following a series of pictures that told a story and being asked to complete the series by using either a surprised face or a neutral face. Three stories showed a person watching as an object is placed inside a box (in which case their facial expression would be neutral), and three showed that the person was not aware of the object in the box (which would result in the surprised face). The results showed that deaf children of hearing parents performed worse than both hearing children and deaf children of deaf parents on both the verbal and non-verbal ToM tasks. These results indicated that a delay in language acquisition may result in a delay in mental reasoning, which provides a basis for the understanding on ToM. The researchers cited Lohmann and Tomasello (2003) as stating that it is "difficult for children to construct an understanding of the representational nature of mental states purely from visual scenes alone" (Schick et al, 2007, p. 392), since they need language to facilitate this understanding.

2.2.5 Adaptive behaviour

Adaptive-behaviour is closely linked to the child's social-emotional development, and could be defined as the "degree to which [he] functions and maintains him/ herself independently and also satisfies cultural requirements for personal and social responsibility" (Cicchetti & Sparrow, 1990, p. 173). It is thus an important component of a child's development as it provides insight into how the child will understand and adapt to different contexts. It also examines how children respond to adults around them. Self-help skills are also an important aspect of adaptive behaviour. Key to adaptive behaviour is a sense of autonomy in the child,

where the child slowly begins to perform tasks independently and explore their world unaided. The parents in this case assume the role of guides, where they allow the child the opportunity to tackle new tasks and explore the world with their support. However, research has indicated that mothers of deaf children tend to be "less flexible, less imaginative, less encouraging and less permissive while being more didactive, more intrusive" (Marschark, 1995, p. 58), and that as a result their children tend to be dependent on their mothers, and are often delayed in reaching their developmental milestones such as toilet-training, self-feeding, etc. However, deaf children of deaf parents appear to reach these milestones at a similar rate to hearing children (Meadow, 2005). In a classic study conducted by Meadow in 1966, deaf children of both hearing and deaf parents who attended the California School of the Deaf in Berkley, California were examined. She matched the two samples according to gender, age, IQ score, degree of residual hearing, family size, and to some extent the family's socio-economic status, and found that deaf children of deaf parents were more likely to be responsible, independent and mature than deaf children of hearing parents. It was thus hypothesized that the delay in these areas are not due the child's deafness but rather due to what they have been exposed to, where for example, deaf parents will provide their child with greater responsibilities than hearing parents. It is important to note that Meadow reported that the difference in adaptive behaviour / independence between deaf children of deaf parents and deaf children of hearing parents increased as the children aged, so it may be hypothesized that the difference between the two is not likely to be significantly different during early childhood.

An example that illustrates the delayed independence of deaf children is provided by a study conducted by Wedell-Monnig and Lumley (1980), which found that deaf children were less likely to explore a play room independently, and would attempt to draw their mother into

their explorations of the environment. They also reported that the children were more likely to exhibit learned helplessness.

2.3 *Early intervention programmes*

Guralnick (1998) writes that in order for an early intervention programme to be as effective as possible, it should meet the needs of the child and their family on a number of different levels. The three key parental needs are *information*, *guidance* and *counselling* (Guralnick, 1998; Ling, 1984), with the primary focus being on the first two components. As each child and family is unique, early intervention programmes must be flexible and devise interventions that meet those unique needs. The principle underlying early interventions is "one of compensation – that certain individuals require additional or specialized assistance to meet their developmental potential" (Black, 1991, p. 51).

The earlier the intervention, the more likely it is that the parents and family will communicate effectively with their deaf or hard-of-hearing child (Noorbhai, 2002). For example, parents may be taught communication strategies, such as emphasizing non-verbal communication, and basing language firmly within a context. Parents also need to be taught practical aspects of handling their child, such as allowing their child more autonomy (Andrews et al., 2004). Further, active parental involvement during early intervention is one of the strongest predictors of good language ability (Moeller, 2000).

Inclusion places the child at the centre of their family unit, and encourages the child to participate in the various family activities and routines (Guralnick, 2005b). Ling (1984) and Noorbhai (2002) write that as the family is the most fundamental system for young children,

it is important to give the family an integral role in the early intervention programme. This is best explained through the family systems approach (Noorbhai, 2002). This approach states that the family works as a system, where all the family members are discrete individuals who are interdependent. In other words, if one family member is affected by something, then all family members are likely to be affected too (although to differing degrees). For this reason, it is critical that all family members are involved in the programme to ensure that their needs, in addition to the child's needs are being addressed. Families who are included at such a fundamental level in early intervention programmes and have their specific informational and support needs met have reported that the programme in fact "sustained them" (p. 665) during a time of the familial stress (Carpenter, 2007).

Upon hearing of their child's diagnosis, parents often experience a "crisis of information" (Guralnick, 1998, p. 20), in terms of both deafness, and how their child's development is likely to be affected. Guralnick (1998) writes that parents may need a lot of guidance in terms of attachment and bonding with their child, the developmental delays their child is likely to manifest, and how to interact with their child and other members of the family. It is therefore important to meet the parental need for information on every level, since if the need is not met, it may impact the quality of the parent-child relationship. This is particularly a concern if the parents are already feeling anxiety or distress over their child's diagnosis. For example, as deafness is sometimes co-morbid with learning disabilities, the inability to communicate, and inability to apply knowledge abstractly, it is thus important to have properly trained professionals working with families of deaf children, as they will have specialized knowledge of deafness, the relevant developmental milestones and the available interventions, as well as a clear and unbiased knowledge and insight into deafness (Storbeck, 2005). A further example of this is provided by Tharpe et al (2009), who write that even children with

minimal hearing loss are likely to struggle when learning to communicate effectively without some form of early intervention and support. In part, this is due to the increased mental effort they exert when listening. This may be difficult for parents to fully grasp, and an early intervention programme could address such concerns and uncertainties. Further, parents often require guidance in learning how to read the child's cues, and in developing the relationship they have with their child appropriately (Guralnick, 2005b). For this reason, Guralnick recommends devising programmes that emphasize parental support and empowerment, as well as the family working together with the child.

The primary challenge facing early intervention programmes lies in assessment, where the "traditional measures are most often at odds with the needs and missions of early intervention" (Bagnato, Neisworth & Munson, 1997). Such tests provide an indication of the child's limitations, rather than placing the child within his context and examining areas of potential. An ideal way of providing a holistic assessment of a child is through developmental assessments, which examine all developmental domains. Through assessing children in this manner, the professionals assemble the knowledge of the individual child to design an intervention programme that targets their unique needs. It also provides a benchmark against which to measure the child, or a way to track the child's individual progress. This is illustrated overleaf in the following 4-stage model in figure 2 proposed by Bagnato, Neisworth and Munson.

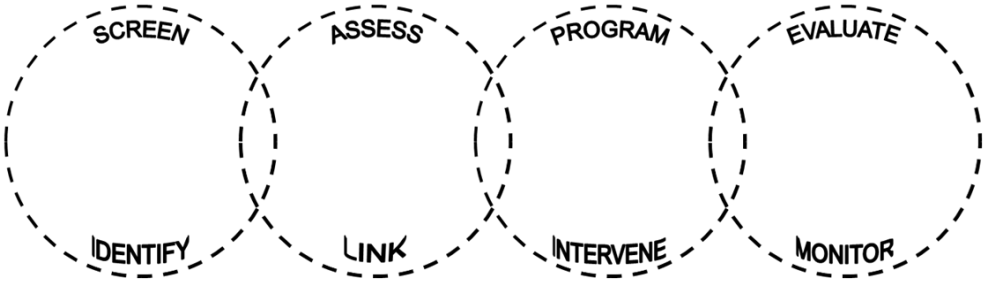

Figure 2. **Linking assessment and intervention goals**

S. J. Bagnato, J. T. Neisworth, & S. M. Munson (1997). *LINKing assessment and early intervention: An authentic curriculum-based approach*. Baltimore: Paul H. Brooks Publishing Co., p. 14.

Once the child's disability has been diagnosed through the relevant screening tests, they should be comprehensively assessed (Bagnato, Neisworth & Munson, 1997). The results of this assessment should inform the professionals of the child's areas of strength, areas of weaknesses and how best to approach the child. This enables the professionals to devise a series of strategies that target the child's weaknesses, whilst enhancing the strengths. A critical component of the model is the fourth stage which is the monitoring of the child's progress at regular intervals. This allows for the adjustment of the strategies used, to ensure that the child's ever-evolving needs are being identified and met through the early intervention programme.

2.3.1 **HI HOPES**

In 2006, an early intervention programme was founded in South Africa that aimed to provide early intervention services to young deaf and hard-of-hearing children and their families. The **H**ome **I**ntervention – **H**earing and Language **O**pportunities **P**arent **E**ducation **S**ervices (HI HOPES) provides home-based, family-centred support to children aged three years and younger, and was closely modelled on the international, well-established SKI-HI programme that is based in the United States (Storbeck & Pittman, 2008). HI HOPES works in collaboration with other health-care professionals, such as audiologists, paediatricians, etc., to

provide families with the holistic support and information needed in order to empower them. These professionals are often the ones who refer the deaf and hard-of-hearing infants to HI HOPES for such intervention. HI HOPES is currently based in the Gauteng, Western Cape and KwaZulu-Natal provinces. At the conclusion of the three-year pilot phase, there were plans to expand to a nation-wide level. HI HOPES works with the families of deaf and hard-of-hearing children through Parent Advisors (PA's), who have been trained by HI HOPES to provide the necessary guidance and support to the families. Noorbhai (2002) stresses that South African research (e.g. Fair & Louw, 1999; Gopal, 1999) has indicated that cultural factors are likely to impact the success of an early intervention programme. Therefore, once a geographic match has been made, PA's are matched as closely as possible to their respective families, in terms of race, home language and religion. The PA's meet with the families on a weekly basis, in order to offer sustained support. One of the key challenges is shifting the families' mindset from merely accepting the fact that their child is deaf, to being more proactive in interacting with the child and thus provide an enabling environment for optimal development of their child. It is in this arena that the PA's work with the families, informing, equipping and teaching them various strategies in order to effectively engage in conversations with the children.

There are a number of reasons why PA's arrange home visits with the families they have been assigned to. Research has indicated that young children learn best when in their own environment, surrounded by familiar toys, furniture and objects, as these tend to provide the child with a level of comfort and security in which learning is optimal (Thompson, Atcheson & Pious, 1985). The primary reason is that the home environment is authentic for the child, and thus creates the ideal context for the child to learn and develop. The parents and primary

care-givers are considered to be the 'experts' on the child, and their input and feedback is thus a critical component of the HI HOPES programme.

In addition to providing families with guidance and support in interacting with the deaf and hard-of-hearing children and teaching families strategies in communicating with the children, early intervention programmes also provide bi-annual developmental assessments of the children's overall development, such as their motor and socio-emotional abilities, with particular attention paid to their language development (both receptive and expressive). As noted in the previous section, the developmental domains are so enmeshed, and consequently no area of development can be understood in isolation, as each area of development could impact the success of the programme. For example, Briggs-Gowan and Carter (2007) write that the child's socio-emotional skills may play a role in early intervention programmes. A child who is more withdrawn, fearful of separation from their mother, or who displays oppositional behaviour is less likely to connect with professionals, such as the PA's and may be less willing to participate in the intervention programme.

In addition to conducting a holistic development assessment of the child, HI HOPES also administers the Language Development Scale (LDS) on a quarterly basis, in order to track the child's language development (Storbeck & Pittman, 2008). This is to aid the PA's and programme administrators in tracking individual language development, as this is the pivotal focus of HI HOPES. While all areas of development are considered to be important and are addressed in the programme, the primary challenge faced by the children at HI HOPES is the domain of language and communication.

The LDS and other developmental assessments are conducted at regular intervals, so that the intervention programmes can track the child's progress, and then adjust the intervention strategies to best meet the child's changing needs. These individualized strategies are implemented during the PA's weekly home visits (Storbeck & Pittman, 2008). The PA's typically spend one hour a week in the homes of the children they work with, and spend the hour teaching the parents, siblings, and caregivers strategies that enable them to engage with the child more effectively. They work on teaching communication strategies in the mode that family has chosen for the child (i.e. either oral or manual). They also demonstrate strategies that will promote growth in the areas that the developmental assessments have indicated as being areas of weakness for the child.

2.4 *Developmental assessments*

Since the 1970s, there has been an increase in the administration of developmental assessments on infants and toddlers. The rationale underlying assessment of infants is that these assessments can be used as diagnostic tools that can pinpoint a child's areas of strength as well as limitations and areas of growth (Luis & Jansen, 2001), and by evaluating these, professionals can devise intervention and / or teach strategies that can address these areas.

There are very few tests currently that are suitable for children aged two years or younger. There are a number of difficulties involved in the assessment of toddlers, as they are too young to follow instructions and provide insight into their abilities, and Gregory (2007) describes infant assessment as an extremely challenging and complex process. Firstly, Voress and Maddox (1998) caution that a single administration of a test may not provide an accurate and holistic view of the child's abilities, citing the rapid development of young children.

Secondly, most tests for babies and toddlers focus only on certain aspects of development (Aitken & Groth-Marat, 2006). For example, Briggs-Gowan and Carter (2007) published research on the value of the Infant-Toddler Social and Emotional Assessment (ITSEA) in informing strategies used in early intervention programmes. However, this test only focuses on socio-emotional development, and does not provide the parents or professionals any insight into other areas of the child's development yet. Other tests only focus on cognitive development, with no focus on other aspects of a child's development, such as language and motor abilities. Given how intertwined all areas of development are, by only assessing certain areas of development, the programmes cannot provide a holistic picture of the child, and of their general strengths or weaknesses. For example, the professionals may have a score for the child's socio-emotional development, but unless it is put the context of all the other areas of development, such as cognitive, language and adaptive behaviour, the professionals will not know the optimal strategies to implement in the early intervention programme. Therefore, in order for an intervention programme to gain insight into the child, information is need on every area of a child's development.

Many of the assessments for infants and toddlers were developed with the objective of predicting later intelligence and academic performance. For example, the infant's motor ability would be viewed as an indicator of future visuo-spatial and arithmetic abilities. Even developmental assessments have been considered to be a predictor of future cognitive ability.

The administration of the tests may also prove to be challenging, particularly when assessing infants and very young children. For example when assessing infants, the infant may exhibit separation anxiety, anxiety if the assessor is a stranger, may show signs of fatigue more easily than an older child, is likely to have a very limited attention span, and may be non-compliant

(Bailey & Rouse, 1989; Bradley-Johnson & Johnson, 2007). Aitken and Groth-Manat (2006) write that very young children also often lack the motivation to perform a task. However, they write that as the child develops, they gradually start to show more interest in both the tasks and social interaction, which makes the test easier to administer. The rapport between the assessor and the child is this seen to be of critical importance.

The content of the various assessments is also a critical issue. Brauer et al. (1998) write that many cognitive tests assume that the child has been exposed to various experiences and as a result has a particular knowledge base. However, deaf and hard-of-hearing children may not only be over-protected and as a result not exposed to as many experiences as their hearing counterparts, but may also lack access to any incidental learning through overhearing conversations, listening to the radio or watching television. Brauer et al. caution that if not seen within this context, the assessor may attribute this to poor cognitive ability. A further issue is that of translation, or posing the questions in such a way that the original purpose of the test item is retained, whilst ensuring that the deaf or hard-of-hearing individual fully understands the question and can answer it to the best of their ability (Brauer, et al., 1998).

There have been several studies conducted in the past on deaf and hard-of-hearing individuals using the typical norms and untranslated test items of various personality tests (e.g. Schlesinger & Meadow, 1972). These tests were further administered by "nondeaf and largely non-signing individuals" (p. 302). These studies have revealed that administering these assessments under such conditions indicated "personality deviance that [is] at variance with objective observations by researchers who are knowledgeable and experienced with deafness and deaf people" (Brauer et al., 1998, p. 302).

Finally, Voress and Maddox (1998) note that while most of the tests have been standardised, they have been normed for the American population, and thus there may be testing bias when the test is administered in different countries, with different cultural groups and under different conditions. Ballard (1991) cites Zelazo (1982) as writing that the assessments measures were therefore designed to meet standard infant and toddler milestones, with the underlying assumption that the children have been exposed to certain developmental experiences. It is therefore important for the assessor to take particular care to place the child within his *own* context and environment when conducting the assessment.

There is also a cultural element that must be considered in applying American norms to South African children. Children in South Africa may develop at different rates to American children, and there are some cultural differences, which may have an effect on when they reach the milestones (Mwamwenda, 2004). Mwanwenda provides the example Killbride (1969) who conducted a study in Uganda, where she administered the Bayley Scales of Infant and Toddler Development (BSID). She found that the children in the Ugandan sample reached certain milestones earlier than the norm. These items (e.g. sitting, head control, co-ordination of limbs, etc.) tended to be skills that were emphasized in cultural practise. She further reported that Ugandan children tended not to be as advanced on items that contained skills that were not part of the child care practice of that culture (e.g. crawling).

Brauer et al. (1998) suggest that in assessing deaf and hard-of-hearing children, their "cognitive functioning must be estimated independent of their deafness" (p. 306), and as a result recommend that assessors only use non-verbal tests of intelligence. In other words, they propose that by examining only the non-verbal cognitive ability a clear understanding of the child will be provided. However, this is an overly simplistic view of development that

underestimates the interdependent quality of all the developmental spheres of a child. Rather, assessment should be a detailed, thorough process, where the assessor views all areas of a child's ability in order to "provide the whole picture of a child's functional development" (Bagnato, Neisworth & Munson, 1997, p. 4). Further, assessment ought to be *prescriptive*, in addition to *descriptive*. In other words, rather than simply identifying and describing areas of strength and weakness, an assessment should provide suggestions to help the child enhance their strengths and develop areas of weakness.

The assessment of children who are deaf or hard-of-hearing should be tailored to address their specific needs, and ultimately inform any intervention strategies that are implemented. Psychologists and psychometrists should be cognizant of the myriad factors that affect assessments of young children, such as the family's socio-economic status, family size, parents' education, child's personality and temperament. However, when assessing a child with a hearing impairment additional factors need to be taken into account. For example, the psychologist or psychometrist needs to take into account the aetiology of the hearing loss and the degree of hearing loss per ear, the hearing status of the child's parents and siblings, the child's communication mode (e.g. signing or speech reading), age of onset and age of identification of hearing impairment, visual acuity.

A further issue in the assessment of deaf children is that of measures and assessment tools. Very few assessment tools have been standardised for use with this particular population (Sattler, Hardy-Braz & Willis, 2006), and world-wide practise is to adapt commonly used tools when assessing children with hearing loss. However, Mullen (1999) and Sattler, Hardy-Braz and Willis (2006) caution that this affects the standardisation, reliability and validity of these tests. While a few tests have been specifically standardised for use within this

population, such as the Carolina Picture Vocabulary test for deaf and hard-of-hearing and the Scales of Early Communication Skills for Deaf and Hard-of-Hearing Children, these tests are only appropriate for children who are at least two years old.

Lane, Hoffmeister and Bahan, (1996) indicate that a key concern regarding assessing deaf children is whether the tests are biased in terms of language or content. This latter concern stems from the fact that parents of deaf children often do not expose their children to as many different experiences and places as parents of hearing children, and thus the deaf child may be at a disadvantage. In addition they write that several test items may prove to be irrelevant for deaf children. A further concern is the wording of the test items, and the instructions that accompany the test, and if the wording is altered it may affect the validity of the test in question and the ensuing scores (Ballard, 1991; Scheetz, 2004).

The key principle of assessments in early intervention programmes is that they should focus on the child's strengths, whilst providing direction in areas of weakness and potential (Ballard, 1991). When presenting feedback and information to parents, it is important to provide parents with information that is clear and concise, and presented in such a way that it educates parents about their child's abilities, strengths and areas of difficulty. Guralnick (2005a) writes that the parent-child relationship must be borne in mind, as negative or one-sided feedback may have a detrimental effect on this relationship. It is also important to place the feedback within a developmental framework. This can be achieved in two ways (Guralnick, 2005b). Firstly, by plotting the child's own developmental progress at regular intervals, and secondly by relating the child's scores to developmental theory and the established milestones.

