AN ATTACHMENT-BASED PARENTING INTERVENTION FOR AN INFANT WITH MILD-MODERATE DEVELOPMENTAL DELAYS IN SOUTH AFRICA: A SINGLE-CASE EXPERIMENTAL STUDY

by

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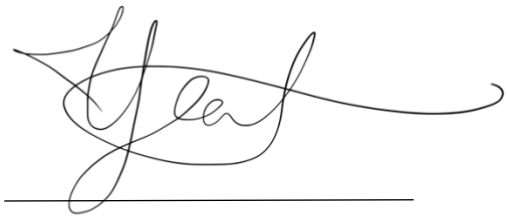
Declaration of Originality

I, **Joshua Gregory Yeatman (13027272)** hereby declare that this dissertation **(An attachment-based parenting intervention for an infant with mild-moderate developmental delays in South Africa: A single-case experimental study)** is my own work except where I used or quoted another source, which has been acknowledged and referenced. I further declare that the work that I am submitting has not previously been submitted before for another degree or to any other university or tertiary institution for examination.



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Ethics Statement

I, Joshua Gregory Yeatman (13027272), have obtained the applicable research ethics approval for the research titled An attachment-based parenting intervention for an infant with mild-moderate developmental delays in South Africa: A single-case experimental study on 11 August 2020 (reference number: HUM034/0620) from the Faculty of Humanities Research Ethics Committee at the University of Pretoria.

Abstract

Despite the clinical and academic prominence of Attachment Theory, there is scant research aiming to explore its value for infants on the spectrum of Developmental Delays and their caregivers. In low resource settings such as South Africa, where an intersection of risk factors combine to increase the likelihood of both developmental delays and insecure attachments, interventions which aim to support caregivers in fostering secure attachment relationships with their children are valuable. The Attachment and Biobehavioural Catch-up intervention (ABC) is a widely established approach to improving the attachment relationship in caregivers and their children who are at risk of insecure attachment and its sequelae by targeting maternal sensitivity through in-vivo coaching. This study uses a single case experimental design to assess the impact of the ABC on an infant diagnosed with developmental delays and her mother. Visual analysis was employed, and supported by statistical and qualitative analyses, to measure the effect of the ABC on maternal sensitivity, attachment security and stress regulation. This study found that the ABC had a positive impact on maternal sensitivity and attachment security, but an inconclusive effect on stress regulation. Analyses of the results of this study indicate that the ABC shows promise for the support of South African infants with developmental delays and their caregivers, but would benefit from further study.

Keywords: Attachment and Biobehavioural Catch-up, developmental delays, maternal sensitivity, attachment security, stress regulation, single case experimental design

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Chapter 1: Introduction

1.1. Introduction

Attachment Theory emphasises that the nature and quality of the emergent relationship in the infant-caregiver dyad plays an important role in the mental health and wellbeing of the child and their consequent development (Bowlby, 1999). After a long and well attended period of research into this field, there is strong psychological and increasing neuroscientific evidence for the utility of the attachment perspective, both theoretically and clinically. Indeed, research has demonstrated links between secure attachment and positive psychological outcomes, such as effective emotion regulation and sociability, whereas insecure attachment has been linked to poor behavioural control and poor peer relationships in children, underscoring the significance of the attachment relationship to a child's socioemotional and behavioural functioning (DeKlyen & Greenberg, 2008).

The nature of attachment is influenced in important ways by the extent to which caregivers are aware of and respond accurately and promptly to the infant's attachment signals (Gibbs et al., 2018; Ranson & Urichuk, 2008; Zajac et al., 2020). In typically developing infants, these attachment signals are usually pronounced and explicit, emerging from a biologically innate drive to seek and maintain proximity to a primary caregiver. As the child ages, the patterned way in which the caregiver and their child express and respond to bids for care develop into a shared and unique 'language' of attachment, underpinned by co-created internal working models of attachment unique to the pair (Bretherton, 1999). While this has been extensively researched in typically developing infants, increasing attention is being paid to infants and young children who, for various reasons, are unable to effectively signal their attachment needs in a way that elicits an adequate caregiver response, thus potentially impacting negatively on their attachment security and ultimate mental health (Janssen et al., 2002). As research into the utility of the attachment perspective becomes increasingly well-established in neurotypical

populations, researchers are beginning to explore the applicability of these positive findings in populations on the spectrum of intellectual disabilities. This research study explores the efficacy of an attachment-based intervention in an infant-mother dyad in which the infant is diagnosed with developmental delays.

1.2. Research Problem

Infants and children with significant Developmental Delays (DD) or Intellectual Disabilities (ID) may be at particular risk of difficulties in the signalling of attachment needs (Feniger-Schaal & Joels, 2018; Janssen et al., 2002; van IJzendoorn et al., 2007). In children with ID, for example, deficits in adaptive behaviours are a defining diagnostic feature and relate to competence in practical, conceptual and social skills (American Psychiatric Association, 2013). Intrapersonally, these deficits impact the infant's ability to interpret social situations, develop patterns of communication and generalise interactive patterns into set schemata (Roelofs et al., 2013). Interpersonally, they also have implications for the infant's ability to signal for care, be it due to sensorimotor deficits or difficulties consolidating complex inputs to express a desire (Janssen et al., 2002; van IJzendoorn et al., 2007). The impact of these deficits on the infant's ability to adequately signal his or her needs may, in turn, have a direct effect on the ability of the caregiver to attend sensitively to the child, impacting, further, on the infant's ability to develop and maintain a coherent repertoire of attachment behaviours. Infants and young children with developmental challenges may, therefore, be at greater risk of developing insecure attachments which, in turn, increases their risk of psychopathology (Janssen et al., 2002). Although infants and young children with DD and ID may be at greater risk for attachment insecurity, only limited research exists pertaining to either remedial or preventive attachment-focused intervention strategies for this group (e.g. Schuengel et al., 2009a; Sterkenburg et al., 2008).

This is particularly true in the South African early childhood landscape, where limited attachment-focused ID research is viewed against a challenging array of parent-associated risk factors including a high burden of transmittable disease, maternal depression, child abuse, parental absence, substance abuse and resource constraints (Cluver et al., 2016; Meinck et al., 2017; Nicolson, 2004). Only one attachment-focused clinical investigation on Intellectual Disability has been conducted in South Africa to date (Mohamed & Mkabile, 2015). There is, therefore, limited attachment-focused support available for this vulnerable population and its support systems. This is despite the fact that the currently available Census data in South Africa reports that up to 4.2% of the population aged five years and older have mild or severe 'cognitive disabilities' (Statistics South Africa & Lehohla, 2014). Furthermore, the same census data did not report on the estimated prevalence of developmental delays in children under the age of five, limiting the potential planning for children during this sensitive developmental period. In part, as a result of the limited research available to inform support of the population of individuals on the ID spectrum in South Africa, the services available to people, particularly children, with ID in South Africa are scarce and poorly resourced when compared with the support needs for this population, who are forced to interact with an overwhelmed and under-trained healthcare infrastructure as a result (Department of Social Development, 2009). The assessment of the efficacy of an attachment-based intervention with infants with developmental delays in South Africa is therefore pertinent, and is where this research seeks to make a contribution.

1.3. Rationale

The research problem highlights the fact that South African children on the spectrum of intellectual disabilities and their caregivers are faced with a significant accumulation of barriers to healthy attachments. Even though the limited research available points to a need for interventions and support which are readily disseminated and affordable, there is little research

or expertise available to do so, putting South African children and their caregivers at risk of an array of long-term challenges already well established in the academic corpus, including caregiver burnout (Davenport & Zolnikov, 2022; Gérain & Zech, 2021), child externalising problems (Eisenhower et al., 2005; Schuiringa et al., 2015) and an increased risk of common mental illnesses such as depression and anxiety in both children on the spectrum of ID and their parents (Mazza et al., 2020; Wallander et al., 2006).

Given the paucity of academic and clinical capacity to identify and support attachment related difficulties typically faced by children on the spectrum of intellectual disability and their caregivers in South Africa, this research seeks to assess an intervention which may address these needs in a manner which is replicable and contextually appropriate. Research on the interaction between Intellectual Disability and attachment is in its infancy, and is extremely limited in the South African setting. This study is unique in its use of a single case experimental design, which allows for a detailed assessment of the Attachment and Biobehavioural Catch-up (ABC) intervention as it was administered in a South African setting, and both quantitative and qualitative evidence seek to inform contextually appropriate ways of rolling out the ABC intervention in South Africa. This degree of specificity in the assessment of the ABC is somewhat established in Western settings, where it was developed, but has so far only been undertaken in South Africa during the study from which this research draws its data. Therefore, this study seeks to contribute by informing the implementation of the ABC intervention in the specific case of a South African dyad in which the child has a developmental delay.

1.4. Aims of the Study

This study seeks to evaluate the effects of the ABC intervention on maternal sensitivity, attachment security, and child stress regulation in a South African parent-infant dyad in which the infant has significant developmental delays.

1.5. Research Question

What are the effects of the Attachment and Biobehavioral Catch-up intervention on maternal sensitivity, attachment security, and child stress regulation in a dyad in which the child has significant developmental delays?

1.6. Hypotheses

1. Maternal sensitivity will increase over time following the introduction of the ABC intervention.
2. Attachment security will improve over time following the introduction of the ABC intervention.
3. Diurnal cortisol rhythm—representing stress regulation—will normalise following the introduction of the ABC intervention.

1.7. Chapter Outline

Chapter 1 has introduced the rationale and aims of the current study, and has outlined the research question and hypotheses which the research intends to investigate. Chapter 2 (Literature Review) synthesises the main lines of enquiry included in the study, and in doing so highlights the main gaps in the field of attachment and the spectrum of Intellectual Disabilities to which this study intends to contribute. Chapter 3 (Methodology) describes the mixed methods used to explore the research question, in a way that facilitates replicability and experimental control. Chapter 4 (Results) outlines the quantitative and qualitative results stemming from the various data analytic strategies employed in this study. Chapter 5 (Discussion) reviews the results of the study in relation to the study's hypotheses and the existing literature. In Chapter 6 (Conclusion) the results of the study are summarised, the strengths and limitations are outlined and recommendations are proposed for practice and future research.

Chapter 2: Literature Review

2.1. Introduction

The following review outlines key points of consideration in the discourse on attachment theory, attachment in intellectual disability and developmental delays as well as the attachment landscape in South Africa. It also provides the basis of the argument for the use of the Attachment and Biobehavioural Catch-up (ABC) intervention in South Africa.

2.2. Attachment Theory: Clinical and Academic Standing

2.2.1. Theoretical Roots

Attachment theory has become one of the most influential theories in developmental psychology, and has provided a widely used framework for understanding stress regulation, social functioning and personality development (Duschinsky, 2020). The theory centres on the premise that the emotional bond, known as the *attachment relationship*, between an infant and their primary caregiver, creates a template for how an individual learns to engage with and navigate through the world across the human lifespan (Ainsworth & Bowlby, 1992). John Bowlby is credited with having founded attachment theory in the late 1950s, while Mary Ainsworth refined his original ideas in the 1970s and pioneered its empirical investigation (Bretherton, 1992; Duschinsky, 2020). Their collective contributions to attachment research are detailed below.

John Bowlby's early work on attachment theory began while he was volunteering at a home for 'maladjusted boys', where he observed different children's behavioural responses to being separated from their mothers (Ainsworth et al., 2014; Waters et al., 2002). He observed similar behaviour patterns among adult psychiatric patients presenting with emotional disturbances, which led him to hypothesise that early interactions with and separations from primary caregivers play a fundamental role in a child's socioemotional development and well-being later in life. His conceptualisation moved away from early psychodynamic understandings of

infants as subject to unconscious developmental drives, and towards a relational theory of their psychosocial development (Cassidy & Shaver, 2016). Continuing the relationally inflected outlook fostered under his training with Melanie Klein and drawing from cognitive psychology to produce an evolutionary approach to development, Bowlby (1982, p. xiii) proposed that "the young child's hunger for his mother's love and presence is as great as his hunger for food".

Bowlby explains that the infant's *attachment behavioural system*, an inborn system developed to ensure social and emotional safety, is activated during moments of perceived threat to promote proximity between the infant-caregiver dyad (Bowlby, 1999; Duschinsky, 2020). This, according to Bowlby, is an instinctual relational inclination common among altricial species such as humans. It evolves to eventually underpin our personalities and the way we relate to others and ourselves. Caregivers, and later all relationships, are positioned on a gradient of primacy (e.g. primary caregiver, secondary caregiver etc), according to which the developing infant learns to organise their interpersonal behaviour, essentially answering the question: 'how do I consistently access care?' (Cassidy & Shaver, 2013). In an attempt to access this care and to maintain proximity to their caregivers in times of threat or distress, infants produce unique, caregiver-specific bids for care, such as crying, reaching or smiling, which they adjust and craft over time to produce a distinct attachment pattern; in doing so, they develop a pattern of behaviour that is most likely to ensure care and safety. Bowlby suggests that this attachment pattern is subsequently consolidated and generalised into broader personological traits which inform interpersonal behaviours (Cassidy & Shaver, 2016).

Bowlby proposed that the infant's innate drive to craft and produce *caregiver-specific bids* for care are complemented by a similar drive in caregivers. He argued that the caregiver's behaviour is also guided by an innate caregiving system designed to protect the infant, providing a secure base from which they can explore the environment (Duschinsky, 2020; Waters et al., 2002). By remaining consistently sensitive and attuned to their infant's needs by

acknowledging and responding to these bids, caregivers support the development of an affirmed self-concept and secure attachment, which have been empirically shown to result in improved socio-developmental outcomes in later life (Ainsworth et al., 2014; Cassidy et al., 2013; Cassidy & Shaver, 2016; Duschinsky, 2020).

As infants bond with their caregivers, the dyad develops a shared 'language' of relating which is guided by the infant's growing understanding of which bids for attention and care are most likely to be safe and successful. Different caregivers come to be used for different needs, usually with a single, primary caregiver being used as a primary and preferred point of departure and return during exploration, labelled a '*secure base*' in the language of Attachment Theory. The repeated emotional experience of interactions with a primary caregiver therefore serve an organising function for infants, wherein successful bids for attention are consolidated into a unique repertoire of self-other representations which guide when, how and why infants approach others for care, known as the *'secure base script'*. This pattern, or script, guides an individual's secure base-related behaviours, emotions and expectations, and becomes generalised from their experience with their primary caregiver into broader relational and personological styles over time, later informing friendships and romantic relationships (Sutton, 2018). As proposed by Bowlby, development across multiple realms is therefore organised around the nature of children's close bonds, used as the means by which they construct their understanding of themselves and the world (Waters et al., 2002).

Departing from the drive-based language of Kleinian psychoanalysis, Bowlby borrowed from cognitive psychology in conceptualising the relational co-creation of attachment patterns as mental representations of secure base experiences (Bretherton, 1992). Infants are seen as competent and curious explorers who use their caregiving relationships to guide their environmental and internal exploration of the world. Bowlby's theory therefore draws on the cognitive tradition to describe abilities which are understood to be inborn and instinctual,

allowing humans to foster unique and organised attachments, and therefore safe relationships in service of optimal development (Cassidy & Shaver, 2016). Interpersonal experiences with significant caregivers result in mental representations of attachment figures, the self and context, which have been argued to become organised as behavioural scripts deployed when certain circumstances necessitate their use.

This cognitive inflection culminated in Bowlby's original description of *internal working models* (IWM), a notion taken from the work of cognitive psychologist, Kenneth Craik (1943), which he favoured for the concept's ability to encapsulate dynamic and contextual representations which allow for adaptive environmental responses (Siegel, 2001). Emotional appraisals inform and guide the use of these models; how certain interactions feel inform expectations about future emotional outcomes and assist in choosing set-goals and behaviours. While these abilities are understood to be predominantly pre-verbal, they emerge and grow in parallel with neurocognitive development, becoming increasingly complex as more interactions are integrated into one's IWM. Over time, reciprocal expectations informed by IWMs come to be the means by which relating and behaving are guided (Slater, 2007). This process is continually updated, as new experiences are either accommodated or assimilated—concepts which Bowlby drew from Piaget (Bretherton, 1992). To Bowlby, these IWMs allow infants to plan their behaviour and make predictions about their safety. Monitoring and interpretation are therefore key elements of the successful selection of bids for care; tasks which are shared by both the infant and caregiver to ensure the maintenance of proximity, allowing the infant to dedicate more time to exploration in times when the caregiver is focused on proximity maintenance, and vice versa. This results in what both Bowlby (1969/1982, p. 236) and Ainsworth (1972, p. 118) have described as a "*dynamic equilibrium*" in the parent-infant dyad, wherein the caregiver and child dynamically balance the demands of proximity seeking with exploratory behaviour (Waters et al., 2002).