The aim of the current study is to compare two developmental measures that are in use at HI HOPES, with regard to the assessment of deaf infants and toddlers. These assessments form a pivotal role at HI HOPES, as they provide evidence of development, as well as inform the intervention strategies. It is therefore important to ascertain which instrument provides the most effective assessment of deaf children. The two developmental measures to be compared are the BSID and DAYC, which are each explained below.

2.4.1 *Bayley Scales of Infant and Toddler Development – Third Edition (BSID)*

The Bayley Scales of Infant and Toddler Development – Third Edition (BSID) is one of the most widely-used tests when assessing infants and young children, and is the result of a considerable body of research and is thus noted for its technical superiority (Kamphaus, 2001). This particular test was selected as a developmental assessment for HI HOPES because the questions can be asked in either English or Sign-Language (in this instance South African Sign Language) and so there is greater chance of communicating effectively with the child. Scheetz (2004) writes that the BSID is one of the developmental tests that can be used effectively with deaf and hard-of-hearing children.

The BSID has been revised three times, with various items removed, added or modified with each revision (Albers & Grieve, 2007). The goals of the most recent edition of the BSID were manifold (Bayley, 2006). Firstly, there was the intention to update the normative data and thus strengthen the psychometric properties of the test. The norming process was a vigorous one and the BSID could be considered to be the "psychometric pinnacle of its field" (Gregory, 2007, p. 300). A further goal was to expand the test to consist of five scales (rather then the three scales that comprised the Bayley Scales of Infant Development – Second

edition), which provides a more holistic view of the child's abilities. The test administration process and stimulus materials were also updated (Bayley, 2006). The most recent revision of the BSID consists of five scales, namely Cognition, Language, Motor, Socio-Emotional and Adaptive-Behaviour, which collectively comprise the 178 items of the test. It is an individually administered test, which has to be administered by a registered psychometrist.

The BSID covers all of the developmental areas discussed earlier in this chapter (i.e. cognitive, language, motor, social-emotional and adaptive behaviour). The *Cognitive* scale contains items that examine the child's mental concepts and constructs. Items assess a wide range of a child's cognitive abilities, from sensorimotor development, exploration and manipulation of objects, to the child's concept formation and memory. The *Language* scale evaluates both receptive and expressive communication. The receptive communication subtest focuses on auditory perception, as well as the child's ability to understand words, and respond appropriately (Bayley, 2006). Expressive communication items examine the child's ability to vocalise, starting with preverbal communication, such as gesturing and babbling, as well as vocabulary development where the child can name objects and attributes. The *Motor* scale consists of the fine motor subscale, which examines fine motor abilities such as perceptual-motor integration and the gross motor subscale, where the items are concerned with "dynamic movement" (Bayley, 2006, p. 4), such as limb movement, balance and co-ordination. The *Social-emotional* scale evaluates the child's social and emotional abilities in relation to developmental milestones, such as communicating needs and expressing an interest in the world around them. The *Adaptive Behaviour* scale contains items that examine various aspects the "daily functioning skills of a child, measuring what the child actually does, in addition to what he or she may be able to do" (Bayley, 2006, p. 4). This sub-scale is comprised of ten skill areas, which assess different spheres of the young child's daily life.

These ten areas are communication, community life, functional pre-academics, home living, health and safety, leisure, self-care, self-direction, social and motor skills. The scores the child receives for each area are combined to calculate the General Adaptive Composite, which provides the "overall measure of the child's adaptive development" (Bayley, 2006, p. 4).

The BSID has four primary uses, which extend beyond the mere measurement of a child's ability (Albers & Grieve, 2007). The first is to measure the developmental functioning of infants and toddlers. Secondly, it is used to identify possible developmental delays. The BSID also identifies a child's strengths and weaknesses, which are of particular use when developing an early intervention programme tailored for the child. Finally, the BSID provides a highly accurate, measureable means of monitoring a child's developmental progress, and as such it has historically been administered as the "instrument of choice" in numerous intervention programmes (Bayley, 2006, p. 6). The BSID is a widely used tool, and has been translated into other several languages, and is used to assess infants and toddlers worldwide (Black & Matula, 2000).

One of the greater challenges with the assessment of infants and toddlers is sustaining their attention and interest for the duration of the test. The BSID attempts to address this challenge by providing the assessor with varied materials to sustain the child's interest. Some examples of these items are a toy bank, toy bear, toy bracelet, a block set, lacing toys, toy ducks, memory cards, facial tissues, coins, food pellets, twelve blocks, a bell, three puzzles, a mirror, a pegboard, a squeeze toy, blunt scissors and blank white paper (Bayley, 2006; Albers & Grieve, 2007). The variety and colour of the materials of the BSID maintain the infants and toddlers interest and participation throughout the testing process (Alfonso & Flanagan, 1999).

The BSID provides a wealth of information on the child's overall development, which enables the programme to isolate the child's specific needs that are not necessarily related to their language ability, as well as identifying their strengths. This form of detailed holistic assessment has proven to be instrumental in early intervention programmes, as discussed previously (Bayley, 2006).

Further, as the assessment is conducted in the child's home, the scores are likely to provide a more realistic view of the child than if they had been tested in an unfamiliar environment such as an office. A study conducted at Purdue University assessed 36 children with the BSID (First Edition) in both the home setting and a laboratory setting. Half of the sample was first tested at the home setting and later tested in the laboratory setting, while the other half of the sample were tested in the laboratory first, and then in the home setting. While they did not find an increase in scores in the first sample, the second sample showed a significant increase in their scores when they were tested in their home. This study provides support for the use of such an instrument, as it enables the child to be tested in an environment that allows them to perform optimally (Durham & Black, 1978). For HI HOPES, there is the additional advantage that this version of the BSID does not require any vocalizations from the child during the cognitive scale, so the child's expressive language is not likely to affect the scores they receive for this scale.

There were some reservations about the applicability of the Bayley Scales of Infant and Toddler Development (Second Edition) (BSID-II) when used for assessing infants with developmental delays (Nellis & Grindley, 1994). It was considered that the gradients at the lower end of the age levels were too steep for such populations, and the BSID scores would

thus yield results which often portrayed the children as being more or delayed than they really were. Research to determine whether the BSID-II would yield expected patterns of development for babies with developmental delays examined two samples. The first sample was comprised of babies with Down's syndrome and the second sample were babies who were considered to be "medically fragile" (p. 4), as they had multiple medical conditions ranging from being born prematurely to having heart conditions or defects. Previous studies conducted using the BSID-II on Down's syndrome children show a sharp drop in scores between their first and second year, while such studies conducted on medically fragile children show stability between the first and second year. These are expected patterns of development, with the development of Down's syndrome children decelerating during early childhood while typically the development of children with medical conditions will increase, it was speculated that this may have been due to an improvement in their medical conditions. In addition to following such different and specific patterns of development, these two samples were included because they are amongst the most commonly referred for early intervention and infant development programmes. The purpose of the study was to determine whether the BSID-II would track these patterns of development, which would support the "clinical validity of the BSID-II" (p. 8). The results supported previous research, with the authors concluding that the BSID-II was "sensitive to developmental changes in the first two years of infants with Down's syndrome and those with multiple medical conditions" (p. 10). While the researchers caution that these findings are not necessarily ubiquitous in all delayed populations, they stress that they do substantiate the clinical validity of the BSID-II (Niccols & Latchman, 2002).

Further, if test items need to be adapted to suit the needs of deaf children, the norms may no longer be valid, as the adaptations may impact the item difficulty and the final test scores

(Bayley, 2006; Black & Matula, 2000). It is felt that to "administer the Bayley-III in a standardized manner to a child with a severe physical impairment ... or sensory impairment ... would place the child at a disadvantage and perhaps underestimate the child's ability" (Bayley, 2006, p. 7). This means that while the BSID is an assessment tool that is utilized in many early intervention programmes, it may not be the optimal tool for an intervention programme working with young deaf children.

An additional reservation is that the BSID consists of a few timed items, for example the child being required to complete a puzzle within a certain period of time. If the child does not complete the puzzle within the set time period, they do not receive a score for the item, even if they are able to complete the puzzle using more time. While the assessor could make observations regarding the child's behaviour and whether they were able to complete the tasks if given more time, the final score that child receives may not be an accurate reflection of the child's abilities (Bradley-Johnson & Johnson, 2007).

Another disadvantage of the BSID is that it only assesses children from birth until three years of age. However, HI HOPES works with children up until the age of five. The BSID would therefore not be appropriate for a number of children in the HI HOPES database. The greatest disadvantage of the BSID, particularly in terms of the HI HOPES context, is that it has been normed on a population of hearing children living in America. Alfonso and Flanagan (1999) caution that the Bayley is limited when assessing "culturally and linguistically diverse children" (p. 213). The BSID is also proving to be a very costly and time-consuming test to administer, particularly given that it must be administered by a psychometrist who is registered with the Health Professions Council of South Africa (HPCSA), who may not necessarily have much experience with deaf or hard-of-hearing children.

A final consideration for the use of the BSID in assessing the children at HI HOPES is a cautionary note on the use of sign language in administration. The manual states that as "manual communications systems are inherently more conducive to relying concept information, concerns about validity arise" (Bayley, 2006, p. 227). This is particularly a concern if the assessor deviates from the wording of an item to help the child understand the content of the question. Given these concerns, the scores of the BSID may not be an accurate reflection of the child's ability.

An additional concern is whether the BSID provides enough information to inform the early intervention programme optimally. Research conducted on the original BSID indicated that greater insight into the child's expressive language ability could be gleaned if the assessors could analyze the child's responses in detail (Siegal, Cooper, Fitzharding & Ash, 1995). While this would be an excellent means of providing a richer understanding of the child, the BSID format does not allow for this in-depth analysis.

However, studies that have examined the correlation between various developmental assessments have found that the various tests yield different scores and may even point to different developmental patterns (Ballard, 1991). For example, Ballard cites an early study conducted by Simeonsson, Huntington and Parse (1980), which found a difference in scores between the first edition of the BSID and the Griffiths Developmental Scales. Such findings suggest that developmental assessments may not be used interchangeably.

Since the BSID is costly and time-consuming, it may be more efficient to use an alternative assessment, such as the Developmental Assessment of Young Children (DAYC), which is

cheaper and quicker to administer, particularly in a growing programme. However, it is necessary to consider the relationship between these two measures.

2.4.2 *Developmental Assessment of Young Children (DAYC)*

The Developmental Assessment of Young Children (DAYC) can be used as a "diagnostic instrument" (Andersson, 2006, p. 206) and is a suitable test for conducting dynamic assessments (Ogletree, 2001), which combine to make it an extremely useful tool in early intervention programmes. It also assesses all the other developmental areas discussed earlier in the chapter, namely cognitive, communication, physical development, social-emotional and adaptive behaviour. It consists of five scales, namely the *Cognitive*, *Communication*, *Physical Development*, *Adaptive Behaviour* and *Social-Emotional* scales, which collectively make up 363 items. It is administered to children from birth to 5 years, 11 months.

The DAYC is a flexible test, in that while it is individually administered, the item administration procedures are not standardised and no specific verbal instructions are provided, although there is a specific outline of the instructions. For HI HOPES, this means that questions can be asked in either English or Sign Language. Further, the individual items can be scored in one of three ways, namely the direct administration of the DAYC on the child, direct observation of the child, or interviews with the child's caregivers (Andersson, 2006). The DAYC typically takes one hour and forty minutes to administer, with each of the five scales taking an average of 20 minutes to administer.

Similarly to the BSID, the DAYC has four primary uses (Ogletree, 2001). The test is used to measure young children's developmental abilities, and track their progress. It may also be

used to identify developmental delays in children, and finally can pinpoint the children's' areas of strengths and weaknesses. In fact, the DAYC was designed with early intervention programmes in mind, with the test developers ensuring that the five scales of the test and their content adhered to the Individuals with Disabilities Education Act (Aitken & Groth-Manat, 2006).

The greatest advantage of the DAYC for HI HOPES is that it does not have to be administered by a registered psychometrist. Rather, it may be administered by trained professionals, provided they have received rigorous training on DAYC test administration, as well as undergo regular quality control checks. An example of where trained professionals may be used is provided by an American study which investigated whether attending full-day kindergarten would promote a child's social-emotional development Researchers trained a group of kindergarten teachers to administer the social-emotional scale to the children attending the school, rather than employed psychometrists or psychologists (Carnes & Albrecht, 2007). HI HOPES has selected various PA's and trained them on the administration of the DAYC. The PA's are required to have a thorough knowledge of the test, the materials, and scoring system (Ogletree, 2001). This is particularly beneficial, as deaf children are often more comfortable being around familiar people who they perceive to be fully accepting of them. Bailey and Rouse (1989) stress that the aspect that is likely to have the greatest impact on both the testing process and performance is the rapport between the child and the assessor. If the assessor has a good rapport with the child, they are less likely to be anxious and more likely to be amenable to the test instructions.

An additional advantage is that the DAYC has similar subscales to the BSID, and it is anticipated that the performance of deaf children on the two tests would be correlated.

However, the DAYC has only ever been normed against a US population of 1 269 children, and was based on the demographics contained in the 1996 US Census (Watson, 2001). No research has been conducted to date on the applicability of this test in the South African context, or its use on deaf and hard-of-hearing children.

2.5 Conclusion

This study aims to determine the extent to which two developmental measures, namely the BSID and DAYC, are considered to be suitable means of assessing young deaf children. It further aimed to investigate whether the DAYC would be a suitable replacement for the BSID. This research project thus examined the assessments conducted by HI HOPES between January and August 2009 in order to ascertain their relationship. The opinions of the Parent Advisors (PA's) were also elicited regarding their views on the appropriateness of these tests in their work with deaf children.

CHAPTER THREE: METHOD

3.1 *Research questions*

It is critical to implement the appropriate instruments when assessing children with hearing-impairments, as the results of these assessments inform the intervention programmes. These programmes are modified as the child's developmental abilities evolve, and thus it is important for HI HOPES to use the testing instruments that best suit the South African context, while also examining their effectiveness as an assessment tool for the hearing impaired.

The primary research question is:

- How applicable and useful are the DAYC and the BSID within the HI HOPES context?

The secondary research questions are:

- What are the Parent Advisor's views of the DAYC and the BSID?
- How do the DAYC Scores correlate with the BSID scores?
- Are there any differences between the DAYC percentiles and the BSID percentiles?

3.2 *Research design*

In order to determine the applicability and validity of the BSID and DAYC, a two-pronged approach was utilized using a mixed methodology. This methodology was comprised of a *quantitative* analysis of the BSID and DAYC, which was augmented by the *qualitative*

insights of the PA's' into the DAYC and BSID. A mixed methodology was selected as the optimal method as the two elements combine to address various aspects of the research objectives; namely to investigate the applicability of these two developmental assessments in the HI HOPES context. A strength of the mixed methodology approach is that it enables the researcher to "converge quantitative and qualitative data in order to provide a comprehensive analysis of the research problem" (Creswell, 2003, p. 18). Given that these assessments have been normed on the American population, the quantitative component allowed the researcher the opportunity to investigate the statistical nature of these tests when administered on South African deaf and hard-of-hearing children, and thus provided the researcher with an understanding of the applicability of these assessments in the HI HOPES context. While this provided the researcher with an indication as to the viability of using these tests in this context, the qualitative insights provided by the PA's enhanced this, and elicited greater insight into the use of these tests. The qualitative component should therefore be viewed as a complementary layer of understanding to these assessments. Through using a mixed methodological approach, it was possible to triangulate the results of the two components, using methodological triangulation. This process is essentially one of corroborating findings through comparing the two or more sets of analyses and findings using different methods (Kelly, 2006).

3.2.1 *Quantitative research*

Quantitative research adopts a structured approach to analyzing the data, with the data being transformed into statistics. The nature of the data is therefore "hard, rigorous, and reliable" (Bryman, 1998, p. 103). Inferences about the population are then drawn from the statistics. The purpose of quantitative research is measurement. Both the information regarding the data

analysis and the inferences that are drawn are communicated in a very precise and unambiguous manner. This research used a non-experimental, correlational design to examine the statistical relationship between the BSID and the DAYC and any differences between the various subtests that make up these assessments.

3.2.2 *Qualitative Research*

The emphasis of qualitative research is on understanding events, experiences, perceptions and beliefs from the perspective of the research participants, rather than from the researcher's point of view, or in terms of the existing literature. The qualitative research report is thus a means of "transporting the … [researcher] directly into the world of the study" (Delport & Fouché, 2002, p. 357) due to its emphasis on the participants' experiences, and is committed to examining the individual in their own context. Qualitative data serves as a framework for the participants' voices to be heard, and as a result, the primary purpose of qualitative research could be seen as a means of evaluating the effectiveness of existing practices for the people involved. Qualitative data relies upon the integration of the voices of the participants in order to collate a rich source of data (Delport & Fouché, 2002). Due to the wealth of information that can be generated from qualitative research, it is important that the researcher endeavour to produce data that is both valid and descriptive in nature.

De Vos (2002) writes that there are four constructs that will determine the validity of qualitative data, namely *credibility*, *transferability*, *dependability*, and *confirmability*. *Credibility* could be viewed as an alternative to external validity. In order to achieve credibility, the researcher has to make sure that the research question is well defined, and that the themes of the research have been identified and defined. Nyamathi and Shuler (1990)

write that credibility is strengthened by the researcher providing highly detailed descriptions of the field of study. *Transferability* is an alternative to external validity or generalizability. It therefore refers to whether the research study can be applied elsewhere. Traditionally, this has been viewed as an inherent weakness of qualitative methods, as the data collections and findings rely to a great extent on the population being studied, the setting, and the interaction of the participants. These are unlikely to remain consistent between studies, with the result that qualitative studies have traditionally been viewed as lacking in external validity. However, De Vos writes that this places an even heavier consideration on the theoretical framework and the methodology used. The study needs to be designed in such a way that it can be conducted elsewhere. *Dependability* is the alternative to reliability or consistency in findings in future studies (Anastasi, 1988). This can best be ensured by the researcher leaving a detailed set of instructions that will allow other researchers to replicate the study. The study must thus be conducted in an ordered and systematic manner, and be verifiable (Greeff, 2002; Nyamathi & Shuler, 1990). *Confirmability* is the alternative to objectivity, which relates to whether the data obtained from the study is sound in nature, and based on objective observations. The qualitative component of the current study consists of a thematic content analysis of the PA's views of the BSID and DAYC as the instruments of choice for HI HOPES.

3.3 *Sample*

The sample was drawn from the HI HOPES database, and was thus non-probability, convenience samples, which yielded two data sets. The first data set consisted of the BSID assessments conducted between January 2009 and July 2009, while the DAYC assessments for the same group of children comprised the second data set. The sample excluded the

assessments of children who had multiple disabilities such as cerebral palsy, as psychometrist was unable to score these assessments and rather interpreted them on a qualitative level. As a result of this exclusion criterion, only 12 assessments could be included in each data set. This database has been preapproved as part of the HI HOPES research (Ethics Protocol 2007 ECE 20). The database consisted of the children who are currently part of the HI HOPES early intervention programme, as well as any children who joined the programme between January 2009 and July 2009. The children were aged between 1 month and five years. All of the children included in the sample resided in Gauteng, with a few residing in Cape Town and KwaZulu-Natal.

The primary qualitative sample for the one-on-one interviews was drawn from the PA's who administer the DAYC. The sample consisted of eight PA's, who were approached to participate in the research, and was thus a non-probability, convenience sample. The PA's resided in Gauteng, and had all received training on the DAYC at the beginning of 2009, and had administered at least one DAYC assessment, as well as observed the BSID being administered.

3.4 *Instruments*

The primary materials used in this study were the Bayley Scales of Infant and Toddler Intelligence (BSID) and the Developmental Assessment of Young Children (DAYC). Both tests were administered to each child on the same day. Both of the BSID and the DAYC have been thoroughly standardized for an American population of hearing children.

3.4.1 Bayley Scales of Infant and Toddler Development – Third Edition

The Cognitive, Language and Motor scales of the BSID were standardized on a sample of 1 700 children, aged between 1-42 months, which was representative of the American population as per the 2000 US population census (Albers & Grieve, 2007). Approximately 10% of the sample consisted of children with special needs, or children who had developmental delays, biological risks, motor impairments or language disorders (Bayley, 2006). The sample was further divided into 17 age groups of 100 children. The internal consistency of these three scales was established using Fisher's *z* transformation, which yielded very good scale composite average reliability coefficients ranging from r=0.91 for the Cognitive scale to r=0.93 for the Language scale. The standardization sample for the Adaptive-behaviour scale of the BSID was drawn from the ABAS-II standardization sample (Albers and Grieve, 2007). Fisher's z coefficient was again used to establish internal consistency, which yielded results that ranged from r=0.79 to r=0.98. The sample for the BSID Social-emotional scale consisted of a smaller sample of 456 children, but was still representative of the American population. Internal consistency was calculated with coefficient alpha, with coefficients ranging from α=0.83 to α=0.94 (Albers & Grieve, 2007).

The cognitive scale consists of 91 items, with the raw score converted into a scaled score between 1 and 19. The language scale is comprised of 49 receptive language items, or questions that test how well the child understands language spoken to them, as well as 23 expressive language items, which examine how well the child can use language to express themselves. The raw scores for each are converted into a scaled score, and the scaled scores are added together to determine the scaled score for the language scale. The motor scale consists of two sub-scales, the fine motor sub-scale made up of 66 items and the gross motor

sub-scale with 72 items. The scaled scores for each sub-scale are added together to calculate the motor scaled score. The Social-Emotional and Adaptive Behaviour scales are administered through a questionnaire given to the child's parent or guardian to complete. The rationale behind this approach is that the parent has the best knowledge of the child and is thus is the better position to provide an accurate view of how the child performs in these areas. The Social-Emotional questionnaire consists of 35 5-point likert scale items, where the parent is asked to indicate how frequently a child exhibits a particular behaviour. The raw score for the scale is then converted into a scaled score. The Adaptive-Behaviour scale consists of 241 items spread over 10 sections which each assess a different skill area. The parents are asked to rate their child on a 4-point likert scale for each item. The raw score for each skill area is converted into a scaled score. The ten scaled scores are combined to determine the child's General Adaptive Composite.

The scaled scores of the Cognitive, Language, Motor, Social-Emotional and Adaptive Behaviour scales are converted to calculate a composite score for each scale. The composite score ranges from 40 – 160 (Bayley, 2006), and is used to compare the child's performance across all five areas. The BSID also provides a percentile rank for the child, which indicates how the "standing of a child relative to that of the children in the standardization sample" (p. 5). Finally, the BSID provides age equivalents, which indicate at which age the raw score is typically found.

The BSID is considered to be a highly intricate test in terms of test administration and interpretation (Bayley, 2006), and as a result, it should be administered by a registered psychometrist. While the test itself takes between 50 – 90 minutes to administer, Albers and Grieve (2007) stress that the psychometrist should take time beforehand to establish a rapport

and sense of familiarity with the child. In addition, the guidelines suggest that primary caregiver of the child be present in order to relax the child as much as possible. However, should a caregiver opt to be present for the administration of the test, they must refrain from interfering with the integrity of the test administration process, such as encouraging the child to perform a certain task.

3.4.2 Developmental Assessment of Young Children

The DAYC was standardized with a sample consisting of 1 269 children aged between 0 months to 5 years 11 months, and was representative of the 1996 US census. Internal consistency was calculated using coefficient alpha, which yielded results of α=0.90 or higher across all five scales (Watson, 2001). Each of the scales yields a raw score, which are converted to scaled score between 1 and 19, age equivalents, a percentile, and a standard score. The standard score is comparable to the composite score of the BSID. A development quotient (DQ) is then calculated. It should be stressed that the DQ may not be considered to be an indication of the child's intelligence quotient (IQ), as it examines different abilities to intelligence tests (Schaffer, 2002).

3.4.3 Interview schedule

The researcher also utilized an interview schedule for the interviews with the PA's, which examined their perceptions about assessing deaf children, and the roles the BSID and DAYC would play in the HI HOPES context. The interview schedule was piloted and then finalized. It is attached as Appendix A.

3.5 *Data collection*

3.5.1 BSID and DAYC test administration

Both the BSID and the DAYC were administered to the children comprising the HI HOPES database as part of their bi-annual assessment, following standardized procedures. The BSID was administered by a registered psychometrist, and the DAYC was administered by the PA's who had received training on the DAYC. The results of the tests administered between January 2009 and July 2009 were made available to the researcher for data analysis purposes. Due to copyright law, copies of these assessment forms could not be appended.

3.5.2 **Individual interviewing**

In order to collect data from the PA's, a semi-structured interview schedule was used, which followed a set interview schedule, where the interviewer deviated from the schedule only to ask questions as a means of clarifying statements made earlier by the participants. This approach enabled the researcher to maintain some form of control over the participant's responses, while still being able to retain the position of an observer (Rosnow &Rosenthal, 1991). For this reason it was important that the researcher had compiled a set of prepared questions that aimed to address relevant aspects of the situation or experience in question.

The questions that were included in the semi-structured questionnaire schedule were open-ended in nature, as these provide the participants with an opportunity to elaborate upon their responses, and to express themselves more thoroughly. This is especially necessary in qualitative research, where the researcher relies upon nuances and detail in the data, and

open-ended questions provide the participants the opportunity to provide these details and nuances (Rosenthal & Rosnow, 1991).

McMillen (1952) notes a number of guidelines that the researcher needs to observe when compiling a questionnaire. The overriding principle is that the questions themselves address the research questions posed by the study. Each question must be phrased in such a way that the intended meaning is clear, while at the same time not taking the form of a 'leading question' or a 'prompt'. Thomas (2003) views leading questions as questions that are worded in such a way that they contain an "implicit or explicit suggestion of a possible answer" (p. 163), which may influence the responses that the participants may provide. The questions must thus be phrased in as objective and neutral a manner as possible.

Prior to conducting the interviews with the PA's, the questionnaire was piloted. Thomas (2004) stresses the importance of piloting questionnaires, to ensure that the question schedule is comprised of coherent, unambiguous questions, with the meaning underlying the questions being explicit. Ultimately, the construction of a questionnaire is meant to reflect the key principle of data collection; namely to collect information that is as useful and as significant as possible and that addresses the issues constituting the research question. In keeping with this, the questions in the schedule were phrased in a clear and precise manner, and the language was aimed at an appropriate level. Thomas argues that there are a number of further difficulties that may be eliminated by piloting the study. For example, frequently a single question may in fact consist of two questions. This may lead to the research participants focusing almost entirely on one of the two questions, at the detriment of the other. The pilot enables the researcher to identify such issues and for example to break such a question down into two separate questions that are able to focus on each issue.

Piloting the questionnaire is also necessary in order to ensure that the questions are relevant to the research questions (Strydom & Delport, 2002). It also enables the researcher to place the questions in a logical sequence, which will allow for ease of discussion. Kerlinger (1964) stresses that it is also important that the questions are not worded in such a way that participants may provide the responses that they deem to be socially desirable.

The interviews with the Gauteng PA's were conducted between May 2009 and July 2009. Upon the completion of each interview, they were transcribed verbatim by the researcher. Braun and Clarke (2006) write that the transcribing process serves a dual purpose, as the researcher can begin to familiarize themselves with the data and develop preliminary thoughts on the coding framework for the data analysis.

3.6 *Data Analysis*

3.6.1 Statistical analysis

There were two separate quantitative analyses conducted, each examining different aspects of the Bayley Scales of Infant and Toddler Development – Third Edition and the Developmental Assessment of Young Children. Firstly, a correlation between the scales of the DAYC and the BSID was conducted using the Pearson correlation coefficient. The scales were matched, for example, the motor scale of the DAYC was correlated will the motor scale of the BSID. The purpose of this analysis was to determine whether there were any significant relationships between the subtests of the BSID and the DAYC.

Secondly, a paired sample t-test was conducted between the means of both sets of subtests, to compare the percentiles of the subtests. A paired samples t-test is used when there are two measures for the same person. This final analysis can be conducted, as both the DAYC and the BSID have standard scores that reflect the percentiles, and a hypothesis is that an individual should score within the same percentile for each test. In order for test scores to be meaningful, the score must be compared to the scores obtained by the norm group, which is representative sample of the population for whom the test is intended (Gregory, 2007). These norms are designed to reflect the characteristics of the population.

3.6.2 Thematic Content Analysis

The interviews conducted on the PA's were analyzed using traditional thematic content analysis, which is a technique that allows one to extract detailed themes from data that has been collected from various forms of social communication, such as the transcript of one-on-one in-depth interviews, written document, etc.

The one-on-one in-depth interviews were each transcribed. These were then scrutinized in detail, to highlight common themes or patterns that emerged from the data. Some involved an overarching umbrella construct, as well as the various nuances that comprised it. Inductive category development was used, which refers to the development of categories from the data itself. The researcher approaches the data with no preconceived idea of the categories or themes that was used in the research. Rather, the researcher formulated the categories after engaging with the data, in an attempt to extract the thematic categories. The data was analyzed using the six-step model formulated by Braun and Clarke (2006).

Thematic content analysis was selected as the qualitative data analysis tool due to its methodological rigour, which is reflected in the defined coding framework and subsequent refining of this framework, as discussed above. In addition, the systematic nature of the framework design makes thematic content analysis a fairly objective form of qualitative analysis, thus rendering it objective, predictive and replicable for future research studies.

3.7 *Ethical Considerations*

Ethical considerations stem from the philosophy that research participants should be treated with the utmost respect, which is demonstrated by honouring their autonomy, and by protecting their interests (Dickens, 1998). This research study consisted of two samples; the first consisting of the deaf and hard-of-hearing children who are a part of HI HOPES, and the second consisting of the PA's who administer the DAYC to these children.

The first sample forms part of the HI HOPES three-year research study, for which ethical clearance has been granted for all the researchers associated with this study (Ethical Protocol 2007 ECE 20). As such, all of the families have signed consent forms that would allow the researcher access to the assessment results.

There are two primary ethical considerations for the second sample, namely informed consent, and protecting the confidentiality of the research participants. There are four key elements constituting informed consent (Andanda, 2005). The first element concerns the full disclosure of all pertinent information, with the satisfactory comprehension of this information by the potential participant. This information consists of details regarding the nature and purpose of the research, the research procedure, the expected duration of the data

collecting session and any risks and benefits they may encounter as a result of their participation (Whitley, 2002). Participants should be allowed to make a voluntary decision as to whether to participate or not (including an option to withdraw from the research sample at any stage), and finally the participants should be provided with the capacity to consent to the research (Andanda, 2005). All of these criteria were explicitly set out in the consent form the PA's were asked to sign.

The consent form contained a clause stating that any participation is voluntary, and that should the potential participant refuse to participate, they will not incur any form of penalty (Whitley, 2002). The PA's who participate in this study were reassured that their responses were kept confidential, and would in no way impact their working relationship with HI HOPES. The PA's needed to be assured of the confidentiality of their responses, with any identifying details, such as their name removed from the transcript and analysis. This consent form is attached as Appendix B.

The researcher also needed to obtain permission from the PA's to record the interviews, so that the content may later be transcribed verbatim. This consent form, which is attached as Appendix C, emphasizes that no one apart from the researcher would have access to the recordings, and outlines how the material will be safeguarded.

Finally, in order to ensure that this research study adhered to the above ethical points, the researcher obtained ethical clearance from the University Research Ethics Committee, which is an independent, objective means of assessing the ethical consideration that are posed by the research study that is proposed, and the steps that the researcher has taken to address these

issues (Schüklenk, 2005). The Ethical Clearance Certificate (Protocol number: MEDP/09/005 1H) is attached as Appendix D.

CHAPTER FOUR: RESULTS AND DISCUSSION

A combination of quantitative data and qualitative analysis was used to examine the BSID and the DAYC, with the objective of determining whether the DAYC would be an appropriate replacement for the BSID, whilst garnering the views of the PA's regarding the suitability of these two developmental assessments in assessing young deaf children. The quantitative analyses are presented first, followed by the qualitative analysis. A summary of findings will be presented at the conclusion of the chapter.

4.1 *Quantitative analyses and discussion*

In order to gauge how similar the two developmental measures are, two key sets of statistical analysis were conducted. The first set of analyses revolved around how well the composite scores for each scale of the BSID correlated with the standard scores of the DAYC. The second set of analyses compared the percentiles that each child scored on each scale for both tests in order to determine how aligned the percentile rankings for the two tests were.

4.1.1 Relationship between the BSID and DAYC scales

In order to utilize parametric statistical tests, the data has to meet five assumptions of parametric data. The data appeared to meet three of these criteria, namely being at least an interval scale of measurement; additive means and homogeneity of variance. The sample was a convenience sample, composed of the children in the HI HOPES database, and the sample therefore cannot be considered to be a random, independent sample, which is criterion 4 of parametric data. However, this criterion is difficult to fulfil, and it is thus assumed for

research purposes. In order to determine whether the data set met the final assumption of normal distribution, a series of statistical analyses were conducted. Firstly, the researcher can conduct a visual examination of the histograms for each scale to establish the pattern of data distribution. If the histograms reveal that there appears to be an approximate normal distribution, the researcher can examine the descriptive data to determine whether it is adequately distributed to allow for parametric analysis. Finally, a statistical test such as the Kolmogorov-Smirnov Goodness-of-Fit Test can be conducted to confirm normal distribution.

The histograms for the scales of each test are presented below:

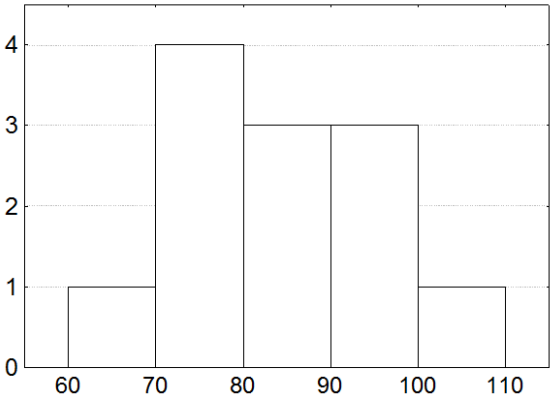

Fig 3: Histogram – Cognitive (BSID)

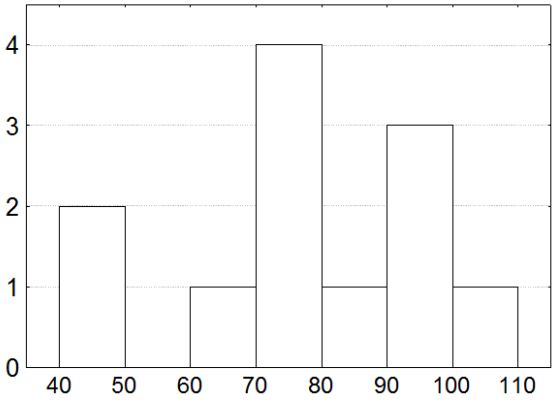

Fig 4: Histogram – Cognitive (DAYC)

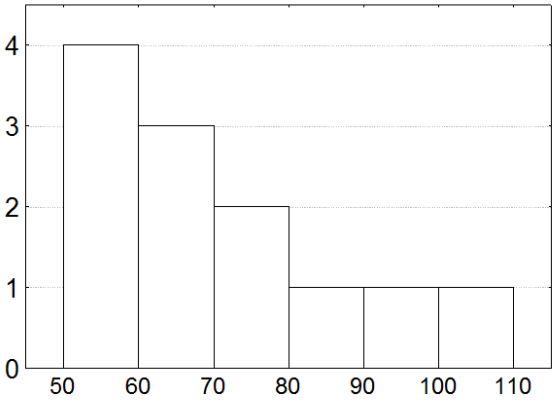

Fig 5: Histogram – Language (BSID)

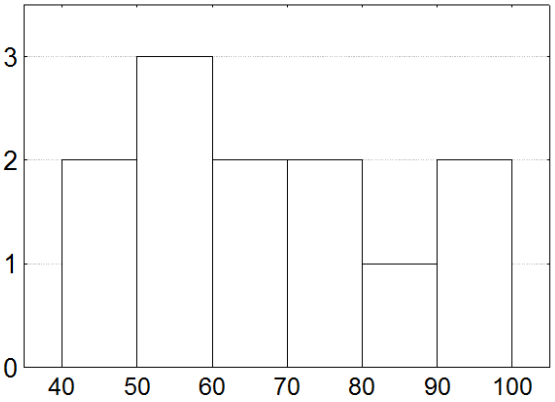

Fig 6: Histogram – Communication (DAYC)

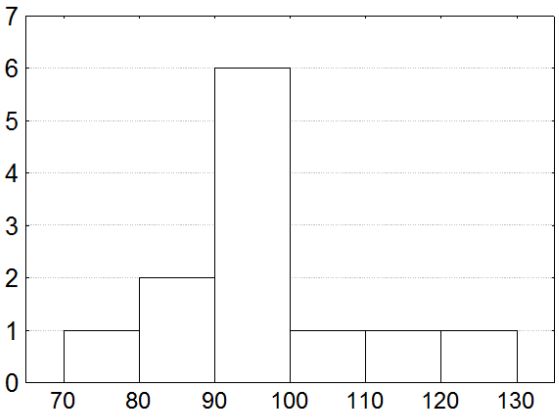

Fig 7: Histogram – Motor (BSID)

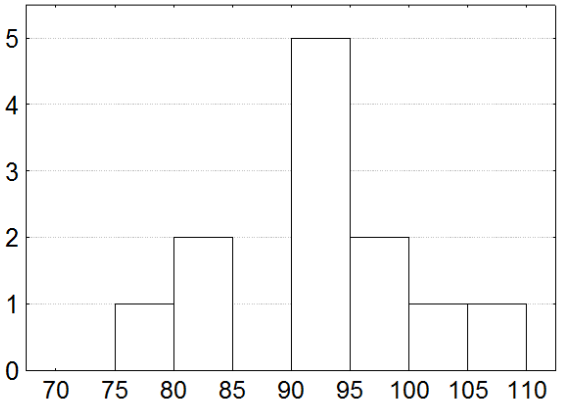

Fig 8: Histogram – Physical Development (DAYC)

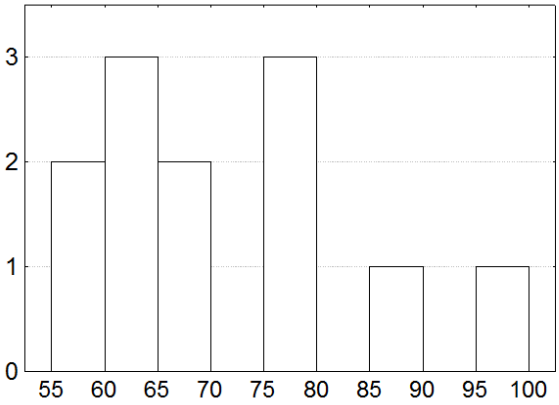

Fig 9: Histogram – Social-emotional (BSID)

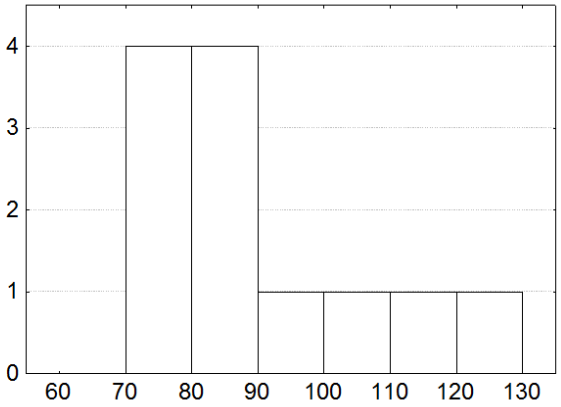

Fig 10: Histogram – Social-emotional (DAYC)

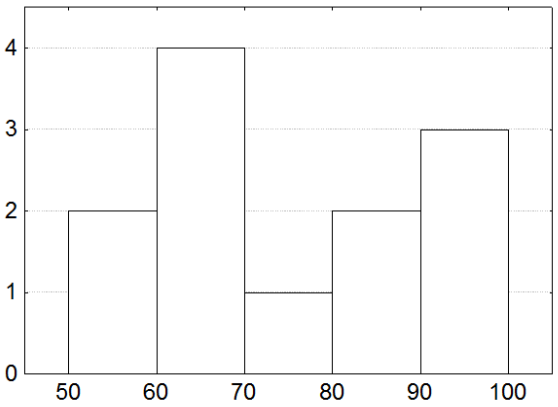

Fig 11: Histogram – Adaptive Behaviour (BSID)

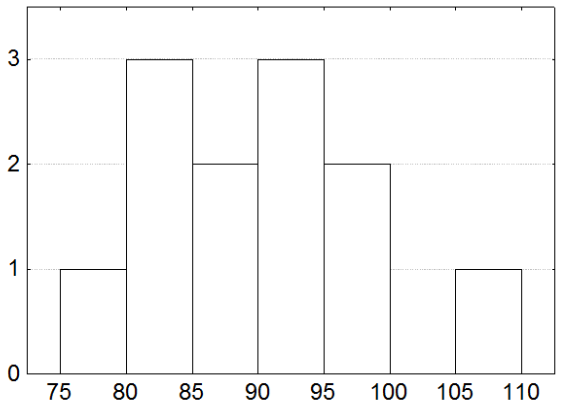

Fig 12: Histogram – Adaptive Behaviour (DAYC)

A visual examination of the histograms suggested that the data for the BSID Cognitive, Motor and Adaptive Behaviour scales, as well as the DAYC Communication, Cognitive, Physical development and Adaptive-Behaviour were approximately normally distributed, with the BSID Language and Social-Emotional and DAYC Social-Emotional being skewed to the left. This indicates that in the latter areas the children obtained slightly lower than average scores.