Acknowledging the co-creation of caregiving relationships, attachment theory prioritises both internal and external factors which have the potential to interrupt healthy, organised attachments in caregiving dyads. This co-creation is facilitated primarily by '*caregiver sensitivity*', a potent contribution of Mary Ainsworth to attachment theory and research, which she defined as the ability of the caregiver to notice and respond to their child's needs and desires in a manner that is both accurate and timely (Ainsworth et al., 1991). Caregiver sensitivity was postulated , and has been demonstrated, to predict the child's ability (both psychologically and biologically) to regulate his or her emotions and develop a secure attachment with their caregiver (Nofech-Mozes et al., 2018), and is an eminent, if not central, contributing factor to socio-emotional adaptation throughout life (Manning, 2022; Raby et al., 2015). Similarly, poor caregiver sensitivity has been shown to translate to the development of insecure attachments, and concomitant psychobiological and behavioural dysregulation (Granqvist et al., 2017).

2.2.2. Attachment Patterns

Another major contribution of Mary Ainsworth was her identification, through the development and use of the Strange Situation Procedure, of individual differences in attachment which she found to be associated with the differential nature of the caregiving received. Initially, these differences were classified according to identifiable patterns known as *secure, insecure-avoidant* and *insecure-ambivalent attachment*. If children are raised by caregivers who meet their bids for care with sensitive and comforting responses, children develop the understanding that caregivers can be used as a secure base (Woodhead et al., 1990). In such relationships, labelled '*secure relationships*' children feel safe expressing negative emotions, are able to resolve their stress through proximity-seeking and be receptive to care offered by a caregiver through the expression of emotion uniquely crafted over time through multiple caregiving interactions. This demonstrates an expectation that care is available when needed, their emotions are worthy of response and the response will be nurturing. In contrast,

insecure attachment types, namely avoidant and resistant/ambivalent, reflect an understanding of caregivers as unresponsive and unlikely to attend sensitively to a child's needs. As a result, proximity-seeking behaviours are stifled (avoidant) in order to remain safe, or over-emphasised (resistant/ambivalent) in order to ensure a caregiving response. While not ideal, these means of accessing care are consistent, and therefore considered '*organised'* (Schore & Schore, 2007). Later, a fourth classification was added by Mary Main, which she dubbed '*disorganised'*, as a form of insecure attachment (Main & Solomon, 1986). In contrast to the distinct patterning of other attachment classifications, disorganised attachments occur when an infant has no coherent and replicable strategy for accessing care. Behaviour is fearful and often freezing, occasionally contrary to the emotional inflection of a given situation (Granqvist et al., 2017). This is theorised to reflect the infant's dilemma in their experience of their caregiver: that their caregiver is both the source of, and solution to, their fright or discomfort, a situation which Main often termed "fright without solution" (Hesse & Main, 1999, p. 484) and reflects a pattern of parent behaviours which are frightening or confusing to the infant, often, but not always, reflecting maltreatment (Granqvist et al., 2017). These distinct clusters of proximity-seeking strategies have been recognised in infants across the spectrum of caregiving structures, cultures and geographies to reliably show that infants actively monitor, interpret and respond to the relationships in which they find themselves, dynamically adjusting their bids to achieve as much nurturance as possible (Posada et al., 1995; Umemura & Traphagan, 2015; Van IJzendoorn & Sagi-Schwartz, 2008).

2.2.3. Longitudinal Outcomes of Early Attachment

The patterns of attachment delineated above have been shown to predict and inform the quality of an individual's development. Indeed, Bowlby's earliest conceptualisations of attachment theory propose that early parent-child attachment experiences characterise one's social, emotional, and psychological development (Bowlby, 1969, 1973). IWMs developed

during infancy and toddlerhood are thought to evolve and guide working models of self, others and the world, to produce a spectrum of healthy or unhealthy interactions and perceptions of interactions which persist for much of an individual's life. These support independence and healthy interdependence by aligning the experience of caregiver availability to expectations of those embedded in the individual's social context. The majority of research in this regard has been nested within research on developmental psychopathology (Cicchetti, 1984; Schore & Schore, 2007; Zajac et al., 2020), and empirical studies aim to associate early attachment experiences with consequent psychopathology or wellbeing. For example, Bohlin et al. (2000) pointed out that attachment security was strongly predictive of healthy social functioning in school age children from a low risk, middle class sample. Children in this longitudinal study showed higher initiative than withdrawal in socially ambiguous situations and increased group belonging when compared to insecurely attached children (Bohlin et al., 2000).

Perhaps the most influential longitudinal study exploring Bowlby's claims regarding the influence of early attachment was the Minnesota Longitudinal Study of Risks and Adaptation (Sroufe et al., 2005), which provided some of the first evidence of the predictive validity of early attachment patterns. Since then, a host of longitudinal studies and reviews have replicated the evidence that early parent-child experiences and resulting attachment security are linked to psychological development. Groh et al. (2014), in their meta-analysis, provided evidence for a statistically significant moderate association between attachment security and social competence in children, and concluded that the age at which attachment security was measured did not impact this association. This implies that attachment patterns consistently inform the development of social competence in childhood across early developmental stages. A more recent review of the existing literature has further aimed to summarise the research on the association between early attachment experiences and emergent internalising or externalising psychopathology (Badovinac et al., 2021). Spanning 34 articles comprising 15 samples, this

review found that early childhood attachment was consistently predictive of emotional outcomes in early childhood, middle childhood and adolescence, although there was inconclusive evidence for the strength of the association in adolescence. Specifically, insecure attachment was significantly and positively associated with heightened risk for internalising and externalising symptoms up and until middle childhood, and positively, although weakly, associated with the same in adolescence (Badovinac et al., 2021).

Across studies, evidence of a moderate association between attachment and developmental outcomes, rather than a strong and causal one, has been explained by acknowledging the role of additional risk factors which combine to produce psychopathology (Groh et al., 2014; Badovinac et al., 2021). For example, in their research on the association between insecure attachment and anxiety in childhood, Kerns and Brumariu (2014) highlight the manner in which the compounded risk for anxiety due to limited peer competence and stress regulation seen in insecurely attached children combines with additional risk factors, such as bullying, to produce clinically significant anxiety. Boldt et al. (2016) echo this and delineate attachment as a powerful moderator, rather than direct source, of developmental sequelae in children on the spectrum of ID.

This brief review of the literature regarding the longitudinal role of attachment security implies that securely attached children can be expected to be more socially and emotionally adjusted than insecurely attached children. Securely attached children will have lower peer conflict overall, and be more adept at resolving disagreements when they arise (Raikes et al., 2013), will have more rewarding and resilient friendships (McElwain et al., 2008), and will also cope more constructively with stress (Thompson et al., 2013). Evidence such as this is underpinned by the proposition that secure attachments produce a resilient IWM which informs a positive attribution bias in appraisals of self and others, which in turn guides a confident and adept approach to developmental challenges (Dujardin et al., 2014; Dykas & Cassidy, 2011;

Ontai & Thompson, 2008; Raikes & Thompson, 2008). By contrast, insecure attachment has been associated with negative attribution biases in an individual's experience of themselves and the world, and have been shown to lead to poorer interpersonal competence and increased risk of externalising and internalising problems (Fearon et al., 2010; Groh et al., 2012, 2014).

2.3. Understanding Attachment in Intellectual Disability

Attachment relationships and their outcomes rely on the ability of the infant and caregiver to communicate with, and respond to, one another. The nature of their attachment is influenced in important ways by the extent to which a caregiver is aware of and responds accurately and promptly to the infant's attachment signals and bids for care (Gibbs et al., 2018; Ranson & Urichuk, 2008; Zajac et al., 2020). In typically developing infants, these attachment signals are usually pronounced and explicit. However, infants and children with significant Developmental Delays (DD) or Intellectual Disabilities (ID) are likely to have difficulties in the signalling of attachment needs to their respective caregivers (Feniger-Schaal & Joels, 2018). Additionally, behavioural and neurological features associated with ID may hamper the caregiver's ability to recognise and respond to the needs of the child in ways conducive to secure attachments. In addition to the potential for impairments in the expression and interpretation of attachment behaviours, there is increased risk that those raising children on the spectrum of ID may have inappropriate constructions of, or reactions to, the disability—for example, as taboo, as caused by the parent, or as shameful (Dupras & Dionne, 2014; Hazarika et al., 2017; Puliyakkadi et al., 2021), which present risks to healthy parent-child attachments. Hence, a growing body of research indicates that this population may be at particular risk of developing insecure attachments, likely impacting negatively on mental health outcomes (Janssen et al., 2002).

ID is a neurodevelopmental condition significantly affecting the intellectual and adaptive functioning of individuals across the lifespan (American Psychiatric Association, 2013). In

particular, behavioural traits associated with ID include low levels of initiation, low responsiveness, and deficits in social and communication skills (Gligorović & Buha Đurović, 2012), all factors which may make interpretation of a child's attachment and exploration-related signals potentially challenging for caregivers. Indeed, Bowlby's founding thesis for the theory was that infants develop cognitive representations of past caregiver experiences to strategise for optimum safety and proximity-seeking behaviours. However, this implies the use of many of the cognitive abilities potentially limited in those with ID. While there is expansive research to support the role of healthy attachment relationships in interpersonal (Zajac et al., 2020), career (Zhang et al., 2021) and neurodevelopmental (Antonucci et al., 2018; Potter-Dickey et al., 2020) outcomes, understanding how this body of research maps onto the nuances of development in the spectrum of cognitive disabilities is still underway. Much of the work that has been done was completed in the late 1990s, an overview of which indicated that children with ID tended to show higher rates of attachment insecurity and disorganisation when compared to typically developing samples (e.g. Atkinson et al., 1999; Capps et al., 1994; Cicchetti et al., 1991; Cicchetti & Ganiban, 1990). However, the samples in these studies were often small, were predominantly focused on ID caused by Down Syndrome, limiting their generalisability, and tended to conclude that the child's disability was the cause and mediating factor in creating risk for attachment difficulties. Recent work by Feniger-Schaal and Joels (2018), however, supports the applicability of attachment constructs in children with ID, but emphasises that maternal sensitivity continued to predict attachment security in this population, as it does in typically developing children. Importantly, this study also found that the extent of the child's cognitive disability did not predict attachment security, whereas caregiver sensitivity did. This reflects more current thinking that maternal or caregiver behaviour is a stronger predictor of attachment security than child characteristics such as ID (van IJzendoorn

et al., 1992), and that the risks associated with ID—not ID itself—translate to a risk for attachment difficulties (Mullen, 2018).

Research on the role of the caregiver in attachment therefore indicates that caregiver sensitivity continues to hold as a predictor of secure attachment in children with ID, a finding that has since been replicated (e.g. Feniger-Schaal et al., 2019). This emphasises the central role of caregiver sensitivity in fostering healthy attachments, which has been shown to be more challenging for caregivers of children with ID than for those caring for typically developing children, often leading to increased rates of insecure attachment in children with ID (Feniger-Schaal & Oppenheim, 2013; John et al., 2012; van IJzendoorn et al., 2007). Indeed, Janssen et al. (2002) link the risk of psychopathology in people with ID to increased dysregulation stemming from insecure attachment, and research by Feniger-Schaal and Joels (2018) found that the rates of insecure attachment (32.5%) in their sample with ID were significantly higher than their sample of typically developing children (5-10%). This finding has been replicated in the limited literature on the intersection between attachment and ID, but links attachment difficulties to the psychological distress and risk factors associated with ID, rather than identifying ID as causing attachment difficulties (Hamadi & Fletcher, 2021). Despite evidence for the protective value of maternal sensitivity across the spectrum of cognitive disability, the lowered levels of perceivable emotional or verbal engagement and cognitive limitations seen in infants and children with developmental delays have been associated with poorer attachment outcomes in multiple studies (Fletcher, 2016; Sterkenburg et al., 2008; Vandesande et al., 2019). The resulting atypical attachment behaviours have been shown to leave a higher proportion of bids for attachment not responded to, and place caregivers at risk for feelings of helplessness which may result in withdrawal from their children, further impacting their responsiveness. Granqvist et al. (2017) have further postulated that the experience of receiving a diagnosis on the spectrum of ID can lead parents to “display subtly frightening, frightened,

or dissociative behaviours toward their infant" (p.2) as they process and perhaps grieve the loss of the imagined typically developing child (Fletcher & Gallichan, 2016; Oppenheim et al., 2009).

Therefore, an analysis of the nuances of attachment in children with ID and their caregivers can be addressed in terms of the caregiver's experience of, and response to, the diagnosis. Marvin and Pianta (1996) addressed this in their conceptualisation of parents of children diagnosed with ID as either 'resolved' or 'unresolved' in their adjustment to the diagnosis. In the context of parents of children with developmental delays and ID, a resolved appraisal would include a parent's revision of their previous representations of their child, and would be adjusted to promote expectations and emotional responses which are aligned with their child's functioning, rather than being driven by representations of the 'wished for' child, or the limited view of disability 'sans persona'; seeing the disability, rather than the personality (Feniger-Schaal & Oppenheim, 2013). Research conducted by Marvin and Pianta (1996) has been corroborated by Barnett et al., (2006), Dolev (2006) and Feniger-Schaal and Oppenheim (2013), confirming that caregiver resolution of a diagnosis of developmental delays or ID results in positive and sensitive engagement and significantly improves the chance of secure attachment relationships.

However, fully reaching a state of resolution is foregrounded by sufficiently informed and appropriate representations of one's child, including insight into the adjusted ways in which infants and children with developmental delays need, make bids for, and respond to care. Fletcher and Galligan (2016) make the example that some children with developmental delays may not have sufficient theory of mind to create and sustain mental representations of their parents, and so need physical and visible proximity in order to confirm security (Fletcher, 2016). Additionally, common behaviours indicative of insecure attachment in those with ID, such as 'aggressive', loud or stereotyped behaviours are more challenging to understand as bids

for care (Janssen et al., 2002; Poppes et al., 2010). The nuanced way in which children with ID may communicate what they need, and how they feel, to their parents can thus make it difficult for such parents to understand what their children need and respond sensitively and appropriately.

The adjusted understanding of attachment behaviours in those with ID identified by these studies has recently been well-represented in the work of Vandesande and colleagues, who describe the nuanced attachment behaviours seen in severe and profound intellectual disabilities as '*differentiated'*. This work explores the way in which attachment behaviours present and can be measured in this group, accounting for the influence of idiosyncrasies such as limitations in fine and gross motor skills, which were found to impact the measurement of selective attachment (Vandesande et al., 2022), developmental age and neurocognitive pre-requisites for attachment, or selective response to comfort provided by parents versus strangers, which was significantly different (Vandesande, et al., 2019; Vandesande et al., 2020). Sensitive and responsive parenting in the context of ID is therefore nuanced, and facilitated by accurate understandings of the unique way attachment presents in those on the spectrum of ID.

Despite the complexity of the barriers to secure attachment faced by infants and children with developmental delays, there is evidence that secure attachments are predictive of positive developmental outcomes in this population. Securely attached children with ID demonstrate comparably better joint and symbolic play, social skills and decreased problem behaviours when compared to insecurely attached counterparts, even when controlling for level of disability (Capps et al., 1994; Naber et al., 2008; Sterkenburg et al., 2008; Willemsen-Swinkels et al., 2000). However, in resource deprived environments, such as South Africa, the challenges to caregiver sensitivity—and, hence, attachment—described above may be compounded by a variety of socioeconomic factors. The following section discusses attachment research from

South Africa and highlights some of the contextual barriers to security in attachment relationships. Many of these factors are exacerbated in the context of ID.