Simple descriptive statistics were then run on the data sets to confirm these visual findings, which are presented below in Table 1. Particular attention was paid to the mean and median recorded for each scale. A data set is considered to be normally distributed if the mean and median are the same, with half the scores falling on either side (Kaplan, 1987).

Table 1: Basic Descriptive Statistics for the Sub-tests:

Variable	*N*	*Mean*	*Std. Dev.*	*Median*	*Minimum*	*Maximum*
Cognitive (BSID)	12	87.08	12.147	85	65	110
Language (BSID)	12	71.33	13.894	66.5	56	106
Motor (BSID)	12	96.83	12.305	94	79	121
Social-emotional (BSID)	12	73.75	12.454	70	60	100
Adaptive Behaviour (BSID)	12	76.42	15.042	74.5	57	99
Cognitive (DAYC)	12	76.92	17.594	76	49	107
Communication (DAYC)	12	67.91	17.218	63	50	100
Physical Development (DAYC)	12	93.08	8.888	93.5	76	107
Social-emotional (DAYC)	12	90.33	16.059	83.5	71	125
Adaptive Behaviour (DAYC)	12	91.68	8.381	91.5	80	110

The statistics presented above confirm the information elicited from the histograms, with the majority of the means and medians appearing to be closely aligned. The BSID Language

subtest descriptive statistics indicated a 5-point difference between the mean and median, and there was a 6-point difference between the mean and median for the DAYC Social-Emotional scale, suggesting some deviation from normality. The DAYC Communication scale indicated an interesting result, with a 4-point difference between the mean and median, even though the histogram appeared to be approximately normally distributed.

Given the apparent normal distribution in the majority of the scales, the Kolmogorov-Smirnov Goodness-of-Fit Test was conducted to determine whether the data was sufficiently normally distributed. In order for the data to be considered to be significant and therefore normally distributed, the test should yield a p-value of at least 0.15. The results are presented below in Table 2:

Table 2: Kolmogorov-Smirnov Goodness-of-Fit Test for Normal Distribution:

	Statistic (D)	***p-Value***
Cognitive (BSID)	**0.23476**	**p>0.20**
Language (BSID)	**0.18338**	**p>0.20**
Motor (BSID)	**0.24460**	**p>0.20**
Social-emotional (BSID)	**0.20166**	**p>0.20**
Adaptive Behaviour (BSID)	**0.16516**	**p>0.20**
Cognitive (DAYC)	**0.13995**	**p>0.20**
Communication (DAYC)	**0.17331**	**p>0.20**
Physical Development (DAYC)	**0.15734**	**p>0.20**
Social-emotional (DAYC)	**0.21343**	**p>0.20**
Adaptive Behaviour (DAYC)	**0.13590**	**p>0.20**

The results yielded by the Kolmogorov-Smirnov Test indicate that all of the subtests were significant ($p>0.20$), and may therefore be considered to be normally distributed. This must be interpreted with caution, as the significant scores may be the result of the small sample size ($n=12$). This is important to note, as the histograms and the differences reported between the means and medians suggest that the BSID Language and DAYC Communication and Social-emotional subtests may be non-normally distributed. Consequently, both parametric and non-parametric techniques were used to address the concerns that the distribution for the Communication and Social-Emotional scales for both the BSID and DAYC may have been slightly skewed.

Both the parametric Pearson Product-Moment Coefficient Correlation (r) and the non-parametric Spearman's Rank Order Coefficient Correlation (ρ) were run to investigate whether there were significant relationships between the subtests of the BSID and DAYC. The results of these two sets of analyses are presented below in Table 3 and Table 4 respectively.

Table 3: Pearson Product-Moment Coefficient Correlation:

			DAYC		
BSID	**Cognitive**	**Communication**	**Physical Development**	**Social-Emotional**	**Adaptive Behaviour**
Cognitive	0.62				
Language		0.95			
Motor			-0.33		
Social-Emotional				0.63	
Adaptive Behaviour					0.01

Table 4: Spearman's Rank Order Coefficient Correlation:

			DAYC		
BSID	**Cognitive**	**Communication**	**Physical Development**	**Social-Emotional**	**Adaptive Behaviour**
Cognitive	0.71				
Language		0.90			
Motor			-0.29		
Social-Emotional				0.5	
Adaptive Behaviour					0.02

As the parametric and nonparametric correlations did not differ in terms of levels of significance, only the parametric results are reported. The results indicate a strong positive relationship between the two Language Scales ($r=0.95$, $p<0.05$), with moderately strong relationships noted between the Cognitive and Social-Emotional scales ($r=0.62$, $p<0.05$ and $r=0.63$; $p<0.05$ respectively). The relationship between the BSID Motor and DAYC Physical Development scales is fairly weak ($r=0.29$, $p<0.05$), with no significant relationship noted for the Adaptive Behaviour scales ($r=0.01$; $p<0.05$). This makes sense given the concern noted by the PA's regarding the structure of the DAYC Motor scale, and how the format may yield different results. Further, as described in the literature review, the Adaptive Behaviour scale for the BSID is comprised of a number of elements which are combined to provide a composite score for the scale, while the DAYC scale is structured as a single scale. This may explain the poor relationship noted in the scores elicited by the two measures.

4.1.2 Differences of means between BSID and DAYC Percentiles

While the child's score for each Scale provides some insight into their performance and abilities, it is their percentile ranking that holds true value in terms of viewing the child in relation to their peers. More importantly in terms of this research, comparing the percentile rankings elicited by the two developmental measures for each scale is the best means of determining how closely aligned the two measures are. As discussed in Chapter 2, both the BSID and DAYC yield percentile rankings for the child, which indicates where a child's score falls in relation to children in the norming sample. Theoretically, a child ought to have the same percentile ranking in both developmental measures, if they were measuring similar attributes

The most appropriate statistical technique to determine the difference between means is the matched-pairs *t*-test, which tests for the difference between two sets of scores of a single sample. One of the advantages of using the matched-pairs *t*-test for this particular question is that it is an appropriate test to use for very small samples, such as this one where n=11. The sample that was included for this analysis is smaller than the previous one, as one of the children was not given a percentile ranking, due to the fact that she had multiple disabilities and the assessors deemed it an in accurate view of her abilities. However, an assumption of the matched-pairs *t*-test is that the data is parametric in nature. Therefore the three tests for normality which were described above were conducted on the data set, and are presented below.

In order to determine whether the percentile scores are parametric or non-parametric, the researcher visually examined the histograms of the percentiles, which has been attached as

Appendix E. It was noted that the data did not appear to be normally distributed, which was confirmed by the basic descriptive statistics conducted on the data sets. This table is presented below as Table 5.

Table 5: Basic Descriptive Statistics for the Percentiles:

Variable	*N*	*Mean*	*Std. Dev.*	*Median*	*Minimum*	*Maximum*
Cognitive (BSID)	11	25.55	23.775	16	1	75
Language (BSID)	11	11.43	20.695	2	0.2	66
Motor (BSID)	11	44.82	25.895	34	8	92
Social-emotional (BSID)	11	9.95	15.136	2	0.4	50
Adaptive Behaviour (BSID)	11	14.95	18.078	8	2	47
Cognitive (DAYC)	11	16.47	20.219	8	0.1	65
Communication (DAYC)	11	9.88	17.291	1	0.1	50
Physical Development (DAYC)	11	35.18	19.681	37	5	68
Social-emotional (DAYC)	11	32.45	32.169	16	3	95
Adaptive Behaviour (DAYC)	11	32.45	18.753	34	9	75

To determine whether the data was parametric in nature, the Kolmogorov-Smirnov Goodness-of-Fit Test was conducted on the data, which yielded the following results. The results are presented in Table 6.

Table 6: Kolmogorov-Smirnov Goodness-of-Fit Test for Normal Distribution:

	Statistic (D)	***p-Value***
Cognitive (BSID)	**0.29233**	**p>0.20**
Language (BSID)	**0.36744**	**p>0.10**
Motor (BSID)	**0.27060**	**p>0.20**
Social-emotional (BSID)	**0.34308**	**p<0.15**
Adaptive Behaviour (BSID)	**0.21773**	**p>0.20**
Cognitive (DAYC)	**0.29233**	**p>0.20**
Communication (DAYC)	**0.36040**	**p<0.10**
Physical development (DAYC)	**0.10785**	**p>0.20**
Social-emotional (DAYC)	**0.25195**	**p>0.20**
Adaptive Behaviour (DAYC)	**0.18171**	**p>0.20**

The test results indicate that while the BSID Cognitive, Motor and Adaptive-Behaviour and the DAYC Cognitive, Motor, Social-Emotional and Adaptive Behaviour percentiles appear to be normally distributed ($p>0.20$), the BSID Communication and Social-Emotional and DAYC Communication percentiles do not appear to be normally distributed. Given the small sample size and the fact that three of the percentiles did not meet the Kolmogorov-Smirnov Goodness-of-Fit Test requirements for normal distribution, it was determined that the data was most probably non-parametric in nature. However, given that the Kolmogorov-Smirnov scores are likely to be affected by the small sample size and the fact that the results of parametric tests tend to be more robust in nature, it was felt that both parametric and non-parametric tests should be run on the data, and any difference between the two sets of results noted and analyzed.

A matched t-test was used to determine whether there is a difference between the two measurements for each individual (Rosnow & Rosenthal, 1991). The results of this analysis are presented below in Table 7.

Table 7: Matched Pairs t-Test between the subtests of the BSID and the DAYC:

	N	*t*	*df*
Cognitive	11	1.87	10
Communication	11	1.02	10
Motor	11	0.83	10
Social-Emotional	11	-2.81	10
Adaptive Behaviour	11	-2.18	10

Note: $p<0.05$

The equivalent non-parametric statistical test for the Matched-Pairs *t*-Test is the Wilcoxon Matched Pairs Test. The results of this test are presented below in Table 8:

Table 8: Wilcoxon Matched Pairs test:

	N	*T*	*Z*
Cognitive	11	16.00	1.51
Communication	11	13.50	1.07
Motor	11	26.00	0.26
Social-Emotional	11	7.00	2.31
Adaptive Behaviour	11	11.50	1.91

Note: $p<0.05$

The results of both the Matched-Pairs t-Test and the Wilcoxon Matched Pairs Test indicate that only the Social-emotional percentiles showed a significant difference (t=-2.81, p=0.1833; Z=2.31168, p=0.02. The Adaptive Behaviour percentiles were not significant, but were borderline between significant and not-significant (t=-2.18; p=0.054; Z=1.91; p=0.056)). This may be partly due to the fact that the Social-Emotional and Adaptive Behaviour subtests in the BSID are scored entirely by the parent, while the DAYC Social-emotional and Adaptive Behaviour sub-tests are scored through a combination of the PA's knowledge of the child, observations and examples provided by parents of their child's ability. Thus there is a degree of subjectivity in these subtests.

In order to determine the likelihood the strength of the relationship between the means, effect sizes were calculated. Effect sizes are calculated when there is a significant difference between the means, and indicate whether "the difference between the means is large compared to the amount of dispersion (or descriptive uncertainty)" (Haslam & McGarthy, 2003, p. 207). This serves a dual purpose, as it informs the researcher about the strength of their research hypothesis (Rosnow & Rosenthal, 1991), as well as allowing for comparisons to be made between results from similar studies. Importantly for the purposes of this research, the size of the effect is not affected by the size of the sample. Cohen's *d* effect sizes were calculated manually utilizing a formula provided by Thalheimer and Cook (2002), which is based upon the sample means and standard deviations. As only the means for the Social-Emotional sub-test were significant, with the means for the Adaptive Behaviour sub-tests bordering on significant, the researcher only calculated Cohen's d effect sizes for these two. It was found that both have large effect sizes, with d=0.93 for the Social-Emotional sub-tests and d=0.97 for the Adaptive Behaviour sub-tests. The large effect size for the Adaptive

Behaviour sub-tests could be considered to be further evidence that the means are significantly different.

4.2 *Qualitative analysis and discussion*

In addition to the above quantitative analyses on the data, a series of interviews were conducted with the PA's who had administered at least one DAYC. The interview schedule is attached as Appendix A. The purpose of the interviews was to collect data regarding the utility of the BSID and DAYC within the HI HOPES context, and to ascertain whether the DAYC was perceived by the PA's as a suitable replacement for the BSID.

The interview data was analyzed with the six-step model for thematic content analysis outlined by Braun and Clarke (2006). The first stage involved the researcher familiarizing herself thoroughly with the data. This begins with the transcribing process, and continues as the researcher reads the transcripts thoroughly to extract preliminary patterns and ideas about potential themes. The second phase involves the coding of the data, or rather organising it under relevant headings. Braun and Clarke stress that at this early stage, it is critical for the researcher to code for as many themes as possible, as it would be easier at a later stage to integrate themes together under an umbrella theme, than to split a single theme up into multiple themes. The third stage entailed searching for themes, where the researcher engaged with the myriad codes and began to find patterns linking these codes together. Braun and Clarke (2006) recommend that the researcher develops a "thematic map" (p. 89), where the various themes are noted, as are the interlinking relationships between the themes. The themes were also organized under overarching headings or broken down into subthemes where necessary. The fourth stage involves the researcher reviewing the themes to ensure that

all the data in the themes was meaningful, and begin to refine the themes. After having reviewed the themes, they need to be defined. In order to do this, the researcher must write an analysis of the theme and ultimately provide a clear and concise label for it. The final coding framework for these themes is attached as Appendix F. The last stage of content analysis is the final report, which consists of a thorough and detailed analysis of the themes, as well as the relationship between the themes. The themes and report are presented below.

In total there were 5 key themes that emerged from the interview data. The content themes are presented in the following format:

1. The names and a description of the umbrella themes
2. The names and descriptions of the themes clustered under the umbrella theme, related back to the issues discussed in the literature review.
3. The themes are then discussed in relation to each other.

Theme 1: Challenges in testing young deaf children

It is important for HI HOPES to match the PA with the family in as many dimensions as possible. The interviews indicated two areas where this was particularly an issue, namely the family's background and home language. It was noted that families may feel more at ease when matched with a PA of a similar background, partly as a means of ensuring that the child feels at ease with the PA ("I would say that most of our children are African children so having an Indian or any other colour [person] for that matter going there, they think, 'Who is this?', I mean it's different" (Respondent 1)). Matching the PA with the family would thus would facilitate the child's sense of ease with the PA (Noorbhai, 2002).

Language and effective communication were noted as being central issues in the assessments, for a number of reasons. There was a concern voiced over whether the PA's would be able to communicate effectively with the families if English is not the family's first language and if they could not speak the family's home language fluently. HI HOPES does attempt to match the PA's with the families as much as possible, in part to ensure that the communication channels between HI HOPES, the PA, and the family are as clear as possible. This is a critical facet of an early intervention programme (Carpenter, 2007; Guralnick, 1998).

The issue of communication was highlighted in terms of administration, with Respondent 7 noting "for children who don't have much language or with parents who can't communicate well with them, then it's a bit difficult to assess *those* children". While the PA's need to ensure that they can communicate the *content* of the question, there is a concern whether the child and parents will understand the question if it is posed in an unfamiliar language. This is exacerbated if the child is very delayed in language, as "much of the time you are just trying to get things out of them because their language is very delayed so that makes it a little difficult because you have to think, how else can you get them to do the task you are asking them to do" (Respondent 1).

The translation of items is a global assessment issue, since, if the content of a question is altered through rephrasing the question, the validity of the items, scoring and final interpretation are compromised (Ballard, 1991; Scheetz, 2004). It is therefore important that the wording be altered as little as possible to ensure that the integrity of the test is maintained. However, it is also important that the children understand the items and what they are required to do. This may involve translating the questions into another language or, even rewording the items to make them more comprehensible for the children. This is a frustrating

issue for the PA's, as "sometimes you know that the child may know something, but you don't know how to ask them to do it" (Respondent 5). When probed, the PA provided the example of asking the child to match objects according to their colour. The PA was aware that the child knew the different colours and was able to sort objects according to colour, but found that it was "quite hard to say to a deaf child 'Match colours'. But he could do that. So I would imagine that is the biggest challenge. You are constantly not able to say to them 'Put the red with the red' even when they actually can do it" (Respondent 5). The concern voiced here does not revolve around the child's ability, but rather how to phrase the item in such a way that the child can respond to it in a way that reflects their abilities, whilst maintaining the integrity of the item. The PA's are cognizant of this challenge, and a few stated that they consider alternative ways of phrasing the questions so that the children understand what is being asked of them. However, this may affect the scoring and interpretation of the test results. If in changing the wording of the question, the PA makes it slightly easier or harder to answer, or modifies the content slightly, then the child cannot be scored accurately according to the norming tables provided by the assessment manuals.

While the DAYC is a slighter more lenient developmental measure than the BSID in terms of the wording of items, there was a concern voiced about whether all the items can in fact be translated ("Even the DAYC has *some* questions that are not translatable into sign language or into a manner that it is easy for the kids to understand" (Respondent 2)). An example of such an item is where the child has to demonstrate their understanding of a familiar word.

The PA's thus appear to be caught up in a debate regarding whether they may word an item in such a way that they can ensure that the child understands the content of the item, and

whether doing so affects the integrity of the test in any way. If the content of the question has been altered in some way, then the scoring and interpretation of the test may be flawed.

As discussed in the literature review, the DAYC addresses one of the key concerns voiced by the PA's, namely that children may not receive a score for an item because of the difficulty in translating an item into sign language, rather than a result of the child's inability to perform the task (Andersson, 2006). As the PA's know the children that they work with and have a good idea of what they are capable of doing, rather than examining the wording of the items to find the best way to ask the questions, the DAYC allows them to score the child for what they know they can do.