2.4. Intellectual Disability and Developmental Delay in South Africa

2.4.1. Epidemiology

The global and South African prevalence of ID is estimated to range between 0.27% and 3.6% in adults and children (Adnams, 2010; Kleintjes et al., 2006; Maulik et al., 2011). Although the reported rates of ID in South Africa are comparable to those internationally, Adnams (2010) suggests that such rates may indeed be higher in developing contexts. This is supported by the most recent Census data which reports that 4.2% of the South African population aged five years and older have mild or severe "cognitive disabilities" (Statistics South Africa & Lehohla, 2014). South Africans diagnosed with ID, however, continue to be poorly represented in academic literature, despite the diagnosis being the most prevalent disability both in South Africa and worldwide (Capri et al., 2018)

2.4.2. Context-specific Risk Factors for the ID-spectrum in South Africa

While there is no evidence that the South African population faces an elevated risk for primary genetic factors associated with ID compared to the rest of the world, Fieggen et al., (2019) propose that there is a higher risk for ID due to secondary or environmental factors such as malnutrition, in-utero alcohol exposure, congenital infections, interpersonal or intimate partner violence as well as HIV-related developmental disorders. Secondary, or environmental, exposures can both cause and deepen the presentation of ID, making the healthcare strategy surrounding the care of these individuals more nuanced and resource intensive (Christianson et al., 2002; Fieggen et al., 2019). These risks are emblematic of a cumulative risk faced by many South Africans, not only for ID but for many adverse outcomes, which deepen in acuity and complexity with decreasing socio-economic status (SES; Adnams, 2010; Kromberg et al., 2008; Mkabile & Swartz, 2020). Chronic poverty and its associated factors, such as low

educational attainment, scarcity of available trained healthcare personnel, increased burden of disease and familial strain are directly associated with an increased risk of delayed acquisition of developmental milestones sufficient to meet the criteria for developmental delay (De-Graft Aikins & Marks, 2007; Olness, 2003). The accumulation of factors described above can be considered emblematic of the South African parenting landscape, and while no reliable data on the epidemiology of ID in the country are available, they combine with known conditions for the onset of developmental delays in the prenatal and developmental period. Key environmental factors in this context, namely malnutrition, HIV and substance use, are described below.

2.4.2.1. Malnutrition

Nutritional deficiency continues to be a significant public health concern in South Africa, with a known and often irreversible impact on cognitive and physical development (Kimani-Murage, 2013; Mkhize & Sibanda, 2020). Up to 44% of South African children younger than age 5 meet the criteria for nutritional deficiency, and the country's rate of undernourishment had increased from 4.4% to 6% between 2004 and 2018, when 11% of households reported child hunger (Sambu, 2019). At present, the most effective strategies for addressing the significant risk of malnutrition in South African children are the Child Support Grant (CSG) and the National School Nutrition Programme (NSNP), which combine to support the nutritional needs of 21 million children. However, the school nutrition programme, which accounts for 9 million learners, does not provide for children not attending school, and neither the CSG nor the NSNP adequately support the needs of pregnant mothers. This is significant, given that undernourished pregnant mothers are more likely to give birth to infants with low to very low birth weight, a strong predictor of developmental delays which is associated with continued undernutrition within the first 1000 days (Danaei et al., 2016; Eales et al., 2020). Indeed, UNICEF reported that children across 18 low-middle income countries who were not

breast fed and consequently failed to meet their micronutritional needs were more likely to screen positive for neurodevelopmental delays (UNICEF, 2020). The effects of malnutrition in the first 1000 days are cascading, and can both cause and exacerbate neurodevelopmental challenges sufficient to cause developmental delays in South African infants (Groce et al., 2014). This is particularly true when considering the bidirectional link between malnutrition and opportunistic infections associated with limited neurodevelopment, such as latent TB emergence caused by a weakened immune system, as well as the significant need for sufficient nutrition in HIV-positive infants (Podewils et al., 2011; Thurstans et al., 2008).

2.4.2.2. HIV

Among countries with the highest rates of HIV infection, South Africa accounts for a fifth of the world's HIV-positive population (McDonald et al., 2013). In 2021, 68% of these individuals were actively using antiretroviral therapy (ART; CDC in South Africa, 2022). The country's management of the epidemic has been highly successful, most notably in the reduction of mother-to-child transmission of the virus from 3.5% to <1% in the last decade (Goga et al., 2018; Woldesenbet et al., 2021). Nonetheless, children who do acquire HIV through vertical transmission are at significant risk of encephalopathies and cognitive, visuospatial and motor deficits, and commonly meet the criteria for a mild intellectual disability (Wilmshurst et al., 2006). Data from the Drakenstein Child Health study confirmed that the risk for developmental delays persists in children who were HIV exposed but not infected, finding that HIV exposed, but seronegative, children were at higher risk of expressive and receptive language delays at age 2 (Wedderburn et al., 2019). While the conferred risk was relatively small compared to HIV-infected children, evidence for this risk was replicated in research conducted in Cape Town, which found that HIV exposed, uninfected children were twice as likely as unexposed children to meet criteria for cognitive delays. This risk increased five-fold for HIV exposed children who were born preterm (le Roux et al., 2018).

In a study conducted in KwaZulu-Natal with over 2000 children aged 4-6, Knox et al. (2018) found that 26% of those who were HIV-positive met screening criteria for a neurocognitive deficit, and their caregivers were four times more likely to report delays in their developmental milestones. The survey also found that children who were HIV-positive were more likely to have been diagnosed with cognitive or language delays. The study, as a secondary outcome, also diagnosed up to a third of the sero-positive children for the first time (Knox et al., 2018), pointing to a concerning lack of screening for this population. In addition, HIV-associated neurocognitive disorders (HAND) in parents may present a significant risk to children due to its potential impact on their availability for, and quality of, caregiving. Research conducted by Joska et al., (2010) indicates that 23.5% of HIV-positive mothers attending a clinic met the criteria for HAND, translating to a potential risk of fall off in the attentive care provided to their children (Rochat et al., 2017; Rochat et al., 2018), as well as risk for vertical transmission of HIV to their child and consequent risk for deficits in cognitive performance in perinatally infected children (Cohen et al., 2015). However, despite the continued risk for neurodevelopmental delays, screening for neurocognitive deficits is seldom carried out in outpatient settings.

2.4.2.3. Substance Use

Substance use during pregnancy continues to pose a risk for developmental delays in South Africa and attempts to generate consistent epidemiological data on the subject have yielded varying results, making intervention planning challenging. The World Health Organisation estimates that roughly 13% of pregnant South African mothers use alcohol during pregnancy (Popova et al., 2016), while a more recent study suggests that this may be closer to 3.7% (Peltzer & Pengpid, 2019). However, both studies agree that between 4-5% of South African pregnant mothers who do consume alcohol meet the criteria for binge drinking (three or more drinks per day), which is the direct cause for Foetal Alcohol Spectrum Disorders (FASD).

FASD is a diagnostic term for the cluster of conditions which emerge when a foetus is exposed to alcohol in-utero, and is primarily associated with neurocognitive delays or deficits, including ID, learning difficulties and problems with cognition and language (Olivier et al., 2016). South Africa is estimated to have the highest reported prevalence of FASD globally, ranging between 29 and 290 cases per 1000 births, and it is estimated that the condition is underdiagnosed (Olivier et al., 2016). Contextual factors in the South African setting may increase the risk of alcohol misuse and, therefore, the risk of FASD. For instance, Rochat et al. (2018) found that food insecurity, parental mental health difficulties, maternal HIV/AIDS and child mental health problems were all associated with a two-fold increase in the risk for maternal alcohol use during pregnancy in South Africa. Similarly, Onah et al. (2016) identified poverty, food insecurity, a history of mental health difficulties and intimate partner violence as the prevailing factors predicting a pattern of substance use in expectant South African mothers (Onah et al., 2016). This not only implies a greater risk of ID and developmental delays in South African infants, but that they might be born into contexts with multiple intersecting burdens which pose a known threat to attachment security (Alto & Petrenko, 2017; Barnes & Theule, 2019).

While data regarding alcohol consumption and infant developmental outcomes in South Africa is fragmented and inconclusive, research on maternal drug use and infant outcomes is scarce. Indeed, Schiebe et al., (2020) note that reliable data on illicit substance use in the country do not exist, despite evidence that illicit substance use is a predictor of other risky behaviours of epidemiological significance. It is estimated that 7-9% of the population uses drugs (Pengpid et al., 2021), and 0.5-1% uses amphetamines, cocaine or opioids (UNAIDS, 2016). In addition, the estimations of people who inject drugs range from 67 000-75 000 individuals (Petersen et al., 2013). Among the 3439 substance-using or hepatitis-positive individuals in Schiebe et al.'s (2020) study, 75% were sexually active, and 37% were HIV-positive, highlighting the significant intersecting risk for developmental pathologies faced by

infants born to individuals in this population (Scheibe et al., 2020). While the relative proportion of individuals in this at-risk group is smallest compared to the risk factors associated with developmental delays in South Africa outlined above, it appears to represent the most significant associated risk, and is underpinned by little and scant reliable research and policy.

2.4.3. ID specific socio-political infrastructure in South Africa and its implementation

The number and intersection of risk factors for the emergence of developmental delays faced by South African infants emphasises the need for a coordinated early intervention strategy in contexts such as South Africa to mitigate the impact and burden of the spectrum of disabilities (Samuels et al., 2012). This, however, is a complex and resource intensive endeavour in a setting where the majority of healthcare expertise is concentrated in major hubs, while 43% of children live in rural areas with little access to specialist screening and assessment (Hall, 2022). As a result, much of the implementation enshrined in South African policy for early childhood intervention is fragmented. For example, home-based screening conducted with over 6000 children living in Mpumalanga revealed that 10% of the sample screened positive for potential developmental delays, of which 3.6% were later formally diagnosed with ID, and genetic factors were implicated in only half of the aetiologies for these individuals, and could therefore have been prevented (Kromberg et al., 2008). This implies that a significant proportion of disabilities in children in this population may yet be undetected, many of which are preventable. Similarly, a developmental screening of 174 infants in Mamelodi revealed that 34% of the sample met criteria for a developmental delay (Abdoola et al, 2020). Evidence therefore indicates that many individuals on the spectrum of ID may remain undiagnosed, a significant proportion of which may be preventable.

This indicates a need for a more capable screening and intervention strategy in patient-facing settings. At present, the Road to Health Booklet is the only developmental screening tool which is nationally implemented, although limited research is available on its

implementation (van der Merwe et al., 2019). Research to date has revealed a concerning array of challenges to the success of even this monitoring strategy. Research conducted at Kalafong Hospital in Gauteng found that only 7% of doctors recorded data in the booklet, and only 54% asked for the booklet during patient visits (Mulaudzi et al., 2007). In addition, Tarwa and De Villiers (2007) found that only 48% of mothers brought their booklets to consultations in primary and secondary settings, while a study done in Vhembe, Limpopo showed that infant weight was only accurately recorded 14% of the time (Mudau, 2010). Data from the Cape Town metropole revealed that only 56% of healthcare workers requested the booklets from mothers during consults (Jacob & Coetzee, 2015). Further, Naidoo et al. (2018) found that the metrics used to assist in the monitoring of developmental delays (length-for-age; weight-for-length and head circumference) were completed in less than 5% of the 318 cases, and no mention was made regarding the recording of the Developmental Screening, which directly screens for developmental delay (Naidoo et al., 2018).

At present, the implementation strategy for early intervention in infants with developmental delays and their families is well articulated. The Framework and Strategy for Disability and Rehabilitation services forms part of the 2015 National Integrated Early Childhood Development Policy, and aims to facilitate the early identification of developmental delays through screening, school outreach and community engagement, and focusing intervention efforts in post-natal clinics (Department of Social Development, 2010). The approach therefore aims to integrate branches of the Departments of Education and Social Development with existing diagnostic and intervention strategies in primary healthcare settings. The elegance of this legislative structure is carried through to support for ID later in life; indeed, South Africa is the only country in Africa which outlines constitutional rights for people with disabilities (Adnams, 2010). Social grants, free primary healthcare, and strategies to reduce institutionalisation are all well enshrined in the South African Constitution, UN Convention

for the Rights of The Child and The Disabled, and the Mental Health Care Act (Adnams, 2010). Despite this, state resources in this regard are strained, with many South Africans with disabilities waiting years before being able to access suitable educational, occupational and residential placements (Docrat et al., 2019; Janse van Rensburg et al., 2018). For example, of the estimated 180 000 individuals living with ID in the Western Cape, only 2% of these have secured placements at protective workshops or receive specialised care during the day (Western Cape Government, 2013). Research on the social support received by children with disabilities in Soweto revealed that while only 44% of those with physical disabilities received the support they needed, a mere 8% of those with ID received assistance, and less than half of the children eligible for a social grant were receiving it (Saloojee et al., 2007). Additional research has identified several community barriers for parents seeking to access ID services for their children, including financial barriers, opportunity costs involved in attending clinics, community violence, stigma, feelings of powerlessness regarding their ability to support their child, and a lack of faith in the ability of services to assist them (Mkabile & Swartz, 2020). Modula (2022) lists additional challenges experienced by parents of children with ID, who identified missed home visits by care workers, needing to fetch their children during school hours due to behavioural difficulties, and limited to no psychoeducation during clinic visits.

Given the extent of resource constraints, inadequate training of health professionals in working with people with ID, and the limited insight into the extent of ID and ecologically valid interventions in South Africa, the outlook for individuals on this spectrum is less than ideal. This is particularly true when considering the impact of intersecting risks specific to the South African landscape on the development of secure attachments. Given that intersecting clusters of risk such as those described above are common in low resource settings such as those seen in South Africa, interventions which are effective and are not resource intensive are necessary.

2.5. The Case for Attachment-based Interventions in Low Resource Settings

Low resource settings are characterised by limited access to infrastructure, including healthcare interventions. Poorer outcomes in these contexts have been linked to an array of factors which define low resource settings, including: a paucity of healthcare training, restricted or overburdened social resources, conservative beliefs and practices, human resource limitations, research challenges, suboptimal health service delivery and often physical and geographic challenges (van Zyl et al., 2021). As a result, roughly 56% of children in low-income settings are at risk of detrimental developmental outcomes (Lu et al., 2016). In these settings, individuals with mental illnesses who would benefit from multidisciplinary support are often faced with a significant burden of disease, which leads to poorer adaptive and psychosocial outcomes. For example, it has been estimated that as much as 85% of individuals with ID live in developing countries, usually with limited to no access to disability support (Mathers et al., 2008). Despite an increased burden of disease, individuals in these settings are known to be faced with a substantial treatment gap for mental health. World Health Organisation data indicates that only 0.16% of the youth needing mental health support receive care in Low-Middle Income Countries (LMIC; Bright et al., 2017; Patel et al., 2011). In these settings, the few resources which are available are usually only accessible to those in need of acute support, and typically only in cities, rather than low resource, outlying areas in such countries.

Resource constraints have been identified as a common risk factor for emotional and behavioural difficulties in children being raised in these settings, and are known to increase the risk of aggression, anxiety, disobedience and sleep/wake disorders (Donohue et al., 2015; Kaiser et al., 2017). Further, children raised in homes facing food insecurity have been shown to have a higher risk for externalising and internalising disorders (Slopen et al., 2010). Where many disabilities, such as ID, have no ‘cure’ and instead require multi-level psychosocial

support in order to address the risk of low quality of life in these populations, low resource settings are associated with a high caregiving burden in the context of socioeconomic pressure. As a result, caregivers in these contexts have been shown to face a high risk for depressive symptoms, both as a result of resource constraints and of raising a child in a resource constrained setting (Docrat et al., 2019; Meinck et al., 2017; van Zyl et al., 2021). Further, resource constraints can increase the risk for violent discipline (UNICEF, 2014), and it has been reported that up to 75% of children in LMICs experience violent discipline in the home (UNICEF, 2010). Low resource settings therefore appear to intersect with a risk for poor parental responsiveness and increased exposure to unhealthy parenting practices.

In order to address the challenges which resource constraints pose for the effective delivery of mental health care, a suite of strategies for facilitating low-cost or resource-light delivery have been researched in recent years. In the context of high risk to both caregiver and child, secure attachment relationships are a known and powerful protective factor which can be achieved with low cost. Indeed, parenting factors have been identified as the primary modifiable factor influencing children's development (Collins et al., 2000; Morawska & Sanders, 2018) and the 2017 South African Child Gauge highlighted the need for an improved focus on responsive parenting in the facilitation of an enabling environment for children in this country (Jamieson & Richter, 2017). Secure attachment has been shown to foster adaptive social and emotional development across a number of studies, and is associated with significant resilience in adverse settings (Balbernie, 2013; Sroufe et al., 1983; van der Voort et al., 2014). Further, it is associated with positive behavioural and emotional coping, academic achievement, healthy friendships, and reduced risk for behaviour problems (Bureau et al., 2009; Cicchetti & Roisman, 2011; Ramsdal et al., 2015). It is therefore understood that supporting healthy attachment relationships in low resource settings plays both a remedial and protective role in buffering the impact associated with family and community adversity on

child development. Attachment interventions, and parenting interventions aimed at fostering attachment, have also been identified as resource-light (Adebiyi et al., 2022; Tomlinson et al., 2016) and sustainable (Raby et al., 2015) interventions, which have a significant impact on outcomes for both caregiver (Feniger-Schaal et al., 2019) and child (Ranson & Urichuk, 2008).

In acknowledgement of the significant impact of healthy attachment on development and mental health, the World Health Organisation issued a call in 2009 to encourage the implementation of interventions aimed at improving the parent-child relationship, which has been echoed by a range of international organisations (Kumpfer, 2009; UNICEF, 2014; World Health Organization et al., 2013). Elevated adversity in low resource environments has been shown to be particularly challenging for those raising children, as outlined above. Attachment-based interventions have a well-established evidence base for their efficacy in addressing the risks associated with parenting in low resource settings, and targeting caregiving factors can therefore mitigate the link between limited access to resources and burden of disease (Alto & Petrenko, 2017; Kohlhoff et al., 2022; Wright & Edginton, 2016).

2.6. The Need for Early Intervention and Parent-Led Models of Care in South Africa

South Africa is defined by a unique constellation of factors which shape the ability of caregivers to positively interact with their children, and to foster a consistent caregiving experience sufficient to support secure attachment. Perhaps the most defining of these factors is the resource scarcity described above, which can impact the physical and emotional availability of caregivers (Hastings et al., 2006; Kaiser et al., 2017) and intersects strongly with the risk factors which distinguish the South African caregiving and attachment landscape (Adebiyi et al., 2022; Docrat et al., 2019; Meinck et al., 2017; Mkabile & Swartz, 2020). Poverty in South Africa is associated with child abuse and neglect, family stress, food insecurity and exposure to violence (Barnett et al., 2019; StatsSA, 2017). Indeed, poverty has been shown to be one of the key predictors for attachment insecurity because it usually implies

a spectrum of impediments to the emotional or even physical availability of caregivers (Alto & Petrenko, 2017; Bright et al., 2017).

Against the backdrop of the association between resource scarcity and risks to healthy caregiving experiences, there is a growing body of evidence supporting the implementation of peer-led caregiver-training programmes aimed at leveraging the short and long term protective effects of early intervention, particularly in settings such as South Africa (Barnett et al., 2019; StatsSA, 2017). These approaches focus on empowerment and skills transfer, while minimising the logistical or financial cost involved in typical mental healthcare provision (Tomlinson et al., 2016). As a result, caregivers, as well as allied health professionals such as community health workers, mothers, grandparents and teachers are increasingly positioned as paraprofessionals, trained to attend to varying levels of mental ill-health and its management (Kyarkanaye et al., 2017; Tomlinson et al., 2016). In the case of attachment-based interventions, in-vivo training in naturalistic settings has focused on increasing sensitive responsiveness in caregivers, a known causal variable in the development of attachment security (Behrens et al., 2012; Meade et al., 2014). This aligns well with known best practice for attachment-based interventions, wherein intimate and naturalistic models of intervention have shown the greatest efficacy (Kyarkanaye et al., 2017; Lachman et al., 2014; Tomlinson et al., 2016). This naturalistic approach aligns well with the South African setting, wherein caregiving is often shared by a network of individuals.

As a result of the resource scarcity described above, children in South Africa are commonly raised by a network of multiple caregivers. The impact of South Africa's previous policy of segregation and migrant labour have left only 35% of children living with both of their parents (Budlender & Lund, 2011). This fragmenting pattern of working and living is coupled with longstanding poverty, and leads to caregiving being shared among large support networks, wherein children fall under the care of, and into attachments with, multiple caregivers due to

the mobility and intergenerational displacement fostered by the labour model in South Africa. As a result, roughly 32.9% of children are estimated to live in households with three or more generations (StatsSA, 2018) wherein the parenting roles typically associated with a nuclear model of care are more dispersed, a pattern which, like much of South African life, is shaped by race and culture. Coloured and Black South African children are more likely to live in three-generation households, and report lower degrees of communication with their parents than White and Indian children, predominantly relying on their grandparents instead (Button et al., 2018; Seekings, 2014). Noting that consistency in caregiving is known to impact early childhood development (Eshel et al., 2006; Narvaez et al., 2013), and that consistent disciplinary strategies foster improved social outcomes, such as interpersonal skills and career achievement (Grusec et al., 2017), the extent to which caregiving systems participate in a cohesive strategy for care is an important buffer against poor psychosocial outcomes. Indeed, attachment theory emphasises that the experience of inconsistent caregiving as a central risk factor for insecure attachment and its associated impact on development (Ainsworth et al., 2014). Importantly, attachment theory has consistently acknowledged that multiple caregivers may be supporting a child at any given time, or indeed that there are many situations in which children have sequential and changing caregivers. Therefore, the overwhelming evidence points, instead, to the need for consistency in the nature and quality of this caregiving, which has been shown to underlie secure attachments and the internal working models which underpin it. Judi Mesman, who currently leads the research lending credence to attachment in multiple caregiver contexts, has challenged the notion that a single individual, and indeed a mother, is necessarily the locus of sensitivity for their child. Acknowledging the various contexts in which multiple caregivers participate in the care of a child, she has coined the notion of ‘received sensitivity’ to appropriately explore caregiver sensitivity and its outcomes in multiple caregiver contexts such as South Africa. Mesman and her colleagues suggest that sensitivity received

from multiple caregivers positions the entire community as a secure base, and that in cases where maternal sensitivity is challenging, the infant's overall experience of sensitive care is protected by the collaborative effort of the community (Mesman, 2018; Mesman, Minter, et al., 2016; Mesman, van IJzendoorn, et al., 2016).

In caregiving systems where there are multiple potential attachment figures, positive caregiver involvement (rather than presence) in which each caregiver is emotionally responsive, engaged in positive activities, and attentive to the needs of children (Kennedy et al., 2015; Lamb, 2010) becomes challenging to sustain in the context of resource constraints in South Africa. In our context, households typically face multiple continuous stressors, inclusive of household overcrowding, low employment rates, exposure to intimate partner violence, violent crime, childhood maltreatment and HIV status, among others, which coalesce to place families at high risk for strained interpersonal relationships which foster harsh or emotionally unresponsive parenting (Lachman et al., 2017; Meinck et al., 2017). Caregiving systems with multiple intersecting stressors such as these are at increased risk of low emotional availability, placing the development of healthy attachments at risk (Pilarz & Hill, 2014). This is not to say that caregiving arrangements with multiple caregivers pose an inherent risk to healthy attachment, but that systems including multiple caregivers often emerge in contexts with low access to resources which necessitate shared parenting approaches. Indeed, a South African study explored the mediating role of mother, father and grandparent involvement in fostering or mitigating mental ill-health and substance abuse in children. The authors found that the positive involvement of one of these primary caregivers prevented internalising and externalising problems, as well as substance use, including tobacco, alcohol and marijuana in children (Profe & Wild, 2016). However, involvement of each family member as a primary caregiver showed high variation in terms of its ability to protect children from developing substance use or mental health difficulties, showing that involvement of each caregiver plays

a unique role. For example, while grandparent involvement was associated with healthier long-term outcomes, this relationship was not significantly predictive of improved resilience when compared to the protective effects of involvement by parents (Profe & Wild, 2016), a result which has been replicated in previous studies outside of South Africa (e.g. Dunifon & Bajracharya, 2012). This emphasises that in contexts with multiple caregivers, interventions which support positive and consistent caregiver involvement, including received sensitivity as described by Mesman and colleagues, could be an important support for the diverse and intergenerational caregiving experience of young children in South Africa. This is particularly true when considering the increased exposure to risk inherent in the South African environment.

In addition to the challenges associated with raising children with multiple caregivers, South African families are faced with a high risk of exposure to violence and illness which can accumulate to affect the healthy emotional development of children. For example, research conducted in low-income areas of South Africa indicates that 55% of children experience physical abuse, and 36% experience emotional abuse, identifying primary caregivers as the primary source (Meinck et al., 2017). Further, exposure to violence in the community has been found to be more predictive of adverse psychological functioning than in-home exposure to violence in a study conducted in the Western Cape (Sui et al., 2021). In a context where there are, on average, 51 daily murders, 142 reported instances of sexual assault and 452 reported instances of assault (South African Police Service, 2017), mitigating the effects these have on the development of children is important. Families and children in the South African context are at risk of multiple simultaneous exposures to violence, a pattern of exposure termed polyvictimisation, which occurs when individuals are exposed to multiple forms of violence, and tends to involve clustered and co-occurring instances of violence (Finkelhor et al., 2011). In the South African setting, this includes intimate partner violence, which is experienced by

up to 50% of women, compared to 30% worldwide (Roman & Frantz, 2013), sexual assault incidences ranging from 25-40% (Ajayi et al., 2021), bullying at school, experienced by 20-40% of learners in the country (Manuel et al., 2021) and others, inclusive of robbery and gang violence. Given that early intervention for healthy attachment has been proven to be a resource-light (Alto & Petrenko, 2017; Morris et al., 2017) approach to addressing threats to positive developmental outcomes in settings such as South Africa which yield sustained positive outcomes into adulthood (Sutton, 2018), parenting programmes are well placed to address the support gap experienced by those raising children in South Africa given the above risks.

2.7. What Does the ABC Have to Offer? The Role of Attachment in Early Intervention for ID

The Attachment and Biobehavioral Catch-up (ABC) intervention was designed for the caregivers of young children at risk of developing disorganised attachments. The aim of the intervention is to foster key attachment-promoting behaviours in the caregiver, namely: improved nurturance, sensitivity and delight in caregiving, in order to enhance attachment and regulation in children through the facilitation of caregiver sensitivity. The intervention draws on attachment theory and stress neurobiology to argue for the importance of sensitive and nurturing responses for the development of at-risk children (Dozier & Bernard, 2017). In the ABC intervention, caregivers are coached on how best to align with and respond to their child's needs and feelings, as well as how to avoid the frightening behaviours associated with developing disorganised attachments (Abrams et al., 2006). Findings from multiple randomised controlled trials confirm the efficacy of the ABC intervention in improving parental sensitivity, attachment security as well as emotional and biological regulation in at-risk children (Bernard et al., 2015; Dozier & Bernard, 2017). The manualised 10-session intervention is a parent-focused approach, and involves in-vivo coaching and video-feedback centred on parent-child interactions in the home setting.

Joining an increasing number of parenting interventions, the ABC uses a naturalistic approach to intervention by utilising existing social and physical resources as key aspects of an intervention. This includes modifying pre-existing caregiving behaviours or resources (such as other caregivers at home) as the key intervention variable, or supporting variables, in the course of the intervention. Doing so encourages a generalisation of skills learnt during the ABC intervention, and reduces the barriers to maintaining new behaviours. Importantly, the skills learnt by clients, for example, following the lead with delight, are embedded in cues or demands which would naturally arise, and a naturalistic approach avoids the skills transfer necessitated by training models which take place in controlled environments. Existing skills are therefore expanded, as caregivers are the primary targets of the intervention, and change is seen and monitored at a dyadic level, rather than occurring exclusively within only a parent or child client. This is consistently prioritised by ABC researchers as a key strategy to ensuring the effective generalisation of new parenting behaviours learnt in the course of the intervention (Bernard et al., 2015; Caron et al., 2016; Dozier & Bernard, 2017)

Intervenors, known in the ABC as ‘parent coaches’, focus on presenting manualised ABC training as well as coaching on how to improve the moment-to-moment sensitivity of a caregiver. They draw attention, in-vivo, to the behaviours that are aligned with, or contrary to, the aims of nurturance and sensitivity, linking these to the effects on the child as they occur in the moment, and offer alternative behaviours or responses, where appropriate (Caron et al., 2016). This in-vivo commentary and coaching allow for effective learning to take place by using positive reinforcement and scaffolding which draws attention to, and praises, effective parenting as it occurs in the course of a natural interaction. In addition to an increase in attachment-related competencies, this results in an increase in therapeutic alliance in the course of this support (Meade et al., 2014). Studies on in-vivo feedback reveal that these techniques

are consistent predictors of the increased frequency and maintenance of target parenting behaviours (Caron et al., 2016).

Video-feedback is used during the course of the ABC to augment in-vivo commentary and deepens the effect of naturalistic learning, allowing for a recording of the frequency and quality of sensitive caregiver behaviours which can be shown to the caregiver (Fukkink, 2008). This complements in-vivo feedback by allowing caregivers to recognise moments of successful, or failed, synchrony and nurturance. Video recording and feedback allow sufficient time to attend to particular caregiver utterances and behaviours, and to demonstrate why it is that they were or were not successful. This third person approach presents a more objective perspective on caregiver behaviour and its impact and allows coaches to compensate for missed in-vivo opportunities (Smith et al., 2013). The video structures and lends examples to feedback and has been shown to improve interactive abilities in clients (Fukkink, 2008; Meade et al., 2014; Smith et al., 2013).

As described in Section 2.3 above, attachment holds as a significant predictor for improved and positive outcomes in intellectually delayed populations. As in neurotypical populations, parental sensitivity is similarly central in supporting attachment in intellectually delayed samples (Feniger-Schaal et al., 2019; Feniger-Schaal & Joels, 2018), but arguably calls for greater support, given the potential barriers to healthy attachments seen in this population (Feniger-Schaal & Oppenheim, 2013; Hastings et al., 2006; Saloojee et al., 2007; Vandesande et al., 2019a). Given the historical focus on early childhood development and family environments (Bakermans-Kranenburg et al., 2003), attachment research is well positioned to find a foothold in supporting those with ID and their families. Examples of such support has already been researched. For example, Schuengel et al., (2010) developed an intervention, Integrative Therapy for Attachment and Behaviour (ITAB) for children with severe ID who display minimal discernible attachment behaviour. Through modelling Bowlby's (1984)

proposed stages of the development of an attachment relationship, ITAB was found to improve attachment related behaviours and reduced psychological arousal in children with severe ID (Schuengel et al., 2009b; Sterkenburg et al., 2008). Another attachment-based intervention, Video-feedback Intervention to Promote Positive Parenting and Sensitive Discipline, adapted for children with visual and visual-and-intellectual disabilities (VIPP-V), was shown to increase parenting self-efficacy among parents, which resulted in increased positive parent-child interactions (Platje et al., 2018). Finally, a modification of the Theraplay intervention designed by Ann Jernberg (1984) was implemented with a South African child with ID to assist with biting behaviour. The intervention had positive sustained effect on both the incidence of biting behaviours and the attachment relationship between the child and her parent (Mohamed & Mkabile, 2015). There is, therefore, some evidence for the utility of attachment-based interventions, in general, for children with ID. However, the ABC has yet to be implemented in this cohort, leaving a gap in the literature with regards to its effectiveness in this population despite its growing evidence-base in neurotypical child populations.

The ABC has been shown to have a significant positive effect on behavioural and stress regulation in children exposed to early childhood adversity compared to controls in a variety of randomised studies. Studies have shown a therapeutic effect of the ABC on diurnal cortisol production in children identified as being at risk for attachment difficulties (Bernard et al., 2015) as well as improvements in parent-rated behaviours and key attachment outcomes, including greater parental sensitivity and lower levels of intrusive parenting (Caron et al., 2016). The immediate positive effect of the intervention has been shown to translate to sustained change in various studies. For example, sustained parental sensitivity was shown to predict normative cortisol regulation in middle childhood following implementation of the ABC delivered to infants with prior contact with Child Protective Services (Garnett et al., 2020). Further, a randomised clinical trial found that the ABC was effective in promoting key

attachment outcomes in both parents and children, including reduced avoidance in both parent and child, and improved bids for care in the children included in the study (Dozier et al., 2009). Further, key elements of the ABC's methodology, namely in-vivo feedback and video-feedback, have strong evidence for their ability to support parenting interventions. In-vivo feedback, a key feature of the ABC intervention, has been shown to be a predictor and mechanism of change in multiple parenting interventions (Feniger-Schaal et al., 2019; Lachman et al., 2014), and video-feedback has been shown to facilitate an increase in the frequency of in-the-moment-comments, a key approach to facilitating the development of caregiver sensitivity (Damen et al., 2011; Meade et al., 2014). Given the scope of evidence in favour of the ABC described above, the intervention is well positioned for novel implementation with children with ID and DD, and their caregivers.