However, there are certain drawbacks to using this method of assessing the child. In both the BSID and DAYC test formats, the parents are asked to answer some questions regarding their child's performance. For the BSID, the parents complete two questionnaires on their child's social-emotional and adaptive behaviour development, while one of the three data collection methods of the DAYC consists of the parents providing concrete examples of how well their child is able to perform various tasks. The assessors are often in the position where they have to accept the parent's word, especially if they cannot get the child to perform the task. However, there was a concern voiced over whether the child can in fact perform the tasks the parents say that they can. This is particularly a challenge for the PA's, who attempt to nurture a good working relationship with the parents. Respondent 6 provides an example of this by stating "I think sometimes if you ask the parents stuff, and they say 'Yes they can', you can't really test it, you are just taking their word. So I think that can be a problem. Obviously if the child is there and you can see it's different, but when the parents say they can do stuff when they actually can't". This was noted above, where the percentiles for the Social-emotional

scales of the two assessments were significantly different, with the percentiles for the Adaptive Behaviour scales bordering on being significantly different. This suggests that the DAYC's approach may be the more reliable approach, where concrete example that needs to be provided serves as a safeguard against parental bias.

A concern was voiced regarding the suitability of developmental assessments with some of the children. There are a large number of children at HI HOPES who present with multiple disabilities, such as those children with Cerebral Palsy. These children often present with developmental delays in many areas, not only language. This not only impacts the number of assessments that cannot be scored and interpreted correctly, but it may also prove to be disheartening for the parents ("Because these children have developmental delays in so many areas, the mom will be caught in a cycle of saying 'No, she can't do this' and 'No, she can do that'" (Respondent 6)). There is a concern that the parents may feel dejected by these results, but on the other hand it provides a baseline for monitoring future progress in terms of language development (Brauer, et al., 1998).

Finally, the PA's noted that when working with deaf children it is important that they familiarize themselves thoroughly with the assessments. This is not just in terms of the test format and the content of the tests, but also how to use the test to obtain the best possible results for the child. As discussed, this partly involves rephrasing the test questions so that the children may understand them and can thus respond appropriately. It also involves the assessor being able to work around behavioural aspects of the test situation. An example of this would be sustaining the child's attention throughout the testing period. The literature indicates that this is a challenge in testing very young children and assessors need to find

ways in which to keep the child interested in the test and motivated to perform (Aitken & Groth-Manat, 2006; Bailey & Rouse, 1989).

Theme 2: Positive attitudes towards the BSID

Meets certain key needs of the HI HOPES programme.

- Comprehensive assessment of the child
- It tracks the child's development
- Provides insight into the child and thus provides guidance to the PA
- Provides guidance for parents

The BSID addresses four key needs that have been identified for HI HOPES. Firstly, it is seen to provide a holistic, detailed report on the child on every area of their development. This report serves to track the child's development on a regular basis, as well as to inform the PA's work with the child. Finally, it also provides a basis for giving guidance to the parents in terms of their child's development and future strategies for the PA's work with the children and their families.

The PA's appear to view the BSID as being an assessment measure that addresses multiple areas of a child's life, corroborating the literature (Bayley, 2006). This is seen as important as it provides insight into how the child is progressing on a holistic level, and not merely in terms of language development ("I find the Bayley Scale goes into so much detail and is very in-depth. It goes into all of the different areas, like language, physical, socio-emotional. It goes nicely into each area, whereas the Language Development Scale only looks at the child's language" (Respondent 7)). While the LDS is also a key assessment within the HI

HOPES programme, it focuses exclusively on the child's expressive and receptive language ability. However, as half of the PA sample observed, it is important to gain a clear idea of how the child is progressing in other areas of development. Not only do these areas impact on language development, but understanding the child's overall development also provides both the PA and parents with further insight into the child's strengths and weaknesses in *all* developmental domains (Bayley, 2006). ("I think that's important when you are giving the parents the results from the different areas of development. It's nice for them to see that language-wise they may be a bit low, but with physical she is doing very nicely and so on. So it's nice to give them good news, because often the children are quite behind in their language development. Just gives them some positive" (Respondent 7)).

Importantly, the assessment reports also provide guidance to the PA's in terms of their work with the child, as the report details areas where the child requires extra support ("When you go through the report, you find that it tells you about the child. It tells you what the child can do and what improvements can be made" (Respondent 3)). This would enable the PA's to use targeted strategies that directly address the child's areas of weakness (Storbeck & Pittman, 2008).

The core value of the BSID in the HI HOPES programme is that it provides a means of regularly tracking the child's development in line with the milestones that are typically expected at their age. The fact that the BSID can be administered every six months allows the programme directors and the PA's the opportunity to track the child's development and see how they have progressed in relation to their last set of test scores.

According to the literature, this is one of the aims of the BSID (Albers & Grieve, 2007). It has been developed and rigorously tested and normed as a tool that allows the child's developmental progress to be tracked both in relation to their own progress and in relation to their peer group.

Background of the BSID

- Focus of many studies
- Well-normed and standardized

A single mention was made acknowledging the strong psychometric properties of the BSID, which has been thoroughly normed and standardized (as mentioned above). It was also mentioned that the BSID has been used the subject of numerous research studies. While these are important given HI HOPES' need to use a standardized test that has been used successfully in early intervention programmes, it should be noted that while the previous incarnation has been used in many studies, the current version of the BSID is still a relatively new developmental measure, and to date there hasn't been a substantial body of research built up around this assessment measure. Further, there has not been any research conducted on the use of this edition of the BSID when testing deaf or hard-of-hearing children.

Test format of the BSID

- Relies on observations
- In-depth questionnaire
- Uses a Likert Scale

There were limited comments regarding the format of the BSID. However, there were three aspects of the format that were considered to be particular advantages of the BSID. The BSID questionnaire was considered to be "more complicated ... and more in-depth than the DAYC" (Respondent 7), which is viewed as an advantage as it provides richer and more detailed information on the child, which is what enables the BSID to provide rich insight into the child.. There was a single comment regarding the fact that the Motor, Cognitive and Language Scales of the BSID rely on observing the child, which was felt to provide the assessor with an idea of how the child really functions, instead of merely accepting the parents' feedback on their child's ability. While it was acknowledged that at times a child may not do a task that they are asked to do, the PA suggests that "that can be a thing you can pick up on, and you can say 'Well, maybe the child's not doing that, but maybe there is something behind that'" (Respondent 6). In other words, the assessor could use the child's inability to perform a task as a means of gaining insight into the potential barriers that the child may be experiencing.

The Social-Emotional and Adaptive-Behaviour Scales utilize questionnaires that the parent completes by rating their child on a four-point Likert scale. There was mention that through scoring the children in this manner, the parents are in a position to provide more accurate feedback regarding their child's development ("I think you would get more realistic, more accurate scores, definitely because you have more of a range of answers to choose from, and hopefully one of those answers will be the right one, rather than just a 'Yes' or 'No'" (Respondent 7)). The scales essentially allow the parents to report the *nuances* of their child's behaviour through expressing the extent to which a child's able to perform a task.

These different scoring methods provide an in-depth, detailed understanding of the child. The primary means of collecting information, however, is through the psychometrist's observations.

Administered by a psychometrist

- Accurate interpretation
- Standardized testing

A single mention was made of the value of having a psychometrist administer the BSID, for two reasons. Firstly, it was felt that having a single trained psychometrist administering all of the assessments ensures that the testing procedure is standardized, with each child being assessed in the same testing procedure by the same person. Further, the PA noted that a single psychometrist would interpret the child's performance in a consistent manner, while having a team of different assessors conducting assessments (such as with the DAYC) could result in differences in scoring. As she stated "I like the fact that she [the psychometrist] does the Bayley, because then all the assessments across the board are the same because they have been done by one person, whereas with the DAYC, each Parent Advisor administers and interprets in their own way. And then of course you don't know if it is accurate because you have your own way of interpreting things" (Respondent 7). While the PA's have been trained to administer the DAYC in an objective and professional manner, there does appear to be a concern as to whether their administration and scoring would be consistent throughout.

Test material is suitable for the age group

- Toys suitable for the children

Half the sample observed that the test materials used for the BSID could be considered to be one of its primary advantages. The toys are considered to be "nice and exciting" (Respondent 3), with Respondent 8 observing that "the children love them. It uses play and fun items to assess the child, which I think is a strength". This is particularly important given the task of sustaining young children's attention on the task. Given their interest in the toys and test material, they may be more likely to remain focused on the tasks at hand, which was noted as being one of the key areas of concern when assessing this population. This supports literature that states that the toys are able to engage the child's attention and interest throughout the assessment process (Alfonso & Flanagan, 1999).

Theme 3: Negative attitudes towards the BSID

Use at HI HOPES

- Test only goes to age of 42 months

There was a single concern voiced regarding the age limit of the BSID, which provides norming tables for young children up to 42 months. However, the HI HOPES database includes children as old as five. This means that for certain children, the assessment will not be able to provide a detailed and accurate analysis of their abilities and the PA's and parents will not receive reliable information on the older child's developmental growth. HI HOPES therefore requires a developmental measure that assesses children up to the age of six.

Test format

- Very strict test in terms of scoring the child

While there was limited mention of how observing the child during the testing scenario would provide insight into the child's current level of development, several of the PA's noted that the test was "very strict" (Respondent 1) in terms of the scoring, with Respondent 6 noting that "if the child doesn't do something ... then we can't give them that score so you won't get an accurate recording". As noted in the literature, there are numerous factors that may impact on a child's ability to perform optimally during the assessment, such as illness or tiredness. There does appear to be a concern regarding whether this measure of scoring the children would yield an accurate reflection of the child's abilities. However, as noted above, there is a sense that this strict scoring could also be a strength of the BSID, as it leads to consistency and allows for comparisons to norms to be made.

'Slice of life'

- Only shows what the child does at that particular moment

In addition to the sense that the BSID is a very strict test, there was a single mention was made of the fact that as the BSID only allows the assessor to score the child on items they perform during the allotted assessment period, the report "only gives a slice of [the child's] life, it shows how they perform during the test time only. It doesn't show you how they do outside of the test and what they are capable of doing" (Respondent 8). This has implications for the accuracy of the report, as well the recommendations and suggested guidelines indicated therein. However, this is a limitation of other developmental assessment tools, where the assessor is generally only able to record what the child does during the assessment. This also needs to be balanced with the amount of detailed information that the BSID is considered to provide (Bayley, 2006).

Scoring

- The use of Likert scales

There was a single mention made that the Likert scale could be a disadvantage in terms of the scoring. It was noted that "the Likert scale is not great because you are not sure when you are going to get a 3 or a 4" (Respondent 2), which may impact the accuracy of the results. This may be a particular issue given that the questionnaires are completed by the parents, who may not be impartial in their observations of their child. It should be noted that another respondent viewed the Likert scale as an advantage, as it allows the parents to report on the nuances of their child's behaviour, rather than being confined to absolutes. However, to some extent this may address the issue noted above that the BSID only shows a 'slice' of the child's life, as the parents are able to report on their child's abilities outside of the testing situation.

Test material

- Children are not always familiar with the toys included in BSID

There was a concern noted by several of the PA's that the test material of the BSID may not be appropriate within the South African content, as "in South Africa, poverty means that children are not exposed to much stimulation and don't have as much access to toys and things" (Respondent 4). If a child has not been exposed to the toys before, they would be unfamiliar to them and as a result the children "don't know how to manipulate them" (Respondent 1). Respondent 1 continues to state that sometimes the first time that a child is exposed to a particular toy (such as building blocks) is during the assessment process itself. However, the assessments do not make allowances for the child's socio-economic status, and

if the child is unable to use the toy correctly they are given a score of zero for the item. This limitation has been noted in the literature (Alfonso & Flanagan, 1999).

However, as discussed earlier, the test material is also viewed as a positive, due to the fact that the toys are seen as engaging the child's interest during the assessment process. This is important to note, given the difficulties noted in the literature on maintaining the child's attention and interest during the testing procedure. As the BSID has a strict format, and the items and materials cannot be altered or substituted in any manner, a possible strategy would be for the PA's to expose the child to such toys during the weekly sessions so that the child can be more accurately scored during the assessment.

Assessment is too long

- The length of the assessment impacts the child's ability to concentrate
- Cognitive scale is very lengthy

There were some concerns noted regarding the length of the testing process, with Respondent 8 observing that "It seems to take a bit long. I mean, little children tend to get tired after a while, and so they won't perform as well as they could". There was a single mention of the cognitive scale being particularly lengthy, which could impact the child's final score. Given the challenges noted in assessing very young children and sustaining their attention and interest throughout the testing period, this may indeed impact on their scores, with the child's scores not being an accurate reflection of their real ability. This again reflects the nature of the other developmental assessments, It can further be argued that through conducting a lengthy assessment, the assessor is able to obtain enough detail to provide a fully comprehensive report, which was noted as being a strength of the BSID.

Has to be administered by a psychometrist

- Inconvenient and costly for HI HOPES
- Make more logistical sense for the PA's to administer a developmental measure
- Psychometrist is a stranger to the child, which may impact their performance

While having a trained psychometrist administer the test was viewed as a positive by some PA's due to the resulting uniformity in test administration and scoring, others viewed it as a negative quality. The PA's view the fact that the BSID has to be administered by a psychometrist as being a disadvantage to the child, as the psychometrist is generally a stranger to the child and thus does not have an established relationship and sense of rapport with them. There is a concern that as a result the child may feel uncomfortable and become withdrawn when being assessed by a stranger, which may hamper their performance (Briggs-Gowan & Carter, 2007). The child may also experience separation anxiety, which could hamper their ability to focus on the tasks at hand (Bailey & Rouse, 1989).

Further, there is a sense that it is a costly exercise having a single psychometrist administer all the assessments, particularly given the geographic spread of the children, with Respondent 2 stating that "In terms of *our* needs and reaching people far away and having to do assessments on kiddies who are living in remote areas and the logistics of travelling to those areas and the logistics of getting the Bayley done the way it is meant to be done is difficult".

The suggested means to address these issues is for the PA's to take over the assessing role, as they would be able to build the assessment into a home visit. As they have already established rapport with both the child and their family, the child is likely to feel more at ease and comfortable to perform the tasks required. However, this is not a viable option for the

BSID, as the manual explicitly states that only a trained and registered psychometrist may administrate the assessment due to the intricate nature of the test administration and interpretation (Bayley, 2006). Further the psychometrist is likely to provide an unbiased evaluation of the child's development, while a potential disadvantage of the PA's administering the assessments is that they may be biased in their views of the child.

Language may affect the child's performance

- Rewording the questions into sign
- Rewording the questions into another oral language
- Language of child is poorly developed, which hampers test administration

There was some concern voiced over whether the child's language ability would affect the test administration and scoring process, for a couple of reasons. Firstly, it was felt that in translating the test items into sign language or a vernacular language (for example Afrikaans or Zulu) the assessor may alter the wording and as a result even the content of an item. This would mean that the integrity of the test would be compromised somewhat, and the child will not be able to receive a normed score. This has been noted as a key difficulty when assessing deaf or hard-of-hearing individuals (Brauer et al., 1998, Scheetz, 2004).

Secondly, there was a single mention made of how a child may not be able to complete the assessment if the child's language ability is particularly poor, as many of the items rely on the child's understanding of the content of the question with Respondent 1 noting that "you can't even assess that stuff because the language of the child is not at that level yet". This means that the report will not provide an accurate reflection of how the child is performing in their

other areas of development, such as motor development. In such a case, any feedback and strategies contained in the report regarding these areas of development would be inaccurate.

The themes of the DAYC were examined with the perceived advantages and disadvantages of the BSID in mind. The researcher attempted to determine whether the perceived strengths of the DAYC matched the perceived strengths of the BSID, whilst assessing whether they DAYC would address any of the perceived disadvantages noted for the BSID.

Theme 4: Positive attitudes towards the DAYC

DAYC meets some of the needs at HI HOPES

- Provides guidance
- Research possibilities
- DAYC covers full age group

The DAYC meets three critical needs that HI HOPES have identified. Similar to the BSID, the report it yields serves as a source of guidance as it "gives us things to assess a child by and gives us specific things to work with" (Respondent 5). Respondent 5 continued to state that "I think it gives us valuable information about the children's development that we can use to plan what we can do with them. For example if you do the DAYC and you see for example that the child can't hop on his right leg, you can work on that. You can play with them, teach them to hop, things like that. You can teach all sorts of things, words, colours". As discussed in the literature, the DAYC has been used to provide a detailed holistic overview of the child's development ability (Ogletree, 2001; Aitken & Groth-Manat, 2006).

The DAYC addresses one of the disadvantages noted for the BSID in that it "caters for older children, so we are covering the entire age group from birth till 6" (Respondent 1). This means that the entire database of children can be assessed with the same developmental measure, and their development can thus be tracked over a longer period of time. There will thus be a sense of consistency in terms of assessments and scoring up to the age of six. This is an important consideration, given how many children are diagnosed as being deaf or hard-of-hearing as toddlers or even older. This means that if a child joins HI HOPES at an older age, they may still receive the same developmental tracking and strategic developmental input as the younger children.

Finally, to date, there has not been much research conducted on the DAYC, and particularly on its role in early intervention programmes. Further, there has been no research conducted on the DAYC in South Africa, and whether the practical advantages of the test (such as having PA's administer the test, and scoring some items beforehand) hold true when it is implemented in practise. However, a respondent noted that this could be a benefit for HI HOPES, as they have the "option of looking at the reliability and validity in South Africa and it's a test that does not have the previous biases of previous research" (Respondent 2). This holds promise for HI HOPES, as they have the opportunity to produce a body of research that focuses on the DAYC in particular as an assessment tool in an early intervention programme. However, it should be noted that the current edition of the BSID would provide similar research opportunities for HI HOPES, as there is a paucity of published research on its role in early intervention programmes.

Test format

- More comprehensive that the BSID

There was a single mention made that the DAYC offers a very comprehensive view of the child as it "breaks down the child's scores more. And it covers everything. Like when you look at physical development it covers a lot of things" (Respondent 3). The literature indicated that this was the intention of the assessment (Aitken & Groth-Manat, 2006).

DAYC is very time-efficient

- Can be done during home visit
- Time efficient
- Can be scored beforehand
- Child may receive a score from variety of sources

The administration of the DAYC is considered to be a particular advantage, partly because it can be administered by a PA during a home visit, and partly because the PA can score some of the items beforehand, provided that they have the evidence in the form of examples to support their scoring. Further, if they are unable to get the child to perform a task, they can ask the parents whether the child can do the task and request examples that serve as confirmation that the child can perform the task ("It seems to be easier because what we are able to do is for the Parent Advisors we look through the questions and see which items the child is definitely able to do and definitely not able to do, and they can already mark them. We then go along and assess the child. If we don't see what we are looking for we ask the mom. This makes it a lot shorter" (Respondent 1)). The DAYC thus addresses one of the key limitations noted for the BSID, namely that it only shows what the child can do during a short

period of time. As the administration time is shorter than the BSID, the child is less likely to lose interest in the testing process. As discussed previously, this may be beneficial in terms of the child's performance, as they are more likely to stay focused and motivated. One of the disadvantages of a lengthier assessment such as the BSID is that the child's score may not be an accurate reflection of the child's ability due to possible fatigue, lack of interest or motivation, etc.

DAYC can be administered by a PA

- Children have a relationship with PA's, which may affect performance
- Convenience of having PA's administer the test

A criticism of the BSID was that it had to be administered by a psychometrist, who is not known by the child and is unfamiliar with the family. It was felt that this would impact the child's performance, and as a result they may have a lower score. It was therefore suggested that the PA's be trained to administer the BSID. As discussed, the BSID format does not allow for this while the DAYC's format does (Carnes & Albrecht, 2007; Ogletree, 2001). The PA's perceive this to be an advantage, noting "it is easier for the PA to get the child to do something because we know how to work them. It's also easier for us who know the child to get him to give us examples for the items" (Respondent 8). The PA's have established a relationship with the child and their family, and are also familiar with the child's environment. They also have experience in working with the child and getting them to do various activities. There is a general acknowledgement that "it helps a lot going into the situation knowing the child" (Respondent 4). This is therefore seen as an advantage of the DAYC that addresses a key disadvantage of the BSID. In addition to the established rapport between the PA and the child, there is a further advantage to having the PA administer the

DAYC. Noorbhai (2002) stressed that it is important for the professional to be matched to the child as closely as possible in terms of demographics so that they have a good understanding of the child, their family and their broader context. Similarly, if the assessor is closely matched according to these demographics, the same empathic understanding may be evident throughout the assessment, which serves to strengthen the rapport.