2.8. Conclusion

Attachment Theory is an empirically supported perspective for the consideration of risk factors in children's development, and has been identified as a potent mediator for psychological outcomes across the lifespan. Against this backdrop, the intersecting complexities faced by South African children with DD or ID and their caregivers place the development of healthy attachment, and therefore their social and psychological development, at risk. While there is limited research on attachment interventions in populations with ID and their caregivers, there is evidence that secure attachments hold similar benefits to both neurotypical and neurodiverse individuals and their caregivers. The Attachment and Biobehavioural Catch-up intervention has a wide history of evidence to support the hypothesis that it may be of use in low resource settings such as those seen in South Africa, and be particularly valuable to those parents raising children with DD and ID in our context.

Chapter 3: Methodology

3.1. Introduction

The goal of this study was to assess the degree to which the ABC, an established intervention, can improve maternal sensitivity, attachment security and stress regulation in a South African mother-child dyad in which the infant has developmental delays. This chapter provides an outline of the methodology used, including the research design and the population and sampling procedure, followed by a description of the dyad who participated in the study. Next, the data collection and analysis strategy is discussed. Finally, the chapter concludes with a discussion of the study's ethical considerations.

3.2. Study Design

Exploring the efficacy of the ABC intervention in dyads in which the child has developmental delays calls for reliable evidence of the intervention's ability to influence outcomes. Single-subject (n=1) research designs are well-suited to this need, particularly in specialised populations where it may not be possible to recruit large samples, such as infants and young children with difficulties on the spectrum developmental disabilities (Zhan & Ottenbacher, 2001a), as well as in settings such as South Africa without a co-ordinated system that provides care for this cohort, oftentimes making them difficult to locate, and access. Single-case designs, typically used in the social sciences, are a suite of experimental design methodologies well-documented to assess causality in social and behavioural research (Ledford et al., 2018; Lee Swanson & Sachse-Lee, 2000; Meade et al., 2014), and do so by positioning the subject, in this case the infant-caregiver dyad, as its own control. This study conducted a secondary analysis of existing single-subject data previously collected as part of a larger study conducted by North-West University and the Vrije Universiteit Amsterdam. Qualitative and quantitative data gathered during this larger study were used to assess and

explain change over time with regard to caregiver sensitivity, attachment security, and stress regulation in an infant-mother dyad in which the infant had significant developmental delays.

To this end, this study used a basic AB-design with follow-up, following a simplified single-subject approach, where A denotes the baseline phase and B denotes the intervention phase. In the original study, the infant-caregiver dyad was observed systematically for five weeks prior to the introduction of the independent variable (ABC Intervention) to establish a stable baseline against which to measure changes in the dependent variables of interest (caregiver sensitivity, attachment security and stress regulation). The ABC intervention was then introduced (B-phase) alongside continued weekly observations of the dependent variables. According to single-subject design, this introduction should be actively manipulated in order to make claims to causality, which took the form of the removal of the intervention following its completion after 10 sessions, which was followed by a further two-week period of follow-up observations of the dependent variables (Zhan & Ottenbacher, 2001a). The design of the study can therefore be denoted as follows:

AAAAABBBBBBBBBAA

Single-case designs are often called into question for their ability to provide valid evidence for a demonstrated effect. To manage this, mixed methods and triangulation are typically employed in order to address any issues that may have been controlled for in studies with larger data sets. As such, this study gathered multiple quantitative measurements of the outcome variables, of social validity and the working alliance. In addition, social validity was explored qualitatively through semi-structured interviews.

3.3. Population, Sample and Recruitment

The population of interest comprises infant-caregiver dyads in which the infant has significant developmental delays. The dataset for the specific infant-mother dyad included in this study was randomly drawn by the research supervisor from a larger study involving

multiple such dyads. This case was initially recruited for the larger study through purposive sampling, a non-random sampling technique in which participants are selected according to specific criteria that will allow for the answering of the research question (Vogt et al., 2012). Dyads were eligible for inclusion if: the primary caregiver of the infant was 18 years or older and lived with the infant; the infant had been diagnosed with developmental delays by a health professional; and the child had a developmental age of 6-36 months. Dyads were excluded if: the infant was diagnosed with a specific syndrome (such as, for example, Williams Syndrome, Fragile X Syndrome or Foetal Alcohol Spectrum Disorder) that may have interfered with the measurement of attachment security; the infant had severe-to-profound intellectual or developmental disabilities; the infant or caregiver was institutionalised or had chronic illnesses; or the infant had a developmental age of over 36 months.

In the original study, researchers contacted a Pretoria-based centre providing a range of allied health services to infants with identified developmental delays and requested that potential participants be approached for inclusion in the study. After the director of the centre approved the request, practitioners were briefed on the study and provided with an information leaflet to distribute to families who expressed interest in taking part. Practitioners obtained permission from the families to have their contact details shared with the researcher who subsequently made further contact with them, answered questions, and scheduled an appointment for screening. These families were then screened for each infant's developmental age using the Vineland Adaptive Behaviour Scales (Burger-Caplan et al., 2018). Dyads in which the infant was screened as being within the developmental range of 6 and 36 months old were then invited to participate in the study. This study conducted secondary analyses on the anonymised raw data collected from one of these infant-caregiver dyads, which had been randomly drawn from the complete set of cases recruited for the original study.

3.4. Case Description

At the time of the study, LM was a two-year-old girl living with her married biological parents and her seven-year-old brother in Tshwane. At the time of her birth, her parents had been married for seven years, after meeting originally at school and reuniting later at university. Both of LM's parents were 39 years old and have achieved a tertiary level of education. They are active members of their church community and are supported in their role as parents by a live-in nanny while they work full time.

LM's gestation and birth were marked by several factors to note. Prior to her birth, LM's mother had been placed on bedrest due to her own difficulties with ulcerative colitis, an inflammatory bowel disease which causes open ulcers to form in the patient's rectum and can spread to the colon. While there are medical interventions which can assist in managing the disease, there is no cure, and symptoms include abdominal cramping, anaemia, blood or pus when passing urine or stool, and diarrhoea. Further, LM was born prematurely, at six months gestation, due to foetal distress. She was delivered via caesarean section and weighed 630 grams, and was therefore considered to have a Very Low Birth Weight (VLBW; <1.5kg). She was hospitalised for six months following her birth and was incubated for 3 of these, requiring resuscitation six times during her stay. LM's mother had difficulties producing breastmilk and LM rejected formula. She also contracted several infections during her stay in hospital, hampering healthy development. She required oxygen therapy until she was approximately 14 months old due to poor lung development.

LM's mother was hospitalised for 3 days following her birth and she visited LM daily for the remainder of the infant's stay in hospital. Following LM's discharge, her mother stayed at home for 3 months in order to assist in caring for her. During this time, LM was diagnosed with cerebral palsy by a paediatrician, and her development has been described as "slow". At the time of the study, she was unable to walk, but could stand and move with support or by leaning on furniture, and was using some baby talk. LM and her family have received a wide

range of professional and informal support following her birth. After her diagnosis, LM was referred for specialised outpatient support in Pretoria, where she still receives care as an outpatient. Her family has also been supported significantly by neighbours, the church, and LM's paternal grandmother. Currently, she is in speech therapy in order to support her verbal development and she receives physiotherapy and occupational therapy. LM was also seen by a dietician due to her feeding difficulties. Her stay-home nanny was trained by a care worker to ensure correct medical management.

Despite extensive social and medical support, LM's mother reported feeling anxious and afraid in response to her daughter's diagnosis and she has struggled with public reactions to her daughter's appearance. She feels guilty and responsible for LM's problems, sometimes questioning whether she did indeed have a part to play in her daughter's difficulties, particularly when others ask, "What did you do?". While close family and friends are supportive and accepting, extended family and strangers have been less understanding, and she worries about what her daughter will experience in the future due to the ignorance of others about her condition.

3.5. Data Collection

In the main study, data was collected before and after the introduction of the independent variables, and was continued following its removal to track and assess change in the dependent variables over time. The baseline (A), intervention (B) and follow-up (A) phases occurred in the course of 5, 10 and 2 sessions, respectively, with the intervention phase occurring over a 15-week period. Following the naturalistic approach recommended by the ABC intervention, all assessments took place in the home of the dyad. A key feature of single-case experimental designs is the maintenance of constant conditions throughout the research process, ensuring that any change in the dyad can be attributed to the effects of the intervention. These assessments took the form of measurements during naturalistic observations of parent-infant

interactions (caregiver sensitivity and attachment security), saliva sampling taken by the mother (cortisol/stress regulation), completion of questionnaires (demographics, working alliance and social validation) and interviews (social validation and clinical information) as detailed below.

3.5.1. Measures

3.5.1.1. Screening/Developmental Age

Screening of cases was done using the Comprehensive Parent Interview Form of the Vineland Adaptive Behaviour Scales, 3rd edition (VABS-III); a tool developed to support the diagnosis of intellectual and developmental disabilities (Burger-Caplan et al., 2018). Items tap into three domains of adaptive functioning: communication, daily living skills and socialisation, and are scored on a three-point scale between "never performed" (0), "usually performed" (1) and "behaviour is habitually performed" (2). The VABS produces an overall Adaptive Behaviour Composite score as well as age-equivalent indicators which provide an estimation of the child's development age. The VABS is reported to have strong reliability, internal consistency and high construct validity across a variety of studies (de Bildt et al., 2005), with strong concordance between versions (Farmer et al., 2020).

3.5.1.2. Demographics

A brief questionnaire designed by the principal investigator was administered to the parent to gather demographic data including age, gender, race, educational level, employment status, marital/relationship status, income level, medications and other interventions. This information allows for the case to be described comprehensively for the purposes of clarity, transparency and replication.

3.5.1.3. Semi-Structured Interviews

Semi-structured interviews were used for two purposes in this study. First, a standard semi-structured clinical interview was conducted by the principal investigator in the original study, a trained clinical psychologist, to obtain a case history during the baseline phase (Craig, 2005). This is particularly important in single-subject research, where small or unique samples are often studied, and case-specific information can be used, firstly, to explain unusual or unexpected findings that may occur. Secondly, it serves to facilitate dissemination and implementation, as a detailed description of the nature of the case could assist clinicians or researchers in identifying similar clients/patients to whom the intervention may be best suited or with whom this case may be compared (McLeod, 2010).

Second, semi-structured interviews conducted during follow-up were used to explore the subjective evaluations of the intervention from the perspectives of the parent and parent coach. Conducted by an independent research assistant during the original study, this involved exploring the participants' experiences of having received and delivered the ABC, including their perceptions of the changes observed in parenting and child behaviours, the benefits of the intervention (or lack thereof), as well as experiences of the relationship between parent and parent coach. The interview conducted with the dyad included in the study was used to gather the parent and parent coach's subjective evaluations of the effects of the intervention on the relationship between the dyad.

3.5.1.4. Caregiver Sensitivity

Caregiver sensitivity was assessed over the course of the intervention using the Ainsworth Maternal Sensitivity Scales (AMSS; Ainsworth et al., 1991), which measures the caregiver's ability to perceive accurately and respond appropriately and timeously to their infant's cues. This is done on a 9-point scale spanning ratings which include "highly insensitive" (1-2), "insensitive" (3-4), "inconsistently sensitive" (5-6), "sensitive" (6-7) and "highly sensitive" (9). Video recordings of parent-infant free play (each with a duration of 10-15 minutes) were

conducted weekly in the home, across all phases, for the purposes of coding caregiver sensitivity by two independent trained and reliable coders who were blind to phase of study. Data for a total of 15 such observations for this case were included in the study.

Interrater reliability was established on the double-scoring of 100% of the AMSS observations, yielding an intraclass correlation coefficient of .63, indicating moderate interrater reliability (Koo & Li, 2016). The internal consistency of the AMSS has been found to be .81 while predictive validity of the measure using the Strange Situation Procedure (SSP) produced correlations ranging from .23 to .78 (Tryphonopoulos et al., 2016). Convergent validity has also been confirmed against the SSP and AQS (National Collaborating Centre for Mental Health, 2015), and a South African study has shown an intraclass correlation of .83 (Dawson et al., 2018). The latter study has also found that the AMSS is a more appropriate measure of sensitivity in the South African context compared, for example, to the Maternal Behaviour Q-Sort.

3.5.1.5. Attachment Security

Attachment security was assessed using the Attachment Q-Sort, version 3 (AQS). The AQS (Waters & Deane, 1985) is an observation-based procedure that is made up of 90 items scored by a trained rater based on the degree to which these items describe the child being observed, ranging from 'very much *un*like' (1) to 'very much like' (9). Each item consists of a description of specific behavioural characteristics of children up to five years of age. The aim of the AQS is to describe secure base behaviour in order to determine the child's level of attachment security (on a spectrum spanning secure and insecure attachment) as compared to a prototypically secure child. Final scores were calculated using a Pearson correlation coefficient to compare each of the 90 items scored by the rater to the same scores for a prototypically secure child, and therefore range from -1 (exactly *un*like a perfectly secure child) to +1 (exactly *like* a perfectly secure child).

In the original study, observations were conducted once weekly for 60 minutes across all phases. Each observation was video recorded for later scoring by two trained independent observers who were blind to phase of study. Data for a total of 15 such observations for the respective case was included in the study. Interrater reliability was established on the double-scoring of 41% of the AQS observations, yielding an intra-class correlation coefficient of .75, indicating moderate to good interrater reliability (Koo & Li, 2016). Further, a meta-analysis by van IJzendoorn and colleagues (2004) reports the AQS to have sufficient convergent validity (r = .31) compared to the Strange Situation Procedure (SSP; Ainsworth et al., 2014), and strong predictive (r = .39) and discriminant validity. A more recent study reports similar results, reporting a strong convergent validity (r = .39) with the SSP, and good predictive validity for sensitivity (r = .32; Cadman et al., 2018).

3.5.1.6. Stress Regulation

According to Gunnar and Donzella (2002), caregivers play an important role in regulating the activity of the limbic hypothalamic-pituitary-adrenocortical (L-HPA) system during infancy and childhood. While the construct of stress regulation can be qualitatively measured, cortisol is commonly used as a proxy due to its established relationship with evaluations of threat, where increases in levels of cortisol secretion correlate directly to evaluations of social threat (Smyth et al., 2013). This is in keeping with the theoretical assertions and empirical support for attachment theory, showing that a key outcome of secure caregiver-child attachment is the development of effective stress regulation in children (Gunnar et al., 1996; Schuengel, Oosterman, et al., 2009a). As such, stress regulation in this study was monitored over time through the sampling of diurnal salivary cortisol levels in the child included in this study. This approach has been used previously in attachment research as an indicator of stress regulation in children with ID (Sterkenburg et al., 2008), and in a study of the effects of the ABC intervention (Dozier, Manni, et al., 2006).

In the original study, the caregiver was trained according to established protocol to collect saliva samples from the infant three times daily—morning, afternoon and evening (Gunnar & White, 2001)—for one day per week throughout all phases of the study. Data from a total of 49 saliva samples that were collected for the selected case have been included in this study. Saliva was collected using *SalivaBio* Children's Swabs obtained from *Salimetrics*. The caregiver was instructed to place the swab into the infant's mouth for 60-90 seconds and encourage them to mouth it until it was wet with saliva (Kirschbaum & Hellhammer, 1994). The caregiver was instructed to place the wet swab into a storage tube (obtained from *Salimetrics*) that was prelabelled with an anonymous alphanumeric code unique to the dyad and to store this in their home freezer until the samples were collected by the principal investigator on a weekly to fortnightly basis. The samples were subsequently transferred to a private andrology laboratory where they were stored until they were analysed using the Liquid Chromatography-tandem Mass Spectrometry (LC-MS) method, which has been shown to be comparable to the Immunoassay method in a study measuring cortisol concentration in children (Bae et al., 2016).

The data from the three measurements were then transformed to provide an indication of the change in cortisol using two Area Under the Curve formulae used to indicate the amount of (production) and change in (variation) cortisol produced within each weekly 12-hour measurement window. AUC-G (area under the curve with respect to ground [0]) indicates the magnitude of cortisol produced over a 12-hour period, and AUC-I (area under the curve with respect to increase) represents the change in cortisol across the 12-hour period, beginning with the first measurement in the morning. Negative values for AUC-I would therefore represent a decrease from the morning assessment and be considered a more normative diurnal pattern.

3.5.1.7. Social Validation

Subjective data used in parallel with statistical outcome data allows researchers to assess the degree to which an intervention is relevant and valuable to the participants (i.e. its social validity) and crucially informs arguments for the sustainability of the behavioural changes an intervention seeks to foster (Leko, 2014). This is particularly pertinent because interventions appraised as impractical or misaligned with the subjective goals of the participants are less likely to be sustained after the intervention, regardless of the statistically determined size of the intervention effect (Leko, 2014; Lloyd & Heubusch, 1996). Social validity was assessed using an adapted version of the Social Validity Scale (Seys, 1987) administered after the intervention phase. Social validation is concerned with the degree to which a given intervention is perceived as useful by those to whom it is administered. The SVS is a self-report questionnaire describing the desirability, applicability, clarity and efficiency of the intervention for the caregiver. The adapted version of the SVS consisted of 21 items scored on a 5-point scale. The original SVS has been used in other studies for this purpose (Platje et al., 2018), including a single-subject study by Damen et al. (2011), who computed internal consistency estimates ranging between .76 and .88.

3.5.1.8. Working Alliance

The intervention process was assessed by administration of the Working Alliance Inventory, Short Form Revised (WAI-SR; Hatcher & Gillaspy, 2006), a self-report measure that was administered to the caregiver after each session during the intervention phase of the study as a general measure of therapeutic relationship. It consists of 12 items measuring general alliance, as well as three specific aspects of the alliance—bond, goals and tasks—which are scored on a five-point scale ranging from ‘rarely/never’ (1) to ‘always’ (5). ‘Bond’ refers to the perceived rapport between the participant and coach, ‘goal’ refers to the perceived consensus regarding and commitment to the aims of the intervention, and ‘task’ refers to the perceived value of the behaviours espoused by the intervention (Munder et al., 2009). The

WAI-SR has been used in a similar, larger-scale effectiveness study of an attachment-based intervention for parents of children with visual and intellectual disability (Platje et al., 2018). The WAI-SR is reported to have demonstrated excellent reliability (domain-specific Cronbach alphas: .81-.90; total score Cronbach alpha: 0.91; test-retest: .93) and construct validity (Paap & Dijkstra, 2017).

3.5.1.9. Treatment Integrity/Fidelity

Treatment integrity, the extent to which the treatment is implemented as intended, and with accuracy and consistency (Gresham, 1996), is key in single-subject research as it contributes towards the demonstration of a functional relationship between the manipulation of the independent variable and changes in the dependent variables under scrutiny. The ABC intervention is a fully manualised intervention, which contributes to the treatment integrity as implementation is standardised according to the manual. Furthermore, each treatment session was video recorded for the purposes of weekly clinical supervision conducted by the developers of the ABC intervention, which further served to augment the integrity of the treatment.

3.6. Data Analysis

The aim of this study was to assess the effects of the ABC intervention on attachment security, caregiver sensitivity and child stress regulation in an infant-caregiver dyad in which the child had significant developmental delays. In the tradition of single-case studies, visual analysis was foregrounded and supplemented by statistical as well as qualitative analyses. Visual analysis guidelines prescribed by Lane and Gast (2014) were followed, and are outlined first, followed by a description of three measurements of correlation calculated using peer reviewed online calculators to generate single-case-specific measurements of effect (Parker et al., 2011; Tarlow, 2017). Further calculations were conducted using Microsoft Excel and online calculators designed for this purpose by single-case researchers. The outcome data was complemented by data on the social validity of the intervention, which was graphically

displayed and described. Finally, qualitative data gathered during interviewing was briefly described using a basic thematic approach. This approach approximates best practice recommendations for single-case research by providing a comprehensive, replicable assessment of the intervention to ensure rigour (Gresham, 1996; Lobo et al., 2017).

3.6.1. Quantitative Analyses of Outcome Variables

3.6.1.1. Visual Analysis

Guidelines outlined by Lane and Gast (2014) were followed for the visual inspection of this study's data. Line graphs, the most common format for presenting data in single-case experimental designs, were created for each dependent variable using Microsoft Excel wherein each data point represented a measurement of the outcome variables during either the baseline, intervention or follow up conditions, allowing for a detailed representation of the effects of the intervention over time. Each line graph was then visually analysed in terms of the trend, level and stability of the data for each variable both within and between each phase of the study. Each level of analysis of the visual data is briefly described below before being outlined in more detail as they are applied for each of the within-condition and between-condition analyses.

a. Trend

Trend indicates the direction of change in the data over time. Within-conditions/phases, trend is commonly described as either accelerating (upward trend), decelerating (downward trend) or zero-celerating (plateaued trend), and can be further categorised as either therapeutic or contra-therapeutic, depending on the implication of the trend for the hypotheses. An upward (accelerating) intervention phase trend was considered therapeutic in the cases of sensitivity and attachment, whereas a downward (decelerating) trend was considered therapeutic for stress regulation when proxied by cortisol secretion, as it indicated a reduction in cortisol production

throughout the day, consistent with a normative diurnal rhythm. Between-condition analysis of trend involves indicating how the trend has shifted from one phase to the next

b. Level

Level, represented by the median of the data, was used to describe the overall magnitude of performance on each dependent variable within each phase, and its variation between phases. In both within- and between-condition analysis, the median was used as the primary index of magnitude because it is less likely than other measures to be impacted by outliers, particularly in smaller sample sizes such as in the present study (Lane & Gast, 2014; Maggin & Odom, 2014).

c. Stability

Stability indicates the degree to which the data varies under a given condition. This aims to assess whether the data gathered under a given condition, or between conditions, can be taken as representative of the effects of the absence, introduction or removal of the ABC intervention. Within-condition analysis of stability was used to assess the representativeness of the data under each condition (baseline, intervention and follow up), and during the between-condition analysis the stability was used to explore the immediacy of effect resulting from changes in condition.

3.6.1.1.1. Within-condition Analysis

a. Trend

The trend within each condition was calculated using the split middle technique, which uses the difference between the median of the first and last half of the data within each condition to determine whether the performance of each variable under the respective condition under analysis was accelerating, decelerating or zero-celerating.

In each case, particular attention was paid to the assessment of trend during the baseline condition for each variable's data set. Attending to a baseline trend through both visual and

statistical analysis is crucial in ensuring the validity of the analysis because a baseline trend impedes the ability to predict the value of the next data point should there be no intervention, and leads to questions about the relationship between the observed change and the intervention itself. However, unnecessary correction of baseline data where a trend is not present, or is negligible, can have a similarly deleterious impact on the accuracy of the data. Within-condition assessment of the baseline phase therefore focused on the degree to which the represented data can be considered a reliable baseline against which to compare the effects of the intervention. Following visual analysis, the identification of a baseline trend was confirmed by statistical analysis of the significance of the trend in each case.

b. Level

Within-condition analysis of the level of each variable included the calculation of the difference between the median of the first and last half of the data within each condition (relative level change) as well as the difference between the first and last data points within each condition (absolute level change). These were used to quantify the performance of each variable before, during and after the introduction of the ABC intervention and classify performance under each condition as either improving or deteriorating.

c. Stability

Within-condition assessment of stability is used to indicate whether the data is sufficiently representative of the outcomes of that condition, answering the question; 'how do the dependent variables perform under this condition?'. The assumption in assessing the stability of the data is that a given condition should foster a trend that is consistent and unencumbered by the effects of normal variation in data or outliers, and the plotted data should be sufficient to indicate this. Stability was assessed using the stability envelope described by Lane and Gast (2014), in which sufficient stability for a given phase is indicated when 80% of the data falls within 25% of the median value within a condition. To do so, the proportion of data which fell

within the range of 25% above and below the median of each data set was calculated as a percentage. This is most important in the baseline phase, where sufficient data would ideally have been collected to indicate a stable basis for comparison to indicate an intervention effect upon introduction of the independent variable.

3.6.1.1.2. Between-condition Analysis

a. Trend

Between-condition assessment of trend was conducted by noting the visually evident change in trend direction, if any, in the intervention phase compared to the baseline condition. In Chapter 4, the results of these analyses have been tabulated and included below the respective line chart for each dependent variable and used to describe the effects of the intervention on the mother-infant dyad.

b. Level

Next, between-condition assessment of level was used to identify the extent of the change in the overall performance of the dependent variables between phases once the ABC intervention was introduced, and then again when it was removed. In the context of single-case experimental designs, a clear and immediate change in level is taken to indicate a functional relationship between the independent and dependent variables, and is described as improving (producing the hypothesised effect) or deteriorating (not producing the hypothesised effect).

Following guidelines outlined by Lane and Gast (2014), relative level change was calculated to indicate between-condition changes in performance by subtracting the median of the second half of the baseline phase from the median of the first half of the intervention phase, and then subtracting the median of the first half of the follow-up phase from the second half of the intervention phase. Next, absolute level change was calculated using the last and first data points between conditions; the last data point from the baseline phase was subtracted from the first data point in the intervention phase, and the first data point in the follow-up phase was

subtracted from the last data point in the intervention phase. In both cases, level change from baseline to intervention should ideally be higher than the level change from intervention to follow up to indicate a demonstration of effect. Additionally, the difference between the median for each phase of the study was calculated to describe overall change in the performance of each variable during a given condition. The between-condition analysis of level concluded by assessing the percentage of non-overlapping data (PND) and the percentage of overlapping data (POD) for each variable.

PND and POD constitute some of the original supplemental measures in single case visual analysis (Scruggs et al., 1987) and provide a useful and easily understood value to estimate the efficacy of an intervention. They do so by indicating the proportion of dependent variable data which is either above or below the data in the baseline phase. Scruggs and Mastropieri (1998) have suggested the following ranges for the interpretation of non-overlapping data scores: 0-50% (ineffective), 50-70% (questionable), 70-90% (effective) and 90% or above (very effective). Whether this percentage should be above or below the baseline phase depends on the hypothesis for the given variable. In this study, any sensitivity and attachment security data which fell above the baseline phase was considered therapeutic and indicative of a positive intervention effect, whereas any cortisol data which fell below the baseline phase was considered therapeutic and indicative of a positive intervention effect. While PND and POD have been critiqued for being vulnerable to outliers, particularly in smaller data sets such as the data included in the present study (Lenz, 2013), they were included as a point of reference and feature of the sensitivity analysis described below.

c. Stability

Stability between phases is described in terms of the degree of variability in the data from one phase to another, and includes a description of the change in range and direction of the data

to describe whether there was a significant variation in the stability of the data between phases, or not.

3.6.1.2. Statistical Analysis

Once the nature and extent of the relationship between the dependent and independent variables was established through visual analysis, statistical analyses were conducted to quantify the size of the effect of the intervention on the outcome variables in the study. Parker and Hagan-Burke (2007) argue that effect sizes provide an objective measure of intervention strength to complement the visually represented data, allow for improved analysis of effect when these are not large or obvious and are a method of comparing outcomes across studies. However, statistical analytic standards are still being developed for single-case designs due to challenges regarding the production of an acceptable measure of effect. To address this, it has been recommended that multiple effect size estimators are utilised, thus conducting a sensitivity analysis (Lobo et al., 2017).

Several factors needed to be considered in deciding which statistics would be appropriate to include in this sensitivity analysis. First, the non-normal distribution of the data was noted. Second, the relatively few measurements included in the dataset were accounted for, particularly with regards to their effects on stability. Third, where the visual analysis indicated a baseline trend, this was accounted for in order to use data confidently during the baseline phase as an experimental control. Finally, statistics which map onto the visual analysis, which is the central focus of the data analytic approach, informed the selection of the following measures.

Indication of an acceptable intervention effect across all three of the below estimators was taken to show sufficiently firm evidence of the impact of the ABC on the chosen outcome variables: maternal sensitivity, attachment security, and stress regulation (diurnal cortisol production). The estimators included in this sensitivity analysis were as follows:

3.6.1.2.1. Tau-U Analysis

First, a family of non-parametric approaches based on Kendall's Tau was chosen as the primary statistical adjunct to the visual data to indicate the strength of the effect of the intervention on the outcome variables. The Tau-U analysis has been used successfully in a number of single-case design studies (e.g. Brossart et al., 2018; Campbell, 2004; Parker et al., 2011) and is appropriate for several reasons. The Tau-U generates information on the impact of the intervention on the respective outcome variables at the level of both within and between conditions and therefore aligns well with the structure of visual analysis (Lane & Gast, 2014). Further, the 'Tau-U' statistic is a rank order correlation statistic with the advantage that it accommodates cases in which there is a baseline trend, and corrects this where necessary (Parker et al., 2011). Additionally, the Tau-U statistic is non-parametric, and appropriate for smaller data sets such as those in single-case designs and the current dataset, addressing two of the key limiting factors of the sample in this study. Further, Tau-U has been developed to map onto the visual analytic approach by providing feedback on both within and between phase trends.

Taking into account the advantages of the family of Tau statistics increasingly used in single-case research, as well as the critiques raised against these, this analysis used the Baseline Corrected Tau proposed by Tarlow (2017) to assess for a statistically significant baseline trend for each of the dependent variables before calculating Tau. A published power table designed by Tarlow (2017) was additionally used to estimate the statistical power of the baseline dataset for each variable to confirm the representativeness of the data in each phase, and the online calculator designed for this purpose was used to test for the significance of a baseline trend. Tarlow (2017) recommends that at least 5 baseline measurements be taken, and that stability be indicated by a low overall trend (Tau lower than 0.4), rather than by number of measurements alone.

Tau has been described as a family of statistics because the method is often systematically applied in single-case research to include correlation statistics at several levels of interpretation. The following procedure was used in the analysis of this data:

1. While it is important to be critical of any trend in the baseline phase, and therefore correct for it, it is equally important not to overcorrect or correct without cause. Brossart et al. (2018) have demonstrated that the use of baseline controlling measures where there is no trend can bias Tau estimates. As a result, two approaches were used to investigate baseline trend. First, all baseline data were tested both visually and statistically for a significant baseline trend, where Tau-U>0.4 was considered to indicate a significant baseline trend. Second, significance testing for baseline trend was supported by a power analysis, conducted for each baseline trend by referencing the power table proposed by Tarlow (2017) which allows the user to determine the statistical power of an adjusted baseline trend depending on the degree of trend and number of measurement occasions. This is important since smaller baseline data sets, such as the data included in this research ($n_{baseline}$= 5), can impact the ability to control for trend.
2. Once it was confirmed that no significant baseline trend was present, Tau was determined using an open-source online calculator designed by Tarlow (2017; https://ktarlow.com/stats/tau/).
3. Then, within and between-phase Tau values were calculated to determine:
    a. Within-phase baseline trend, in order that it should be corrected where necessary
    b. Within-phase intervention trend
    c. Between-phase correlation between baseline and intervention

4. Finally, Tau for the overall study was calculated to provide a combined effect size indicating the strength of the effect of the ABC intervention on the selected outcome variables. Given that the hypothesised effects on sensitivity and attachment security on the one hand, and stress regulation on the other, are inverse, two overall effect sizes were calculated. The first combined the Tau calculations for the effects of the intervention on sensitivity and attachment security, both of which are hypothesised to produce an accelerating trend. The second combined the effect sizes on stress regulation, which was hypothesised to produce a decelerating trend.

Interpretation of effect sizes must be approached with caution, given that different statistics provide differing ranges for significance. Wattanawongwan et al. (2022) recommend, specifically for the Tau-U effect statistic, the following interpretation guidelines: .88 as 'strong'; .64 to .87 as 'moderate'; .21 to .63 as 'small'.

3.6.1.2.2. Standardised Mean Difference

a. Cohen's d

Cohen's *d* is a comparison of means which yields a measurement of the variation between two groups of data by using the standard deviation from the mean. By calculating the difference between the means of the data in the baseline and intervention phases and dividing by the standard deviation, the effect size gives an indication of intervention effect by controlling for variation, or noise, in the dataset. Effect sizes outlined by Cohen (1988) suggest that .2 can be considered a 'small' effect size, .5 be considered 'medium' and .8 or above be considered 'large'. However these are recommended for use only in very novel cases, where no existing literature can be used as a basis for comparison (Fidler, 2002; Parker & Hagan-Burke, 2007). Cohen's *d* was calculated for all outcome variables between each phase of the study using Microsoft Excel and tabulated alongside Hedges' g, described below.

b. Hedges' g

Hedges' *g* holds an advantage over Cohen's *d* in small samples, as well as in cases where the datasets being compared are not the same size. The calculation for Hedges' *g* is the same as Cohen's *d*, adjusted only by pooling the weighted standard deviation of the baseline and intervention phases respectively. The statistic uses the same interpretation thresholds as Cohen's *d*, and was similarly compared to existing literature which notes either Cohen's *d* or Hedges' *g* based on the recommendation of Fidler (2002).