Theme 5: Negative Attitudes towards the DAYC

While the above advantages of the DAYC were noted, numerous perceived disadvantages noted for the DAYC. However, in analyzing these disadvantages, the researcher remained cognizant of the fact that the PA's were more familiar with the DAYC, and were thus more likely to be able to engage with the test critically. Further, the researcher considered that the majority of the PA's were novices in terms of test administration, and as a result several perceived disadvantages may have been a reflection of this relative inexperience rather than disadvantages to the test itself.

Format of the DAYC

- It is not as in-depth as BSID
- The structure of the Physical Development scale may be unfair to the child

There was some mention made that the DAYC may not be as comprehensive as the BSID, with Respondent 7 stating that the DAYC "gives a nice general picture of the child. But I do still think that if you want more in-depth assessments on each of the areas, you would still want to do the Bayley. Or even, language-wise you would want to do the Language Development Scale". There does appear to be a strong sense that the more information

yielded by an assessment, the more useful the assessment is in terms of devising programmes for the children. The concern is whether the DAYC can yield the same level of detailed information as the BSID, as the latter was viewed as being very comprehensive and providing a lot of detail (Albers & Grieve, 2007). This needs to be balanced with the criticism that the BSID is long and time-consuming for this reason.

There was a sense that the Physical Development scale has the potential to be unfair to the child, due to the way in which it is structured. The items relating to a particular task appear to be clustered together, so that if the child is unable to perform one motor skill, they may not be able to progress to later items that they are able to perform ("If you can't walk, then you can't get the next point or the next point or the next point. Even if the child can do it, they can't get the score, because they would have received so many zeroes for the walking items" (Respondent 2)). There is therefore a sense that this could place the child at a disadvantage when it comes to the final scoring and interpretation of the Motor scale. While the DAYC's structure may differ to the BSID's format, it is not unique to the DAYC, with other developmental assessments following a similar structure. It should also be noted that there was no significant difference in the percentile scores for the Motor scale between the DAYC and the BSID, so the structure of the scale does not appear to impact the child's final scores in a significant manner.

Scoring

- Difficulty in determining whether child has performed task
- PA's experiencing difficulty being impartial when scoring
- Possibility that parents' responses are not reliable
- Difficulty in obtaining examples of child performing a task from parents

- No Likert scale

As described in the literature, there are three methods of obtaining scores for a child. Firstly, the assessor can go through the questionnaire and score the child on items they know the child can perform. For the remaining items, the assessor could ask the child to perform a task and score them according to whether they performed the task or not. If the child does not perform a task, they can ask the parents whether the child can do this task, and ask for an example of the child performing the task. As discussed earlier, the variety of sources of information regarding the child's ability (observations, parental input and PA input) is viewed as an advantage of the DAYC, collectively providing an intimate and detailed view of the child. However, there were a few concerns noted regarding the scoring of the DAYC. One was that there is some difficulty involved in determining whether the child has intentionally performed an item, or whether they did so inadvertently or by chance. Respondent 6 noted "There was what I actually saw – the same thing was it by chance or was it actually her doing it, that type of thing. Because that could skew your whole assessment and score. If your aim was to see if they could follow something with their eyes, like to follow the toy or something with their eyes, you would take the toy and move it across and the child must follow the toy with their eyes. But did they really follow the toy or did they look at something else". This is exacerbated by a sense that as the PA's have an emotional connection to the child and want the child to do well in their assessment, there is a possibility that their scoring will be biased in some way ("When you are watching that baby, you so want them to succeed!" (Respondent 4)). Respondent 6 stated that when conducting an assessment, the PA's "have got to be *very* objective in your observations and sure that the child is actually doing [the task]. Because obviously if the child is not doing that then you've got to tell the parents, 'Well, the child is here and the child is actually there' so it doesn't give an accurate

assessment. So, ja, *you* have got to set yourself apart from the family in that way. Even though we see the family every week, you have got to assume the role of the tester and got to be objective. As much as you want the little baby to be on that level, you've got to play the role of the objective observer". This means that the PA's need to be very aware of their propensity to be biased in their scoring and make a concerted effort to be as objective in their scoring as possible. However, this may be addressed as the PA's gain experience in test administration and scoring.

A similar concern was voiced by the PA's regarding the parents' responses and input. There was a sense that just as the PA's feel a sense of investment in the child's performance and consequently want the child to do well, so too do the parents. The parents may therefore provide slightly embellished responses, with Respondent 7 stating that "when you ask the parents, 'Can the child do this?', they always want to overemphasize what their child can do, and they say 'Oh yes, she can walk five spaces or talk five words or do somersaults' or whatever it is". There is therefore a sense that the PA's should exercise caution in accepting the parent's feedback, and obtain concrete examples of the child performing a task. However, it should be noted that the Social-Emotional and Adaptive Behaviour scales of the BSID rely entirely on parental responses, and therefore the possibility of bias exists for both measures, the difference being that with the BSID, the parents can rate their child on a scale of 1 to 4, while with the DAYC, they are limited to stating only whether the child can perform an item or not. There was mention made regarding the use of a Likert scale in this instance, as "sometimes the child does do something, but not all of the time, so you can't give a '1'" (Respondent 1). Respondent 7 confirmed this by expressing that "you give the child a 'Yes' when the child is really only half-way there". There is a sense that a Likert scale may provide a more accurate depiction of the child, as it allows the assessor to score the child in terms of

the extent to which they can perform a task (for example, 'some of the time'). The lack of a Likert scale is therefore viewed as a disadvantage of the DAYC. This may in part stem from the sense of uncertainty noted by the PA's regarding whether a child has performed an item, as well as their own sense of possible bias in scoring. As the parents possess tremendous knowledge and understanding of their child, their input should be considered to be a suitable means of collecting information to score the child, provided that the parents can provide corroboratory examples of their child performing the tasks. A suggestion to overcome this would be for the PA's to explain to the parents the importance of their role in the assessment, and the necessity for candour.

PA's are still learning how to administer the assessment

- PA's need to be well-trained in this skill
- Overwhelming to learn the test format
- Overwhelming to administer the test
- Difficulty in learning the scoring
- PA's need to put in a lot of prep beforehand
- Difficulty learning how to sustain child's attention on tasks at hand

As noted above, there is a sense that part of the challenges voiced by the PA's reflects their levels of experience in test administration. The PA's were generally cognizant of this, with over half the sample describing various aspects of the testing process they have been struggling to familiarize themselves with.

As noted, the PA's come from different backgrounds, and all have different experiences. Apart from one PA who is a fully trained registered psychometrist, the remaining PA's have

only received limited training in test administration in terms of the LDS. It is therefore felt that it is “important to do your homework and really know the questionnaire very well” (Respondent 7).This is necessary given that the PA’s noted that the questionnaire was long and could become overwhelming. It was therefore important for the PA’s to familiarize themselves with the layout of the questionnaire, the order of the scales, and the items contained therein. There was a sense that after the PA’s had prepared sufficiently, the sense of feeling overwhelmed would subside and the PA’s would feel increasingly confident (“My initial impression like I said was that it was quite long with lots of paper and a bit overwhelming, but when I had actually prepared and knew the child then it wasn’t so bad” (Respondent 5)).

There is also a sense that the PA’s are still grasping basic test administration skills, such as sustaining the young child’s attention, and in terms of the more technical aspects of test administration of scoring and knowing when to end the assessment. This particular point is of particular concern, given the difficulties that the PA’s have noted in terms of scoring the child correctly, which were described above. However, the PA’s generally appear to be optimistic about their test administration skills, stating that as after familiarizing themselves with the DAYC, it became less overwhelming. A suggestion for the PA’s to overcome this anxiety and sense f feeling overwhelmed is for the PA’s to conduct a few assessments in pairs, so that their confidence can increase and they can be exposed to more assessments.

Child's hearing may impact their performance

- Items in the DAYC rely on hearing

A single concern was noted regarding how the child's lack of hearing impacts on their performance, as several items "rely quite a lot on hearing, like the child must startle to a loud noise, for example" (Respondent 2). In such cases, the child obviously cannot be scored for the item. While this would not affect the discontinue rules of the DAYC as these type of questions are distributed throughout the assessment, it is an indication of a type of item that is difficult to administrate and would need to be adapted or changed to meet the needs of deaf and hard-of-hearing children.

4.2.1 Summary of themes

The primary themes that emerged in the thematic content analysis have been summarized in tabular format, indicating the various advantages and disadvantages of the two assessments. This table is presented overleaf as Table 9.

Table 9: Summary of the thematic content analysis:

BSID		Key themes	DAYC	
Advantage	Disadvantage		Advantage	Disadvantage
×		Comprehensive assessment of the child	×	×
×	×	Assessment format	×	×
	×	Scoring	×	×
×	×	Has to be administered by a psychometrist		
		Can be administered by a PA	×	
	×	Age range of assessment	×	
	×	Length of assessment	×	
	×	Language may impact child's scores		×
×	×	Assessment material		
		Research possibilities	×	

Both the BSID and DAYC are seen as providing comprehensive reports. This is particularly viewed as a strength of the BSID, with most of the PA's noting that the holistic overview it provides of the child is accurate and detailed. The DAYC is also seen as being thorough and providing an accurate view of the child, but somewhat less so than the BSID. Both developmental measures are viewed as providing an accurate means of tracking the child's developmental progress which allows for the development of effective strategies to help the child develop their areas of weakness.

There was a concern with both assessments that the child's language delays may impact on their scores, as the child may not understand the content of the question, or the psychometrist or the PA may need to alter the wording of the question in some way to ensure that the child may understand the question. This does not only affect the communication scores for the child, but could potentially impact the scores for the other scales.

There was a slight concern voiced regarding the order of the Motor scale in the DAYC. There was a sense that the format of the scale may be unfair to the child if they are unable to do several items (such as walking) but can do items later on in the scale.

However, the DAYC does address a key need that the BSID does not: it may be administered to children up to the age of six, while the BSID may only be administered up until 42 months. This means that a greater number of children can be regularly assessed, with the view of providing detailed strategies to address any developmental delays that exist.

The BSID was noted as being a very length assessment. There were concerns that the lengthiness may have an effect on the scores as the child may experience fatigue, lose interest in the test and the motivation to perform the various tasks. The DAYC was seen to address this issue somewhat, as certain items can be scored beforehand by the PA, and if the child does not perform a task during the assessment, the PA can ask the parents for the information and examples.

One of the areas of debate that emerged from the thematic content analysis centred on the person conducting the assessment. On the one hand, it was felt that by having a single psychometrist assessing all the children, the assessments were standardized as the administration and scoring remained consistent. However, as HI HOPES expands into nine provinces, there are logistical issues around having a single psychometrist administer all the assessments. Further, the PA's voiced a concern regarding how well the child will perform with a psychometrist, who is essentially a stranger to the child and their family. To this end, the DAYC addresses this concern as the PA's have established rapport and a relationship with the child, as well as the family. The PA's also know how to work with the child.

However, there was a concern voiced regarding whether PA's could adopt an impartial and objective stance towards the child when scoring the child on their performance during the administration of the DAYC and PA's appeared overwhelmed (initially) with the demands of administering the tests.

The PA's exercise their judgement in the child's ability in two ways. Firstly, they are allowed to go through the assessment before administering it, to give the child scores for the items they know the child is capable of ding. The second way in which they score the child is during the assessment itself, where they watch the child performing various tasks, and scoring them accordingly. In either case, the PA's could potentially face their own biases in wanting the child to perform well, and as a result score the child incorrectly. However, it should be noted that the PA's are aware of this possibility, and appear to be monitoring their feeling during the assessment.

The PA's ability to have an active role in scoring is also viewed as an advantage. The BSID allows for two methods of scoring, where the assessor observes the child performing tasks and scores them accordingly, and the parents complete a questionnaire examining their child's social-emotional and adaptive-behaviour development. The DAYC therefore allows for information to be collected in more ways, which may present a more accurate view of the child. The flexibility in scoring also allows the DAYC to be administered in a far shorter space of time than the DAYC, which was noted as being very time-consuming to administer and potentially tiring for the child.

The test material for the BSID was an area of debate for the PA's. The toys were acknowledged to be engaging for the children. However, it was noted that due to the low

socio-economic status of some of the families in the HI HOPES programme, several children had not been exposed to these toys before being assessed, and as a result the scores they attained for the test was not an accurate reflection of their ability. This debate did not appear to be relevant for the DAYC

It was noted that the DAYC would provide research opportunities for HI HOPES, as there had not been much research conducted on the use of the assessment in such a programme. Such research would also provide insight into the applicability on the DAYC within the South African context. While it was not stated by a respondent, it should be noted that the current BSID would provide similar research opportunities for HI HOPES.

4.3. *Comparison between the BSID and the DAYC*

The PA's appeared to be ambivalent regarding a preference for one particular developmental measure. As discussed above, there is evidence that the PA's have a clear idea about the advantages and disadvantages of both, although more disadvantages were noted for the BSID. Over half of the PA's felt that the DAYC was better suited for South Africa and the HI HOPES context in particular. The primary reason driving this is the flexibility in terms of both administration and scoring. There is a sense that the combination of these elements provides a far more accurate depiction of the child and their abilities. Further, the DAYC caters for an older age group, which is a need that the BSID does not meet. However, two PA's felt that the amount of holistic, detailed information provided by the BSID is more valuable, particularly given that the purpose of the assessments is to elicit information that may be used to inform strategies for the child's developmental growth ("If you want a

general idea of the child, then the DAYC is the way to go. But if you want a more detailed look at the child the Bayley is the way to go" (Respondent 7)).

The PA's were unable to reach a final consensus regarding which assessment would be the best option. An example of this ambivalence is demonstrated by Respondent 8, who stated that "I think both should be done. Maybe one covers a small area of one aspect of development that the other test misses, or maybe because the child is familiar with the PA he performs better on the DAYC, or maybe he's excited by the toys and new friend doing the Bayley, so he performs better with her". Therefore, there was a sense that the two measures were very similar in nature, with both yielding similar results. While each assessment has clear advantages and disadvantages, there was the impression that both tests would ultimately serve the same purpose.

Statistically, there was a strong positive relationship noted between the BSID Language and DAYC Communication scales, with a moderately strong relationship noted between the Cognitive and Social-emotional scales. There was a fairly weak relationship noted between the BSID Motor and DAYC Physical Development Scales. Finally, there was no significant relationship noted for the Adaptive Behaviour scales. Despite the moderately strong relationship between the Social-emotional scales, there was a significant different noted for these percentile scores. It is conjectured that this may be a result of the different scoring mechanisms present in the two assessments.

4.4 *Conclusion*

Using triangulation of methodology, the researcher was able to corroborate the findings of the quantitative analyses with those of the qualitative analyses (Kelly, 2006). The fact that there was no significant difference between the percentiles obtained the Cognitive, Communication and Motor scales of the BSID and their counterparts on the DAYC indicates that they are equivalent measures of these abilities in the children. There was a significant difference between the percentiles for the Social-emotional Scales of each measure, and the fact that the percentiles for the Adaptive Behaviour Scales bordered on being significantly different may indicate some bias in the parental reports. These support the exploratory findings from the thematic content analysis in terms of answering the research question, where the DAYC is perceived as being appropriate substitute for the BSID.

CHAPTER FIVE: CONCLUSIONS

The primary research question that this research examined was how applicable and useful the DAYC and the BSID are within the HI HOPES context. There were three secondary questions that addressed various aspects of the primary question, namely:

- What are the Parent Advisor's views of the DAYC and the BSID?
- How do the DAYC Scores correlate with the BSID scores?
- Are there any differences between the DAYC percentiles and the BSID percentiles?

Ultimately, the research aimed to determine whether the DAYC would be a suitable replacement tool for the BSID, the latter which was considered to be costly and time-consuming to administer, as well as impractical as HI HOPES was expanding nationally. The BSID is a tool that been used in numerous research studies, and has been revised and updated twice. For HI HOPES' purposes, it was considered to be an in-depth assessment tool, which provided rich, detailed information on the child and could thus provide the direction needed for the early intervention programme. The materials of the test were considered to be an asset, as they were able to maintain the attention of the young children and stimulate their interest. The fact that the assessment has to be administered by a psychometrist was seen as an advantage as it allowed for an objective professional assessment, but this was also viewed as being a possible disadvantage as the psychometrist does not have an established relationship with the child, which may affect their assessment scores. The BSID was also viewed as a lengthy assessment, which may tire the child, and thus affect the scores. A further disadvantage cited for the BSID is that it only shows what the child is capable of doing during the assessment period, and if the child is unable to perform a task because they are tired or unmotivated, for example, they will not receive the score for the item even if the

parent or PA has knowledge that the child can perform the task. There was also a concern that the child's language ability may impact on their final scores.

The DAYC was seen to address many of the concerns mentioned above for the BSID. The primary advantage of the DAYC is that it can be administered by a PA rather than a psychometrist, which is not only cost- and time-efficient but means that the child already has a rapport with the assessor, and the PA knows how to work with the child. The scoring also means that the test administration is much shorter, thus addressing another concern about the BSID. The DAYC also caters for a wider age range than the BSID, which thus meets a need of HI HOPES that the BSID does not. However, there was a concern, as with the BSID, that language may still impact on the child's overall scores for the assessment. A further potential disadvantage noted for the DAYC is that the PA's have an emotional bond with the children they work with, and thus are not as unbiased and objective as a psychometrist is likely to be. There was also a limited concern that the DAYC may not yield as much detailed information as the BSID, but this was only mentioned by one PA. Overall it appears the PA's view the DAYC positively, and view it as a suitable substitute for the BSID.

The quantitative results confirmed that there was a strong positive relationship between the Language scales, and moderately strong relationships between the Cognitive and Social-Emotional scales of the BSID and DAYC. The correlation between the Motor scales was fairly weak, while no significant relationship was found between the Adaptive Behaviour scales of the two tests. Comparisons between the tests showed that there was a significant difference between the percentiles for the Social-Emotional scales, while the Adaptive Behaviour percentiles were bordering on being significantly different. It was hypothesized that these differences were the result of the scoring used for the two measures. Generally, it

appears that there is considerable overlap in terms of what the DAYC and BSID subscales are measuring, with the exception of the Social-emotional and Adapative Behaviour scales. This is confirmed by the qualitative and quantitative data.

Both assessment measures were seen as offering valuable information that provides guidance for the early intervention programme, and as such they are both seen as useful and applicable for HI HOPES. On completion of this study, certain limitations were observed, which are detailed below.

5.1 *Limitations*

There were a number of limitations with this study. The primary difficulty faced by the researcher was the small sample size for both the qualitative and quantitative components of the study. While the HI HOPES database consists of over a hundred children, only a small percentage of the assessments could be included in the study, due to the children having multiple disabilities, which affected the veracity of the results. The small sample size meant that the quantitative findings were exploratory, rather than confirmatory. This means that the remainder of the statistical findings are tentative. While the size of the sample for the qualitative component was suitable, the fact that PA's had such limited exposure to the assessments made it difficult for the researcher to extract detailed and critical information on the BSID and DAYC. The PA's exposure to the BSID consisted of their personal observations, and therefore they were not as critical with their feedback regarding the BSID, and they had only administered the DAYC once. This was unavoidable due to the time constraints placed on the data collection period. It was noted by the researcher during the thematic content analysis that much of the PA's discussion focused on their relative

inexperience in test administration. A further limitation is the possibility of social desirability of responses. Despite the PA's being assured of the confidentiality of their responses, it was felt that as they were asked to critique the tool that they had been trained in, they may have found it difficult to be impartial in their opinions. Finally, there is a paucity of published research on the latest edition of the BSID and the DAYC, and particularly on their applicability and utility within an early intervention programmes. Such research may have provided some guidance on methodology and directions for the research.

5.2 *Recommendations for future research*

Given that the dearth of published work regarding these two assessments, and in particular the DAYC, it is recommended that future research focuses on this area. Other assessment measures could be compared to the DAYC to determine which assessment best meets HI HOPES' needs.