3.6.1.2.3. Exploratory Analyses: Spearman's Rank Correlations

Additional exploratory analysis was conducted through correlation analysis to elucidate the associations between maternal sensitivity, attachment security and stress regulation. This was done using Spearman's Rank Correlation (Spearman's Rho). In this respect, nonparametric correlation analysis between variables was employed to describe the relationship between variables over the course of the study. As such, Spearman's Rho was used for the analysis of how the outcome variables are associated with each other in order to indicate the strength and direction of the relationship between these variables. This was done by manually pairing the measurements of each variable which were conducted on the same day, and excluding any unpaired measurements, before conducting a correlation calculation. Spearman's Rho has been proven to be a robust and reliable approach to understanding correlation in datasets which are non-normally distributed (Bishara & Hittner, 2016).

3.6.2. Quantitative Analyses of Working Alliance and Social Validity

3.6.2.1. Working Alliance

Working alliance was reported on at three levels in this study. First, raw scores were described over time to give an indication of the progression of working alliance throughout the study. Second, mean scores for each domain indicated the overall subjective evaluation of each domain of working alliance, namely goal, task and bond. Third, a total score for working alliance was calculated and described. Raw scores for each domain of the WAI were calculated,

out of 20, and summed to yield a total score out of 60 for each intervention session. Presentation of these results aimed to give an indication of the progression of working alliance throughout the study, as well as highlight any variation which may have occurred. With this in mind, raw scores, mean scores, as well as the standard deviation and range, for each domain as well as the overall measure, were calculated and tabulated in Chapter 4.

3.6.2.2. Social Validity Scale

The results of the SVS were first tabulated and graphically represented—as a bar chart—before being considered qualitatively in terms of the Likert-type descriptors associated with each numerical value on the scale. Each bar on the chart, on the y-axis, is representative of an item on the SVS, and the x-axis represents the response to each item provided by the parent.

3.6.3. Qualitative Analysis

3.6.3.1. Semi-Structured interview

Qualitative data was gathered during post-intervention interviews with the intervenor and the mother involved in the study. The results of these interviews were briefly summarised by highlighting key themes for each of the role players included in the study and comparing perspectives, where possible. First, the overall appraisal of the intervention was described for each role player, following which key positive and negative appraisals of the intervention were summarised. The analysis of the interviews was based broadly on the process of thematic analysis (Braun & Clarke, 2006) , wherein each interview was coded, and key themes were identified to highlight the respondents' experiences of the intervention. Although a full thematic analysis was not possible due to the scope of this study, and the number of interviews conducted, the following basic guidelines were drawn from the work of Braun and Clarke (2006). First, a realist method was followed to report on the experiences of the intervenor and parent included in the study, as the interviews were not intended to be linked to any broader discourse, but rather to inform an understanding of the efficacy of the intervention from the

perspectives of the intervenor and parent. With this in mind, a theoretical (as opposed to inductive) approach which focuses on the themes relevant to the aims of the study was used to guide the coding and generation of themes from the interviews, aiming to code patterned clusters of data which related only to the research question (Braun & Clarke, 2006). Therefore, Braun and Clarke's steps 2 (Generation of initial codes), 3 (Searching for themes), 4 (Reviewing themes) and 5 (Defining themes) were all informed by the degree to which interview content described changes in the infant-mother relationship which were attributed to the intervention. Step 6 (Writing up themes) therefore summarised the interviews into a main theme for each of the intervenor and parent: Infant Mother Relationship, which included sub-themes for changes noted in the mother and changes noted in the child.

3.7. Ethical Considerations

The present study conducted a secondary analysis of existing data. Permission to use the data was obtained from its custodian while seeking ethical approval for this study (Appendix A). The original study was granted ethical clearance by North-West University. Informed consent for participating in the original study included consent for the data to be used in future research. Hence, the original participants consented to their anonymised data being re-used as it has been in this study. Although the main study made use of video-recorded infant-caregiver observations, the researcher in the present study did not have access to any video-recorded material and was only provided with anonymised numerical data entered into a spreadsheet, as well as interview transcripts, which had already been fully anonymised by the principal investigator of the original study. Beyond basic demographic information, the researcher did not have access to any identifying information and was afforded only the information required to conduct comprehensive analyses. The identity of the dyad in the case was therefore protected. All data is and will be stored electronically in secure password-protected folders on the researcher's personal, fingerprint-protected computer and backed up on an external storage

device to which only the researcher and supervisor (as principal investigator in the main study) have access. Furthermore, data will be archived in the Department of Psychology at the University of Pretoria for a period of 10 years.

Chapter 4: Results

4.1 Introduction

This chapter will present the results of the study. Several variables were visually and quantitatively evaluated as indicators of the major outcomes of this study, including measures of maternal sensitivity, attachment security and stress regulation. Thereafter, results regarding the process, specifically the working alliance and the social validity of the study, will be described. Lastly, the chapter will outline the themes developed from the qualitative interviews conducted with the parent and parent coach. The results discussed in this chapter relate to the study's research aim of evaluating the effects of the ABC intervention on maternal sensitivity, attachment security, and child stress regulation in a South African parent-infant dyad in which the infant has significant developmental delays.

4.2. Quantitative Results

The outcomes of the visual and statistical analysis are included in this subsection. First, visual analysis of each variable includes a plotted line graph of its respective measurements taken during baseline, intervention and follow-up, and is supplemented by within-condition and between-condition analyses. Second, statistical analyses use measurements of standardised mean difference, rank correlation and Tau-U, a measurement uniquely designed for use in single-case research, to provide a triangulated evaluation of the effect of the intervention on the outcome variables.

4.2.1. Visual Inspection

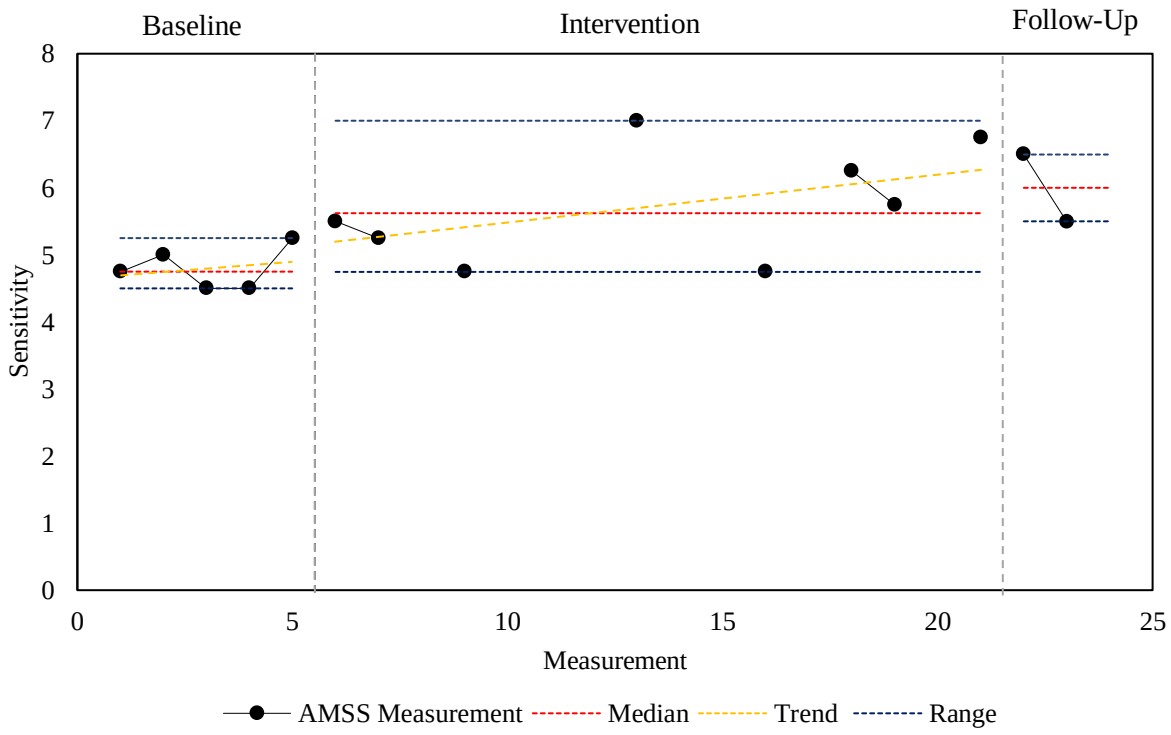
4.2.1.1. Maternal Sensitivity

Visual analysis of Figure 1 indicates a change in the positive (therapeutic) direction for maternal sensitivity which can be attributed to the introduction of the ABC intervention. The figure shows an increase in the median and an increased acceleration in positive trend from baseline to intervention. This positive effect appears to be sustained in the follow-up condition,

demonstrated by a sustained increase in the median. Details are further outlined in the within- and between-condition analyses presented in Tables 1 and 2.

Figure 1

Maternal Sensitivity Measurements over Time with Plotted Median, Trend and Range



Note. Black dots connected with a black line indicate data collected at consecutive measurement points. Black dots which are not connected with a black line, indicate missing data before/after respective measurement points.

Table 1 presents the results of the within-condition analysis. Evaluation of each condition indicated that 100% of the data fell within 25% of the median and was therefore considered a stable representation of the performance of measurements of maternal sensitivity under each condition. The median for maternal sensitivity fell within the 'insensitive' to 'inconsistently sensitive' range during the baseline phase, and approached 'sensitive' during both the intervention and follow-up phases. Evaluation of changes in the level of maternal sensitivity within each condition indicated no change during baseline when assessed using relative level

change, but an improvement when using absolute level change, and an improvement in maternal sensitivity during the intervention was seen in both relative and absolute level change. Trend lines generated using the split middle technique indicated a positive, therapeutic trend towards improved maternal sensitivity during the intervention condition.

Table 1

Within-condition Analysis: Maternal Sensitivity

	Baseline	*Intervention*	*Follow Up*
Median	4.75	5.63	6
Max Stability Range	5.94	7.03	7.50
Min Stability Range	3.56	4.22	4.50
Percent within Stability Envelope	100% **Stable**	100% **Stable**	100% **Stable**
Relative Level Change	0.00 **No change**	0.63 **Improving**	-1.00 **Deteriorating**
Absolute Level Change	0.50 **Improving**	1.25 **Improving**	-1.00 **Deteriorating**
Trend	**Accelerating**	**Accelerating**	**Decelerating**

Only one variable (i.e. the ABC intervention) was introduced after the baseline period. Both relative and absolute level change calculations indicated a positive (improving), therapeutic change in maternal sensitivity immediately following the introduction of the intervention. Improvements in between-condition absolute level change, outlined in Table 2, indicate that the introduction and removal of the ABC intervention had a direct impact on sensitivity, and evaluation of between-condition relative level change shows a sustained improvement in performance in sensitivity from baseline to follow-up. Median level change confirms a therapeutic increase in the performance of sensitivity during the intervention, which was sustained in follow-up. An accelerating, therapeutic trend in the positive direction was seen in both baseline and intervention conditions. Between the baseline and intervention conditions, a

baseline accelerating trend gave way to a sharper, therapeutic increase in trend following the introduction of the ABC intervention, indicating an increase in maternal sensitivity following the introduction of the ABC. Finally, evaluation of overlapping data between baseline and intervention, outlined in Table 3, indicate that only 37.5% of the sensitivity data fell above the baseline data during the intervention, indicating an 'ineffective' intervention effect on sensitivity (Scruggs & Mastropieri, 1998).

Table 2

Between-condition Analysis: Maternal Sensitivity

Relative Level Change	Baseline-Intervention	0.50	**Improving**
	Intervention-Follow-Up	0.50	**Improving**
Absolute Level Change	Baseline-Intervention	0.25	**Improving**
	Intervention-Follow-Up	-0.25	**Deteriorating**
Median Level Change	Baseline-Intervention	0.88	**Improving**
	Intervention-Follow-Up	0.38	**Improving**

Table 3

Percentage of Overlapping Data: Maternal Sensitivity

Percentage of Non-Overlapping Data (PND)	Percentage of Overlapping data (POD)
37.5%	62.5%

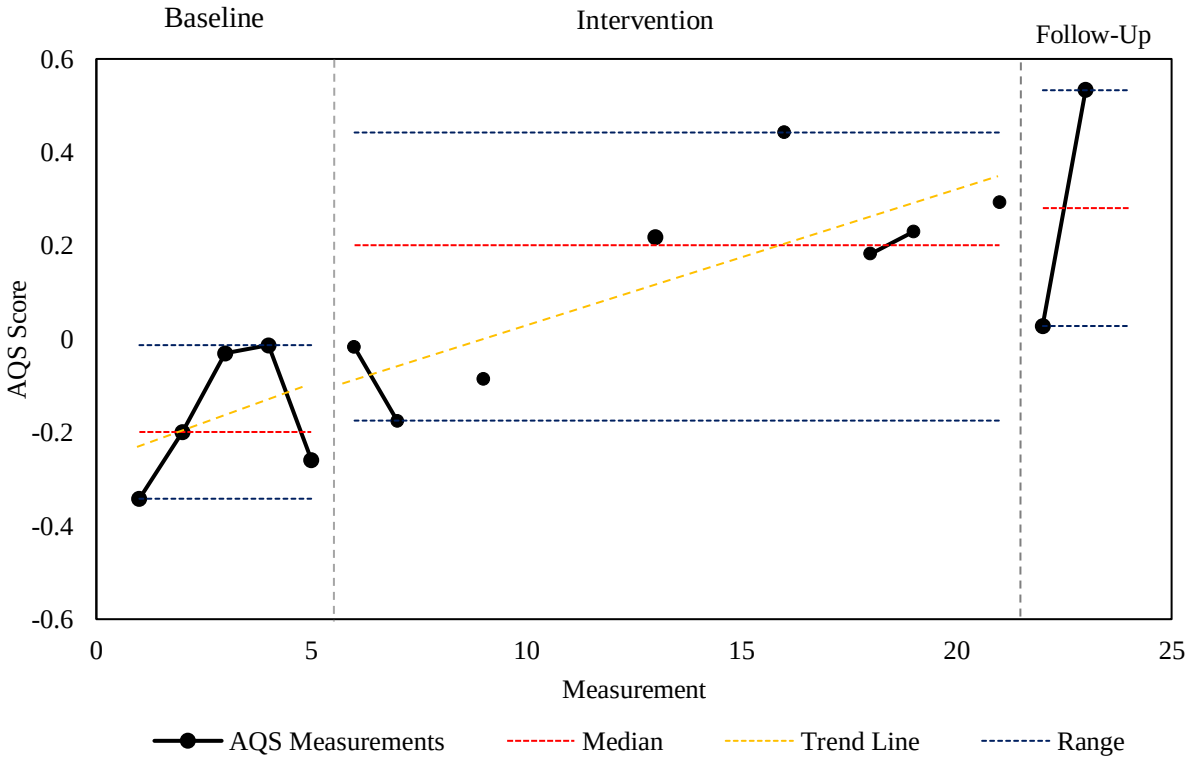
4.2.1.2. Attachment Security

Visual analysis of Figure 2 indicates a positive (therapeutic) improvement in the behavioural markers of attachment security measured by the AQS-3 which can be attributed to the introduction of the ABC intervention. This is indicated primarily by an increase in the median of measurements of attachment security following the introduction of the intervention. This is complemented by an accelerating positive trend during the intervention phase, the effect of which appears to be sustained during follow-up, indicated by an increase in the median in

this condition. Further details are outlined in the within- and between-condition analyses (Tables 4 and 5).

Figure 2

Attachment Security Measurements over Time with Plotted Median, Trend and Range



Note. Black dots connected with a black line indicate data collected at consecutive measurement points. Black dots which are not connected with a black line, indicate missing data before/after respective measurement points.

Evaluation of the proportion of this data falling within the stability envelope, outlined in Table 4, in each condition indicated that data were variable (> 80% of the data fell within 25% of the median) during both baseline and intervention. An analysis of relative and absolute level change indicated improving performance in the therapeutic direction (increasing secure base behaviour) in both the baseline and intervention conditions, with a noticeably sharper increase during the intervention condition. A split middle estimation of trend also shows accelerating therapeutic trend during both baseline and intervention, which appear to be accelerating at a similar rate (Figure 2), with little change between conditions.