Since the focus of the early intervention programme offered by HI HOPES is on language development. It is therefore suggested that the DAYC Communication scale could be compared to the LDS, to determine whether the DAYC provides the depth of information necessary to devise an early intervention programme with a focus on language-related issues.

It was noted above that one of the key themes that emerged in the qualitative data was the PA's inexperience in test administration. If future research is to be conducted, it would be recommended that the PA's have administered multiple assessments so that they may engage with the questions in a more critical manner.

Finally, it is recommended that case studies be conducted to examine more fully the role the developmental assessments play in formulating early interventional programmes. It is felt that by examining this process in more depth, researchers could better understand the elements of a developmental assessment that are necessary for the successful implementation of an early intervention programme.

Thus, this study found that the DAYC could serve as a suitable substitute of the BSID when used with deaf in infants and children, although there was variability in what the Social-Emotional and Adaptive Behaviour scales measured as they were not subject to objective scoring procedures.

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APPENDIX A: Discussion Guide

Contextual understanding

- Why do you think Hi-Hopes wants to conduct regular assessments on infants and toddlers?
- What do you think about assessing deaf infants and toddlers?
- What challenges do you think exist in assessing deaf infants and toddlers?

BSID

- In you experience of working with the BSID results, how would you describe them?
    - If not mentioned, probe:
        - Accurate
        - Effective
        - Holistic understanding of child
- What strengths, if any, do you associate with the BSID?
- What weaknesses, if any, do you associate with the BSID?

DAYC

- How would you describe the DAYC administration process?
- In your experience, what strengths, if any, are there in terms of administering the DAYC?
- In your experience, what weaknesses, if any, are there in terms of administering the DAYC?
- Please would you describe as fully as possible your thoughts on the DAYC, given your experience in administering the test?
- How effective or ineffective do you think the DAYC is in providing an overall assessment of children? Why do you say this?
- How accurate or inaccurate do you think the DAYC is in terms of providing a view on the child? Why do you say this?
- How do you feel about the DAYC in terms of providing an overall assessment of the child?

APPENDIX B: Subject Information sheet

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Tel: 083 608-5209
Fax: 011 728-6753
E-mail: athena.clayton9@gmail.com

My name is Athena Clayton and I am conducting research for the purposes of obtaining a Masters at the University of the Witwatersrand. My area of focus is on the Bayley Scales of Infant and Toddler Development and the Developmental Assessment of Young Children, and the role these assessments play in the early intervention programme offered by Hi-Hopes. I would like to invite you to participate in this study.

Participation in this research will entail being interviewed by myself, at a time and place that is convenient for you. The interview will last for approximately 40 minutes. With your permission this interview will be recorded in order to ensure accuracy. Participation is voluntary, and no person will be advantaged or disadvantaged in any way for choosing to participate or not participate in the study. All of your responses will be kept confidential, and no information that could identify you would be included in the research report. The interview material (tapes and transcripts) will not be seen or heard by any person in this organisation at any time, and will only be processed by myself. You may refuse to answer any questions you would prefer not to, and you may choose to withdraw from the study at any point.

If you choose to participate in the study please fill in your details on the form below and place it in the sealed box provided. I will empty the box at regular intervals, and will contact you within two weeks in order to discuss your participation. Alternatively I can be contacted telephonically at 083 608-5209 or via e-mail at athena.clayton9@gmail.com.

Your participation in this study would be greatly appreciated. This research will contribute both to a larger body of knowledge on the developmental assessments of young children, and their role in the Hi-Hopes early intervention programme.

Kind Regards

Athena Clayton

I _____ consent to being interviewed by Athena Clayton for her study on the role the BSID and DAYC play in the Hi-Hopes early intervention programme. I understand that:

- Participation in this interview is voluntary.
- That I may refuse to answer any questions I would prefer not to.
- I may withdraw from the study at any time.
- No information that may identify me will be included in the research report, and my responses will remain confidential.

Signed _____

APPENDIX C: Consent Form (Recording)

I _____ consent to my interview with Athena Clayton for her study on the role the BSID and DAYC play in the Hi-Hopes early intervention programme being tape-recorded. I understand that:

- The tapes and transcripts will not be seen or heard by any person in this organisation at any time, and will only be processed by the researcher.
- All tape recordings will be destroyed after the research is complete.
- No identifying information will be used in the transcripts or the research report.

Signed _____

APPENDIX D: Ethical clearance certificate for the study

APPENDIX E: Percentile histograms

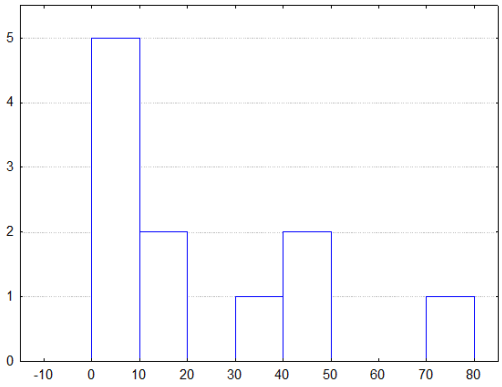

Fig 13: Histogram – Cognitive (BSID)

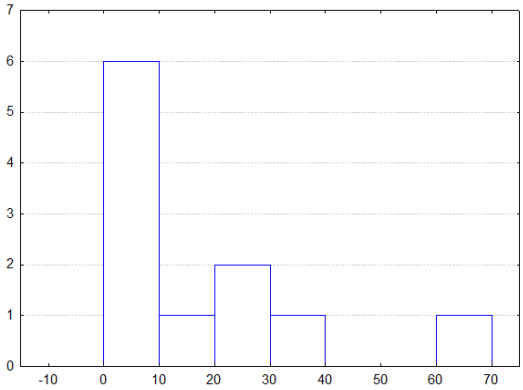

Fig 14: Histogram – Cognitive (DAYC)

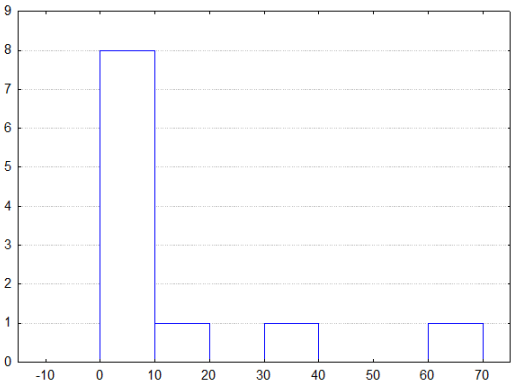

Fig 15: Histogram – Language (BSID)

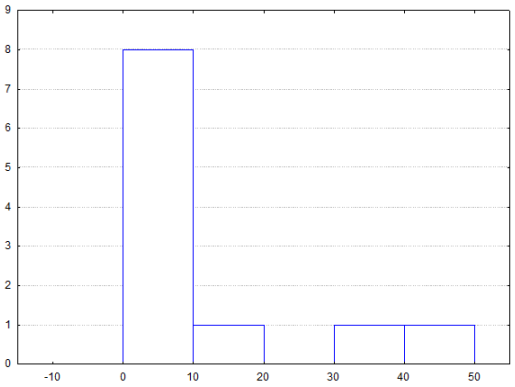

Fig 16: Histogram – Communication (DAYC)

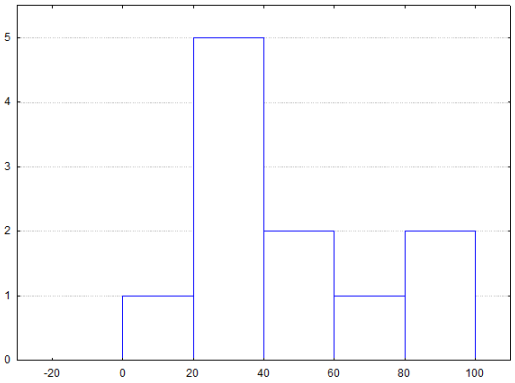

Fig 17: Histogram – Motor (BSID)

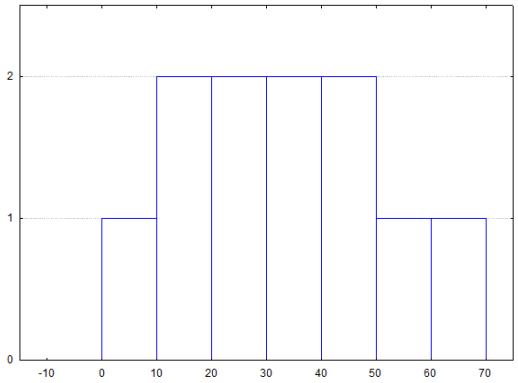

Fig 18: Histogram – Physical Development (DAYC)

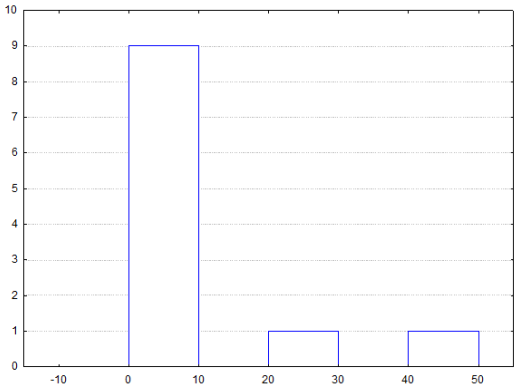

Fig 19: Histogram – Social-emotional (BSID)

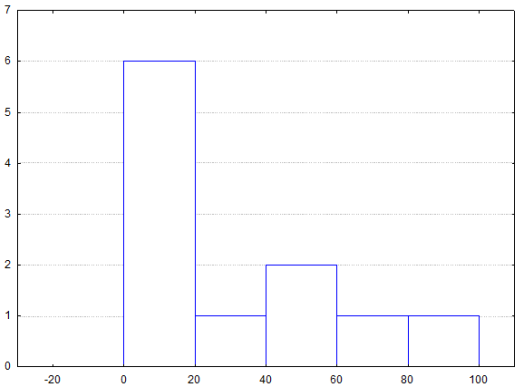

Fig 20: Histogram – Social-emotional (DAYC)

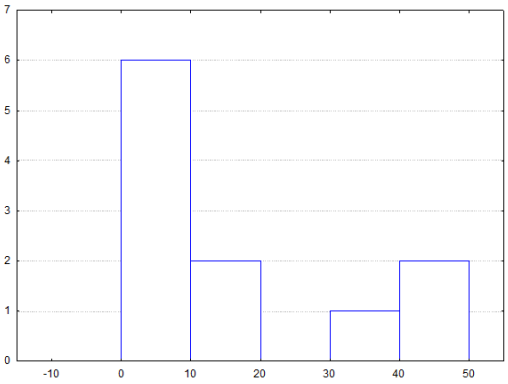

Fig 21: Histogram – Adaptive Behaviour (BSID)

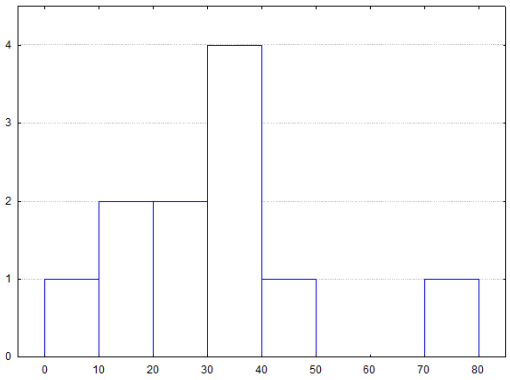

Fig 22: Histogram – Adaptive Behaviour (DAYC)

APPENDIX F: Thematic Content Analysis Framework

DIFFICULTIES IN TESTING DEAF CHILDREN

	Difficulties of testing deaf children: communication barriers because first language is not English
1	Sometimes communication can be a little difficult, because English is not their first language
7	If parents that can't communicate with children with a specific language. A mother knows her child very well, and will know if they want something when they point to it, or are upset about something, or want a specific food. But obviously, we can't always know how to communicate like that
	Difficulties in testing deaf children: items cannot be translated
2	All the assessments have issues with language and how do you restate questions so that the children understand what you are asking of them.
	Difficulties in testing deaf children: Does the child understand what they are being asked to do
2	Even the DAYC has *some* questions that are not translatable into sign language or into a manner that it is easy for the kids to understand. [E.g.] One of the questions was understanding a familiar word
3	Issues like do they understand the questions. It doesn't affect the assessment, but sometimes you have to think of other ways to help the child understand the question
4	You have to be very flexible, because sometimes you need to ask a question in a such a way that you are sure that the child understands what you are asking, and you can't always be sure that they do understand
5	Sometimes you know that the child may know something, but you don't know how to ask them to do it.
5	I can give you an example of the assessment we did the other day. The child that we saw could match colours, but it is quite hard to say to a deaf child 'Match colours'. But he could do that. So I would imagine that is the biggest challenge. You are constantly not able to say to them 'Put the red with the red' even when they actually could do it.
	Difficulties in testing deaf children – Poor language affects test and scores?
7	But if there is no language involved it is quite difficult to assess with those specific tools, like I said the Bayley and the DAYC themselves. It's important that children have language, but obviously some of the children we see don't have language when we start, so testing is a little bit difficult
7	But if they don't have words, or even signs, so not specifically words, then you can't assess them any further. So that is quite challenging. And it may not be a true reflection of their development and ability. It's not like we are saying they are stupid or anything. It's just that language-wise, they don't have the level that they should have at that age
	Difficulties in testing deaf children: matching race is important
1	I would say that most of our children are African children so having an Indian or any other colour for that matter going there, they think, 'Who is this?', I mean it's different.
	You have to know the child very well
7	You have to know the little children very well, and how to work with them
	Difficulties in testing deaf children – Delays in development
4	Often you will find a lack of awareness, knowledge, all of the developmental milestones

	are that much delayed
	Difficulties in testing deaf children – Multiple disabilities
4	Sometimes you get children with multiple disabilities, which means that not only is language impacted but other areas as well
6	Sometimes with a lot of the kids with disabilities they go through and the mom says 'No, she can't do this' and 'She can't do this'
	Difficulties in testing deaf children – Parents having difficulties being impartial
6	I think sometimes if you ask the parents stuff, and they say 'Yes they can', you can't really test it, you are just taking their word. So I think that can be a problem. Obviously if the child is there and you can see it's different, but when the parents say they can do stuff when they actually can't.
	Test time is too short
8	It's only an hour or 2 out of their lives and they often don't perform as we know they can.
	Normed for overseas children
8	There is no South African development scale, so we don't know how they are measuring up next to their peers.
	Difficulties in testing deaf children – do PA's have sufficient understanding?
7	From a sign language, not that it was a prerequisite for the Honours, but I have done Sign 1, 2 and 3. So I have a little bit of sign language. But it has also given me a little bit of understanding of the Deaf culture point of view, the sign language point of view, like sign language being a *language* and not just little signs put together. I think that has given me a better and more thorough understanding than other who have come into the programme with no experience in the Deaf field
	Norming difficulties – Deaf context *[Because asking the questions is the priority, not sticking to the script]*
1	Much of the time you are just trying to get things out of them because their language is very delayed so that makes it a little difficult because you have to think, how else can you get them to do the task you are asking them to do
	Difficulties in testing deaf children – Having in-depth understanding of material
7	I think from a preparation point of view, to really know your assessment tool. Going over the questions before. For example, you can't just read the questions when you are in front of the child. Per unit, there are let's say five questions, and you can't just go in and read them out there to ask the parent, you have to really know the questions and understand what they are asking. So if for example, they don't understand the questions, you can explain them, and give examples, and if they still don't understand, give them even more examples. So that is very important. You really need to go through however many questions you think they child will be able to do, and even a few more. So it is really important to really do your preparation before you go in. Specifically the questionnaire itself. I will have to go and read through the questions and imagine myself asking the child the questions. I might have to do a little bit of a role play to make sure that *I* understand the questions that I am asking. And if I don't then I can phone one of the staff members and ask, 'What does this mean, how can I ask it?', that kind of thing. So more research on the material that we have got.

POSITIVE ATTITUDES – BSID

	THEME: **USE OF THE BSID AT HI-HOPES**
	Overall thoughts and feelings about the Bayley – Useful in terms of working within the programme
3	It shows you how the child is performing and you know how to work with the child
1	It worked for us, because even though our main aim is language, to get language to the children, we do need to look at their overall development. The Bayley does look at the child's ability.
3	When you go through the report, you find that it tells you about the child. It tells you what the child can do and what improvements can be made
	Overall thoughts and feelings about the Bayley – Comprehensive view of the child
6	I think it's good because like I said it's a test that looks at all the different areas of development. Whereas the LDS was just language specifically, well, and maybe some other things around it, but mainly language. While the Bayley has cognitive and social behaviour and all that.
7	I find the Bayley Scale goes into so much detail and is very in-depth. It goes into all of the different areas, like language, physical, socio-emotional. It goes nicely into each area, whereas the Language Development Scale only looks at the child's language.
8	I like that it looks at all areas of development, so it's very comprehensive. You've got your socio-emotional development, language development, and so on. So it's not just a general assessment, you can assess each area quite nicely
	Advantages of the Bayley – Comprehensive view of the child
6	It gives you an overall assessment of the child
7	I like that it is very comprehensive
	Likes about the Bayley – Provides a holistic report of the child
7	I think that's important when you are giving the parents the results from the different areas of development. It's nice for them to see that language-wise they may be a bit low, but with physical she is doing very nicely and so on. So it's nice to give them good news, because often the children are quite behind in their language development. Just gives them some positive.
7	I must say though that the report is presented quite nicely, very clear and concise.
	Like about the Bayley – Good at tracking a child's development
2	The Bayley was nice in that it gave use the information we needed to see which level the child was at. And we could test the child again 6 months later and not 12 months later, so the comparison was good
	Advantages of the Bayley - Milestones
6	It keeps in line with milestones
	Overall thoughts and feelings about the Bayley – Gives parents guidance
6	I think it's nice to keep the parents informed
	THEME: **THE FORMAT OF THE BAYLEY SCALES OF INFANT AND TODDLER DEVELOPMENT**
	Like about the Bayley – Relies on observations
6	I think it's quite nice the way that it's done, like the parents are not necessarily asked, it's more on observation. Some of it is the parents being asked, but other parts focus on observations of the child, you just focus on what the child is doing so it's not really a questioning process, so you can get different views. I think it can be a problem with the child not doing something that you ask them to do, but I think that can be a thing you can pick up on, and you can say 'Well, maybe the child's not doing that, but maybe

	there is something behind that'.
6	Observations seem to be more detailed and concentrated *[as a result?]*
	Advantages of the Bayley – Has a more in-depth questionnaire
7	I also like that it is a more complicated, or rather complex and in-depth questionnaire than the DAYC
	THEME: **SCORING**
	Like about the Bayley – Can sometime score items retrospectively
1	Sometimes you may not be able to assess one item and you don't see something, but sometimes in doing something else you may just see them doing what you wanted them to
	Likes about the Bayley – The Likert scale
7	I like the way it is set up. The structure of the actual material, talking about the questions, there isn't just a 'Yes' or 'No' answer, but instead you can say, 'Sometimes', 'All the time', those kinds of things, which makes it a bit easier to use. I think that will be a little more accurate then. I think you would get more realistic, more accurate scores, definitely because you have more of a range of answers to choose from, and hopefully one of those answers will be the right one, rather than just a 'Yes' or 'No'. So I think the data will be more accurate
	THEME: **HAS TO BE ADMINISTERED BY A PSYCHOMETRIST**
	Advantages of the Bayley – administered by a psychometrist
7	I like the fact that she does the Bayley, because then all the assessments across the board are the same because they have been done by one person, whereas with the DAYC, each Parent Advisor administers and interprets in their own way. And then of course you don't know if it is accurate because you have your own way of interpreting things. Obviously you want it to be as accurate as possible. But I still think the Bayley data is a lot more accurate than the DAYC data.
	THEME: **TEST MATERIAL**
	Like about the Bayley – Fun to work with (for test administrator and children)
1	It's fun to work with, the kids enjoy the toys, and it's fun to see how they play with everything.
3	I think the toys were nice and exciting for the children
5	I liked the equipment, like the boxes and blocks.
8	They are lovely toys to use, the children love them. It uses play and fun items to assess the child, which I think is a strength
	THEME: **HAS A RICH RESEARCH BACKGROUND**
	Overall thoughts and feelings about the Bayley – Well standardized
2	The Bayley is a great tool in terms of assessment and norms and standards and it has been used for a long time. There have been many studies done on it and it has been used over and over again
	Advantages of the Bayley – Well normed and researched
2	Normed, lots of studies, used extensively which is an advantage if you are doing research. And you know it is a reliable test and you know it is valid.

NEGATIVE ATTITUDES – BAYLEY

	THEME: **SCORING**
	Overall thoughts and feelings about the Bayley – Very strict test
1	It's a very strict test, so there is no leeway, so when the mom says my child is not doing that today but they can do it, I can't give the score, because the Bayley is so strict that you have got to see it for yourself before you give the child the score.
2	The fact that you see the child do it or you don't, the child only gets the score if they do the task right there in the assessment. You have to see it.
	Concerns regarding the Bayley – Strictness of test, unable to use parental or PA knowledge of child to give scores
1	The test is so strict, so even when the mother says my child is able to do this you can't give the score. So that's what I don't like about it, it's sort of like a disadvantage to the child, it doesn't show the child's full abilities
	Disadvantage of the Bayley – Likert scales
2	If you are going to look at an assessment tool that has a Likert scale like the Bayley's socio-emotional and adaptive-behaviour scales, the Likert scale is not great because you are not sure when you are going to get a 3 or a 4.
	Overall thoughts – Only shows what the child does at that moment
8	The problem is that it only gives a slice of their life, it shows how they perform during the test time only. It doesn't show you how they do outside of the test and what they are capable of doing
	Dislike about the Bayley – 'Snippet of life'
8	It is sometimes a little closed minded, as only a snippet is taken out of child's life to assess them
	Dislike about the Bayley – Can't score unless child observed doing item
6	What if the child doesn't do something, because then we can't give them that score so you won't get an accurate recording.
	THEME: **TEST MATERIAL**
	Children are not familiar with the toys *[SE Status]*
1	The other thing also is many of our families are poor. So even though these are very wonderful and exciting toys, they don't know how to manipulate them because they have never seen before. Sometimes it is the first time that they have seen them
1	It's like Lego, sometimes they haven't seen Lego before, so they can't manipulate it, and they can't put it together
4	In South Africa, poverty means that children are not exposed to much stimulation and don't have as much access to toys and things.
8	The problem that I have found is that even though there are lovely toys and all that, the children don't always know what they are and how to use them
	THEME: **TIME-CONSUMING TO ADMINISTRATE**
	Disadvantages of the Bayley – Time consuming to administer (+/- 2 hours)
1	For a child to concentrate for two hours, it's quite tiring, and it doesn't really work out for me to go back and forth.
8	It seems to take a bit long. I mean, little children tend to get tired after a while, and so they won't perform as well as they could
8	It seems to take a bit long.. children tend to get tired and so don't perform as well as they could
	Dislike about the Bayley – Length of cognitive scale

1	What I have found with the cognitive scale scores, the items just go on and on and on so that by the end point just becomes really difficult. Even if it is a three-and-a-half-year-old, it is too long.
	THEME: **HAS TO BE ADMINISTERED BY A PSYCHOMETRIST**
	Overall thoughts and feelings about the Bayley – Inconvenience of having to be administered by a psychometrist
2	In terms of *our* needs and reaching people far away and having to do assessments on kiddies who are living in remote areas and the logistics of travelling to those areas and the logistics of getting the Bayley done the way it is meant to be done is difficult
	Disadvantage of the Bayley – Has to be administered by a psychometrist
2	You need to have someone who is a psychometrist to do the Bayley or has a higher level of education, whereas with the DAYC we can get out PA's to do it
5	I would imagine that if the Parent Advisors could administer the DAYC rather than [psychometrist] doing all the assessments, it would make it easier
	Concerns regarding the Bayley – Has to be administered by psychometrist (who is a stranger)
1	It all depends on the child, how the child feels about you, how comfortable the child is, especially with a stranger being there, whether they are asked to do tasks they haven't done before, everyone watching the child
	THEME: **LANGUAGE**
	Overall thoughts and feelings about the Bayley – Auditory items affect scores in other areas
1	A few of the auditory items are a little difficult. And then just that they get very low scores because the children's communication is so low. So the cognitive scale is low, the socio-emotional scale is low
	Disadvantage of the Bayley – Language
2	The sign language, changing the questions, that's an issue for our programme.
2	The other thing with the Bayley is if it is a non-English family that is oral then that is a problem as well, because if you are going to rely on a translator then how much is being lost?
	Dislike about the Bayley – Language affects the child's score
1	You can't even assess that stuff because the language of the child is not at that level yet.
	THEME: **AGE OF CHILD**
	Disadvantages of the Bayley – Only goes up to age of 3
1	We are getting a lot of older children and the Bayley goes up to 3½ , and we have children who are 4, 5, 6. So even though they are not going to cope and they are not going to get scores in their age range, it is going to be lower, we could only compare them to 3½ years
	Concerns regarding the Bayley – Age limit of test (3.5. years)
1	What didn't work for us is it only went up to 3½ and we need something that goes up to at least the age of six

DOES THE BAYLEY GIVE AN ACCURATE VIEW OF THE CHILD?

	THEME: **FORMAT OF THE BAYLEY SCALES OF INFANT AND TODDLER DEVELOPMENT**
	Bayley providing an accurate view of the child – Shows what the child can do on a single day
1	It gives accurate scores at that point. It won't show what the child can do on other

	days. But it will give accurate scores for *that* moment.
2	It depends on *when* you are assessing the child. If the child is tired or sick or the mom is busy it affects the score. Or if the child is just not compliant with the assessor that could be a problem.
5	They *seemed* accurate, ya. [PA indicated that they are not very familiar with testing and reports]
	Report appeared accurate
7	I do read the reports and go through it, it's nice to see how it compares to your general idea of the child as well, and I do think it is an accurate assessment.
	Bayley's use at Hi-Hopes
1	It worked for us, because even though our main aim is language, to get language to the children, we do need to look at their overall development. The Bayley does look at the child's ability.
3	When you go through the report, you find that it tells you about the child. It tells you what the child can do and what improvements can be made

POSITIVE ATTITUDES – DAYC

	THEME: **USE OF THE DAYC AT HI-HOPES**
	Advantages of the DAYC – Research possibilities
2	I think that what is nice about it is that there is not much research done on it, which could be seen as an advantage or a disadvantage. It means that we have the option of looking at the reliability and validity in South Africa and it's a test that does not have the previous biases of previous research. So it's a wonderful test in that way.
	Overall thoughts and feelings about the DAYC – Gives guidance
5	I think it's a useful tool. I think it gives us things to assess a child by and gives us specific things to work with
	Overall thoughts and feelings about the DAYC – more comprehensive
3	I think it's good because it breaks down the child's scores more. And it just covers everything. Like when you look at physical development it covers a lot of things.
	THEME: **TIME EFFICIENCY OF THE DAYC**
	Like about the DAYC – Efficient
3	It seems a little more efficient.
8	It is easy to do within a home visit, easy to quickly get examples and get the child to do the test quickly
	Like about the DAYC – Test administration is easier
2	The DAYC is great because it is easier to administer
5	The DAYC is easier to administrate.
	Overall thoughts about DAYC – Time efficient
7	It's quite a bit quicker to do than the Bayley
	Like about the DAYC – Test administration is quicker
1	It goes a lot quicker
	Advantages of the DAYC – Less time consuming (60 – 90 minutes)
1	It seems to be easier because what we are able to do is for the Parent Advisors we look through the questions and see which items the child is definitely able to do and

	definitely not able to do, and they can already mark them. We then go along and assess the child. If we don't see what we are looking for we ask the mom. This makes it a lot shorter.
	THEME: **SCORING**
1	I think that the main advantage is that being allowed to put scores from what the Parent Advisor knows about the child. It also lets us get some information from the family
5	You can tick off a whole lot of things you know they can do.
6	[Pre-scoring] makes the test go quicker
6	You could go through the test beforehand and see what the child can do. If I knew my child could do something I could tick it off already, and then go in and say 'Well, I haven't seen her do that', and get her to do it there. So it makes the test go quicker I think. And with the younger children I think that is quite important.
6	I think that what's nice is you can fill in certain things in before
7	I ticked off what I knew the child could do already. Like, if I know the child can walk unaided, and so on. So we don't need to do it again in the assessment. So it's easier. Me not being a psychoanalyst and only being a parent advisor, it's easier for us to do this assessment.
	Advantages of the DAYC – Score beforehand
7	What is nice is that because we know the children and have been with them for quite a while, we really *know* the children. So beforehand we can mark off all the things we know they can do, as opposed to going in there and asking them to do things that we already know they can do. We already know the answers.
	Advantages of the DAYC – Can confirm items if necessary
6	If you are not one hundred percent sure of some stuff, you can check it during the assessment while doing the other stuff. And you can also go by what mom and dad have said, like if mom has said a week before 'Oh, she is pulling herself to a stance' then you can tick that off and then maybe say, 'Okay, well, let's see', you know, and maybe put her sitting in front of something and see if she pulls herself up. So you can double-check things yourself, instead of just taking mom's word for it.
	Advantages of the DAYC – Child does not have to perform the item to receive a score for the item
2	You don't have to see the child do it to give them a score, and we always ask for examples when we are assessing, an example of what he can do.
	THEME: **PARENT ADVISORS CAN ADMINISTER THE DAYC**
	Like about the DAYC – Info can be collected from many sources
2	If you don't see the child do it, you can ask the mum and the PA to give the child a score. So that's great because you have a wide range of sources and responses.
6	I do like the fact that it is based on observation, and not so many... What happened was, I went when the nanny was there, but there were actually a few questions were I said to the nanny, 'Does the child do something'. Like one of the questions was 'Does the child enjoy bath-time?' and the nanny was like 'I don't know', so I had to phone the mom and ask her, so there was that type of thing. Just could find out from different people whether the child can do something.
	Like about the DAYC – DAYC is administered by PA (a familiar person)
1	With the Bayley, if an unfamiliar person is there and so many people are watching we are not going to see the full potential of the child *[this does not happen with the DAYC]*
3	We [the PA's] can do it
4	It helps a lot going into the situation knowing the child. I would imagine it is very difficult to go in not knowing the child and having to establish a relationship while testing
	Advantages of the DAYC – Can be administered by PA's
2	Just that it can be administered by Parent Advisors.

5	The PA's can administer it.
7	With the DAYC it is nice that I can perform it, that the parent advisor can perform it
	Advantages of the DAYC – PA's can get more out of the child than an assessor (stranger)
8	It is easier for the PA to get the child to do something because we know how to work them. It's also easier for us who know the child to get him to give us examples for the items
	Like about DAYC – Can be administered by 'anyone'
2	It can be administered by anyone, well almost anyone, with training of course.
	THEME: **AGE OF CHILD**
	Advantages of the DAYC – Covers full age group
1	It caters for older children, so we are covering the entire age group from birth till 6.

NEGATIVE ATTITUDES – DAYC

	THEME: **TEST FORMAT**
	Overall thoughts about the DAYC – not as in-depth as the BSID
7	I think that is a little bit more general and not as much in-depth [as the Bayley]
7	It gives a nice general picture of the child. But I do still think that if you want more in-depth assessments on each of the areas, you would still want to do the Bayley. Or even, language-wise you would want to do the Language Development Scale
	Overall thoughts and feelings about DAYC – Some longer sections
6	With the smaller kids it is harder to do because they have a shorter attention span. I found there was a lot of stuff to get through in some sections
	Disadvantages of the DAYC – Order of the motor scale items
1	What we have found with the motor scale is that it is very specifically ordered. So if the child cannot crawl and there an item later that the child can do, they just don't get the score for it. I don't know how they ruled it, but the items are very specific. So with the motor section we have found there to be a bit of a problem
	Dislike about the DAYC – Order of the Motor scale items
2	The way the motor or physical development is arranged, so if you can't walk, then you can't get the next point or the next point or the next point. Even if the child can do, they can't get the score, because they would have received so many zeroes for the walking items
	THEME: **SCORING OF DAYC**
	Overall thoughts and feelings about DAYC – Difficulty determining whether child has done the item or not
6	There was what I actually saw – the same thing was it by chance or was it actually her doing it, that type of thing. Because that could skew your whole assessment and score. If your aim was to see if they could follow something with their eyes, like to follow the toy or something with their eyes, you would take the toy and move it across and the child must follow the toy with their eyes. But did they really follow the toy or did they look at something else. So trying to decide what they were doing.
	Disadvantages of the DAYC – Difficulty of knowing whether the child is fully responding
6	With the smaller kids it is more difficult to check that they are fully responding.
	Dislike about the DAYC – Getting concise responses and examples for items
2	I think getting the moms to understand that they have to respond in a way so that you can say 'Yes' or 'No', getting PA's to do it and being able to get examples, and knowing

	what the format of the assessment is and getting familiar with the structure
	Dislikes of the DAYC – No Likert scale
7	The scoring is also quite easy sometimes, but sometimes you need the graded scale, it's not just a 'Yes' or 'No'. Sometimes the child does do something, but not all of the time, so you can't give a '1'.
	THEME: **PARENT ADVISORS AND PARENTS BEING IMPARTIAL**
	Concerns regarding the DAYC – PA's being impartial
4	When you are watching that baby, you so want them to succeed!
6	You have got to be *very* objective in your observations and sure that the child is actually doing that. Because obviously if the child is not doing that then you've got to tell the parents, 'Well, the child is here and the child is actually there' so it doesn't give an accurate assessment. So, ya, *you* have got to set yourself apart from the family in that way. Even though we see the family every week, you have got to assume the role of the tester and got to be objective. As much as you want the little baby to be on that level, you've got to play the role of the objective observer
7	I think it may also be difficult to know what we are looking for sometimes, and not being sure whether we should give a score or not. Because sometimes we *want* to score the child up as well. I mean they are relying on me as a person, and the parents as a person to give accurate feedback, and it may not be very objective from that point. I mean we are human beings, so we've got feelings, and we may not understand the question correctly, or we may interpret what the child is doing incorrectly, so I am not a machine and can't always give a definite yes or no answer that is correct.
8	My emotional attachment to child, because I want them to achieve and do well. Also giving results, because they don't do as well as you would like them to do in the test
	Concerns about the DAYC – reliability of parents responses
7	I always wonder the reliability of the data. When you ask the parents, 'Can the child do this?', they always want to overemphasize what their child can do, and they say 'Oh yes, she can walk five spaces or talk five words or do somersaults' or whatever it is. So the reliability from that side. Unless you can test every single thing the parent says. So like if the parents says that the child can walk five steps, let's see it. But then you see they only walk four steps, so you can't give them the score for it
7	Some of the questions you are going to be relying on parent's feedback, on their answers. You can't always test that there and then. You sometimes can't test it out, so we don't know how accurate it is.
	THEME: **PARENT ADVISORS LEARNING HOW TO ASSESS**
	Dislike about the DAYC – Keeping child's attention *[inexperience of PA's?]*
6	Obviously, the child needs to be held while doing all those things, but at times she was just focusing on the nanny. So it was difficult to get the child's attention away from the nanny and get them to focus on doing the different things and to get a response out of the child.
	Amount of prep needed [is this maybe because they are still learning the test???]
7	You must know the material so well and have done your research. You really have to know your work. When you are asking very specific language questions or very specific physical questions, you have really got to know what you are asking, and you must know how to interpret what the parents say. You can't give the child a 'Yes' when the child is really only half-way there. You really have to know the data and what to look for. And you also have to be able to interpret what the parents say, correctly.
	Overall thoughts and feelings about the DAYC – Overwhelming at first to administer

5	Well, my initial impression like I said was that it was quite long with lots of paper and a bit overwhelming, but when I had actually prepared and knew the child then it wasn't so bad
	Concerns regarding the DAYC – PA's being trained and familiarized with the test
1	We all come from different backgrounds and administrating tests is not the easiest thing to do. So the challenge is to actually train up our PA's, and get them going
5	The number of pages can be overwhelming. But I am sure that the more you work with it, the more familiar you are with it.
7	I think I understand the questions a little bit better than a lot of second language English speakers, who may not understand the questions as well. And that feeds back to what I said at the beginning it is important to do your homework and really know the questionnaire very well.
7	Another thing is the knowledge of the material, and how well prepared we all are. We are all different and have different ways of doing the tests.
	Concerns regarding the DAYC – PA's learning to administer the test
5	Initially I found it overwhelming when I looked through the test, just lots of pages. But I think once you've read through it and you know the child, it's okay.
	Concerns regarding the DAYC – PA's understanding the scoring
2	I think the major challenge is getting the PA's to understand the scoring. And knowing where to stop, where do they say 'Okay, enough, we're not going any further'
	Dislikes of the DAYC – Number of pages may be overwhelming for parents
5	The number of pages and pages might be a bit off-putting for parents actually.
	THEME: **HEARING**
	Disadvantages of the DAYC – Items rely on hearing
2	Some of the questions rely quite a lot on hearing, like the child must startle to a loud noise, for example.

DOES THE DAYC PROVIDE AN ACCURATE VIEW OF THE CHILD

	DAYC providing an accurate view of the child
1	I think it is more accurate than the Bayley, because you are getting information from the PA's who are able to score before testing and you can ask questions for the mom and she can give you information. Whereas with the Bayley if they don't do it, you can't score them
2	I think it is accurate
7	I think the best one is the Bayley from an accuracy point of view. Definitely it is better in terms of Hi-Hopes, giving more in-depth information. It also could be better because it is more reliable because it is being administered by one person, as opposed to fifty different Hi-Hopes Parent Advisors, who have different backgrounds, have been trained in different ways, understand it differently
	DAYC providing more comprehensive view of the child
2	I think it gives a good idea of how the child functions overall.
3	It's very useful because you can find out about where the child is at
	DAYC's use at Hi-Hopes
1	That's very hard to say, because we have just started it. It's just been five months. So I think we need to look at it. But so far it is going fine

5	I think it gives us valuable information about the children's development that we can use to plan what we can do with them. For example if you do the DAYC and you see for example that the child can't hop on his right leg, you can work on that. You can play with them, teach them to hop, things like that. You can teach all sorts of things, words, colours.

WHICH IS THE BETTER ASSESSMENT?

	DAYC better assessment – Covers full age group
1	I would say DAYC because it is covering the age group we are working
	DAYC better assessment – More sources to provide information on child
1	We are getting a lot more information which you can use to score, it's not as strict as the Bayley. Whereas with the Bayley, even if the parents gave you the information you cannot score the child. You can note it, but you can't take it into consideration when you are scoring it
	Depends on the goal of assessment
7	I guess it depends on what you want to get out of the assessment. If you want a general idea of the child, then the DAYC is the way to go. But if you want a more detailed look at the child the Bayley is the way to go
	DAYC better assessment – More suited to SA
2	The DAYC. I think it is more suited to South Africa,
	Both likely to provide similar results
7	I don't know which one would give a better report. I don't think that one will give a better report than the other. I think in terms of what we give back to the parents there will be the same things about the child's strengths and weaknesses
	Both
8	It is difficult to say. I think both should be done. Maybe one covers a small area of one aspect of development that the other test misses, or maybe because the child is familiar with the PA he performs better on the DAYC, or maybe he's excited by the toys and new friend doing the Bayley, so he performs better with her. So I think both should done.
	Bayley better assessment – More thorough and in-depth
6	I think the Bayley is more in-depth, I feel the Bayley goes more in-depth.

	Ideal – Have two sets of eyes
6	Maybe two people, for a second set of eyes processing information, because it is based a lot of observation, both the Bayley and the DAYC
6	What happened was we worked as a team, so she would say 'Have you seen this?' and I would say, 'No, actually could you show me' and we would try to get the child to do it. She would try something and then I would try something. So it was quite nice, because our observations sort of fed off each other and we spoke about it at the end, and we discussed things, like 'From what I saw, do you think this is right', that kind of thing. So ya, I think it's good if you can work together with someone to do the assessment