Table 4

Within-condition Analysis: Attachment Security

	Baseline	*Intervention*	*Follow Up*
Median	-0.17	0.14	0.28
Max Stability Range	-0.15	0.25	0.35
Min Stability Range	-0.25	0.15	0.21
Percent within Stability Envelope	20%	13%	0%
	Variable	**Variable**	**Variable**
Relative Level Change	0.13	0.31	0.50
	Improving	**Improving**	**Improving**
Absolute Level Change	0.08	0.31	0.51
	Improving	**Improving**	**Improving**
Trend	**Accelerating**	**Accelerating**	**Accelerating**

Only one variable (i.e. the ABC intervention) was introduced after the baseline period. All level change measurements indicated positive improvement in attachment behaviours on the part of the infant from baseline to intervention. Consistency in improvement in both absolute and relative level changes confirm both proportional and immediate improvement in attachment security following the introduction of the ABC intervention. This is confirmed by consistent improvement in the median between baseline and intervention. During both baseline and intervention conditions, trend is accelerating in the therapeutic direction, with little change in trend following the introduction of the ABC intervention. Finally, evaluation of overlapping data between baseline and intervention indicate that 37.5% of the sensitivity data falls above the baseline data during the intervention, indicating an 'ineffective' intervention effect on attachment security (Scruggs & Mastropieri, 1998).

Table 5

Between-condition Analysis: Attachment Security

Relative Level Change	Baseline-Intervention	0.08	**Improving**
	Intervention-Follow-Up	-0.23	**Deteriorating**
Absolute Level Change	Baseline-Intervention	0.24	**Improving**
	Intervention-Follow-Up	-0.27	**Deteriorating**
Median Level Change	Baseline-Intervention	0.40	**Improving**
	Intervention-Follow-Up	0.08	**Improving**

Table 6

Percentage of Overlapping Data: Attachment Security

Percentage of Non-Overlapping Data (PND)	Percentage of Overlapping data (POD)
37.5%	62.5%

The above data broadly indicates that the ABC intervention caused an increase in secure base behaviour as measured by the AQS-3. Although the measure is dimensional, Solomon and George (2016) recommend 0.3 as a 'cut-off' for attachment security (versus attachment insecurity). With this in mind, measurement of the attachment behaviours for this infant indicate a movement from 'insecure' attachment at baseline (*mdn* = -0.17) to the cusp of what Solomon and George (2016) have suggested as 'secure' during follow-up (*mdn* = 0.28).

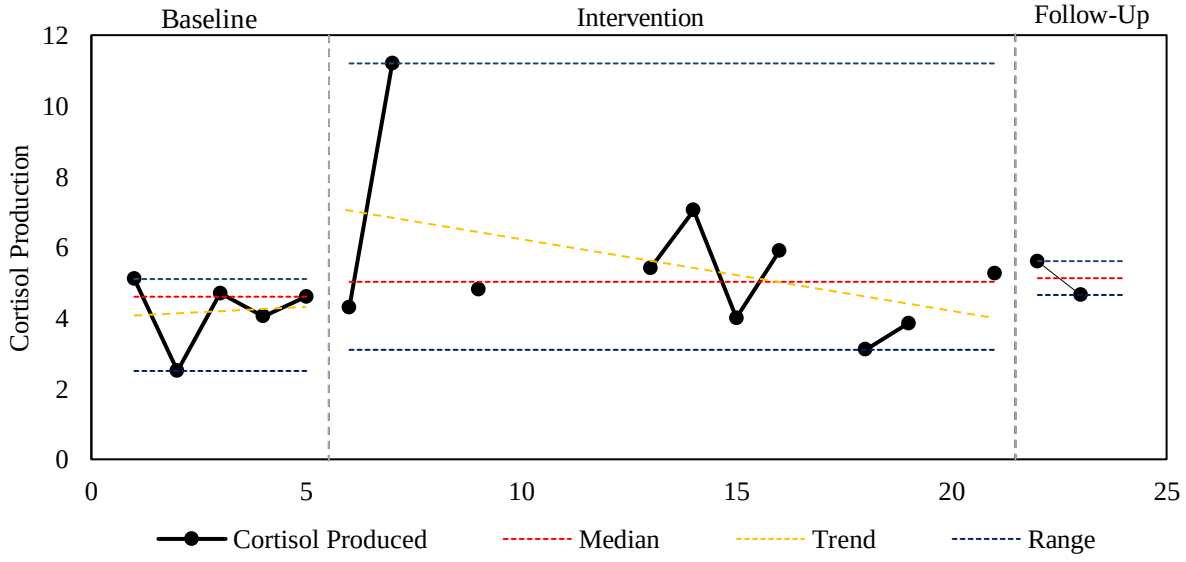
4.2.1.3. Stress Regulation

Stress regulation was measured as a function of the total production of cortisol throughout the day (AUC_G) and cortisol variation throughout the day (AUC_I). Visual analysis of Figures 3 and 4, as well as the stress regulation data outlined in Tables 7 and 8, indicate a variable and largely contra-therapeutic change in measurements of both cortisol production and variation throughout the study. Cortisol production (AUC_G) showed higher stability across conditions, while measurements of the change in cortisol production (AUC_I) were highly variable.

Figure 3 demonstrates variation in the measurements of cortisol production gathered throughout the study, showing a slight contratherapeutic increase in the median of these measurements following the introduction of the ABC intervention, which was sustained into follow-up, and indicates a movement away from 'normative' cortisol and stress regulation, which is characterized by a progressive reduction in cortisol throughout the day and during increasingly secure interactions (Bernard et al., 2015). This is, however, a slight and arguably negligible change. During the intervention, a therapeutic deceleration towards 'normative' cortisol and stress regulation is demonstrated, although this is impacted by the second measurement during the intervention phase, which is notably larger than the rest of the measurements during this condition, and falls outside of the 3rd quartile (Q_3=5.9) in this condition, qualifying it as an outlier (Vinutha et al., 2018). This appears to have impacted the representativeness of the trend line in Figure 3, in which the data largely follows an even, zero-celerating trend during the intervention phase.

Figure 3

Total Diurnal Cortisol Production (AUC_G) with Plotted Median, Trend and Range



Note. Black dots connected with a black line indicate data collected at consecutive measurement points. Black dots which are not connected with a black line, indicate missing data before/after respective measurement points.

The within-condition analysis for total cortisol production (AUC_G) presented in Table 7 demonstrated stability during the baseline condition, and instability during the intervention condition, wherein less than 80% of data fell within the stability envelope. Assessments of level change during baseline were variable, indicating a deteriorating (contra-therapeutic) relative level change in cortisol production, but a decreasing (therapeutic) absolute level change in cortisol production. Evaluation of level change was similarly variable during the intervention condition, wherein relative level change was decreasing (therapeutic) and absolute level change was increasing (contra-therapeutic). Split middle estimation of trend indicates zero-celeration during baseline, and deceleration (therapeutic change) in cortisol production during the intervention.

However, high variation and a decelerating trend occur in a data segment which is considered unstable, and is inclusive of an outlier. Using interquartile range, the second measurement (x=11.2) falls outside of the 3rd quartile (Q_3=5.9) for this segment, marking it as an outlier and impacting the representativeness of the visual and quantitative statistics for this segment (Vinutha et al., 2018).

Table 7

Within-condition Analysis: Total Cortisol Production (AUC_G)

	Baseline	*Intervention*	*Follow Up*
Median	4.60	5.03	5.13
Max Stability Range	5.75	6.28	6.41
Min Stability Range	3.45	3.77	3.84
Percent Within Stability Envelope	100% **Stable**	70% **Variable**	100% **Stable**
Relative Level Change	0.525 **Deteriorating**	-0.55 **Improving**	-0.95 **Improving**
Absolute Level Change	-0.5 **Improving**	0.95 **Deteriorating**	-0.95 **Improving**
Trend	**Zero-celerating**	**Decelerating**	**Decelerating**

Table 8 presents the results of the between-condition analysis of total cortisol production measurements throughout the study. Only one variable (the ABC intervention) was introduced after the baseline period. Evaluation of the level (median) across conditions indicated an increase (contra-therapeutic change) from baseline to intervention; a movement away from 'normative' cortisol regulation. Between-condition analysis of total cortisol production indicates a generally deteriorating (contra-therapeutic) effect on cortisol production following the introduction of the ABC intervention. An increasing (contra-therapeutic) median level change was reflected in a similar deterioration in relative levels from baseline to intervention. Absolute level change indicates a negative (therapeutic) change in cortisol production. Finally, PND, indicated in Table 9, fell within the ineffective range (PND=40%; Scruggs & Mastropieri, 1998).

Table 8

Between-condition Analysis of the Data Indicating Total Cortisol Production (AUC_G)

Relative Level Change	Baseline-Intervention	0.78	**Deteriorating**
	Intervention-Follow-Up	1.05	**Deteriorating**
Absolute Level Change	Baseline-Intervention	-0.30	**Improving**
	Intervention-Follow-Up	0.35	**Deteriorating**
Median Level Change	Baseline-Intervention	0.43	**Deteriorating**
	Intervention-Follow-Up	0.10	**Deteriorating**

Table 9

Percentage of Overlapping Data: Total Cortisol Production (AUC_G)

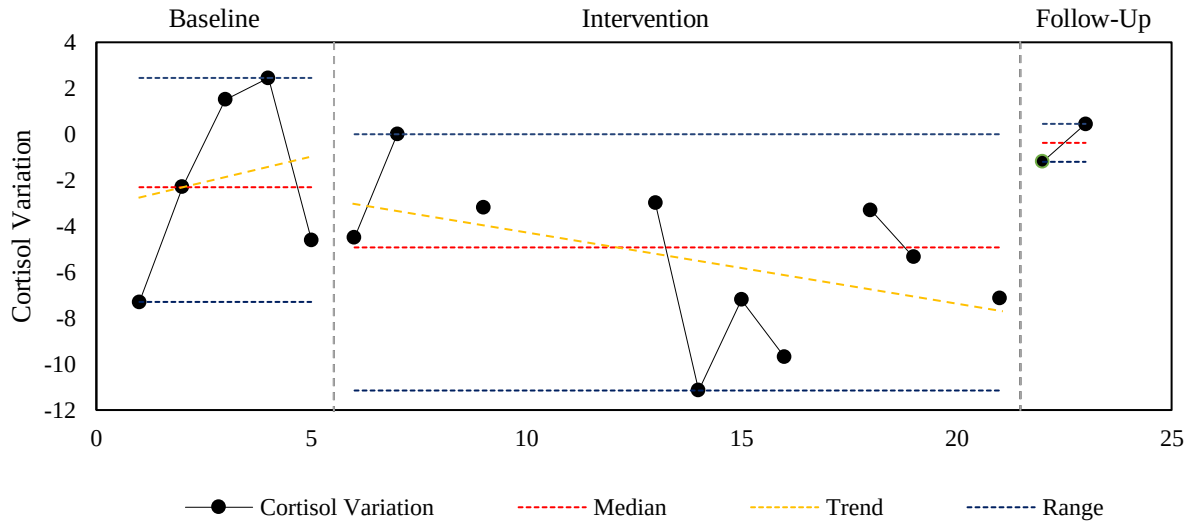
Percentage of Non-Overlapping Data (PND)	Percentage of Overlapping data (POD)
40%	60%

Figure 4 demonstrates variation in the measurements of cortisol variation gathered throughout the study, showing a decrease in the median of these measurements following the

introduction of the ABC intervention, which was not sustained into follow-up. During the intervention, a therapeutic deceleration is demonstrated, although this does not appear to have been sustained in follow up.

Figure 4

Change in Diurnal Cortisol Production (AUC_I) with Plotted Median, Trend and Range



Note. Black dots connected with a black line indicate data collected at consecutive measurement points. Black dots which are not connected with a black line, indicate missing data before/after respective measurement points.

Within-condition analysis of cortisol variation (AUC_I), shown in Table 10, indicates that data were highly variable during baseline and intervention. Level change within conditions indicates that data was deteriorating (contra-therapeutic) during baseline and improving (therapeutic) during intervention as measured by both absolute and relative level change for each respective condition. Split middle estimation of trend indicates an accelerating (contra-therapeutic) trend during baseline and decelerating (therapeutic) trend during the intervention condition. However, these trends must be viewed in the context of high variability in the data for each condition.

Table 10

Within-condition Analysis: Cortisol Variation (AUC_I)

	Baseline	*Intervention*	*Follow Up*
Median	-2.30	-4.93	-0.38
Max Stability Range	-1.73	-6.16	-0.28
Min Stability Range	-2.88	-3.69	-0.47
Percent within Stability Envelope	20% **Variable**	20% **Variable**	0% **Variable**
Relative Level Change	3.73 **Deteriorating**	-3.15 **Improving**	1.65 **Deteriorating**
Absolute Level Change	2.70 **Deteriorating**	-2.65 **Improving**	1.65 **Deteriorating**
Trend	**Accelerating**	**Decelerating**	**Accelerating**

Only one variable (the ABC intervention) was introduced after the baseline period. Between-condition analysis of cortisol variation, outlined in Table 11, indicates that measures of the change in level between conditions were variable. Relative level change between baseline and intervention was improving, whereas absolute level change was deteriorating. Median level change between the two conditions indicated an improving (therapeutic) decrease in median cortisol variation. A between-condition evaluation of trend indicates a change from an accelerating (contratherapeutic) trend in baseline to a decelerating (therapeutic) trend during the intervention condition, which appears not to have been sustained during the two follow up measurements. Finally, PND indicates an ineffective (PND=20%) intervention effect (Scruggs & Mastropieri, 1998).

Table 11

Between-condition Analysis: Cortisol Variation (AUC_I)

Relative Level Change	Baseline-Intervention	-2.03	**Improving**
	Intervention-Follow-Up	5.05	**Deteriorating**
Absolute Level Change	Baseline-Intervention	0.10	**Deteriorating**
	Intervention-Follow-Up	5.95	**Deteriorating**
Median Level Change	Baseline-Intervention	-2.63	**Improving**
	Intervention-Follow-Up	4.55	**Deteriorating**

Table 12

Percentage of Overlapping Data: Cortisol Variation (AUC_I)

Percentage of Non-Overlapping Data (PND)	Percentage of Overlapping data (POD)
20%	80%

4.2.2. Statistical Analyses

4.2.2.1. Standardised Mean Difference

Evaluation of the magnitude of the effect of the ABC intervention on the outcome variables as measured by standardised mean difference using Hedges' g and Cohen's d is presented in Table 13. Compared to baseline, the intervention had a large effect (>0.80) on maternal sensitivity during both intervention and follow up as measured by both Cohen's *d* and Hedges' *g*. Introduction of the ABC intervention had a similarly large impact on attachment security at both intervention and follow up as measured by both Cohen's *d* and Hedges' *g*.

The impact of the ABC intervention on stress regulation, however, had mixed effects. There was a therapeutic decrease in cortisol variation (AUC_I) from baseline to intervention, although the effect size was small when using Cohen's *d*, and large when using Hedges' *g*. Cortisol production (AUC_G) contratherapeutically increased following the introduction of the ABC intervention, with a large effect size measured by Cohen's *d* and a medium effect size

measured by Hedges' *g*, indicating a movement away from what would be considered 'normative' stress and cortisol regulation.

Table 13

Standardised Mean Difference using Cohen's d and Hedges' g

Outcome Variable	*Condition*	*Cohen's d*	*Hedges g*
Sensitivity	Intervention/Baseline	2.27	1.34
		Large Effect	**Large Effect**
	Follow-Up/Intervention	0.41	0.30
		Small Effect	**Small Effect**
	Follow Up/Baseline	3.96	2.79
		Large Effect	**Large Effect**
Security	Intervention/Baseline	9.47	1.62
		Large Effect	**Large Effect**
	Follow-Up/Intervention	1.68	0.62
		Large Effect	**Medium Effect**
	Follow Up/Baseline	6.06	2.19
		Large Effect	**Large Effect**
Stress Regulation	Total Diurnal Cortisol production at Intervention/Baseline (AUC_G)	0.78	0.65
		Large Effect	**Medium Effect**
	Total Change in Diurnal Cortisol Production at Intervention/Baseline (AUC_I)	-0.34	-0.94
		Small Effect	**Large Effect**
	Total Diurnal Cortisol production at Follow-Up/Intervention (AUC_G)	-0.12	-0.16
		Small Effect	**Small Effect**
	Total Change in Diurnal Cortisol Production at Follow-Up/Intervention (AUC_I)	0.81	1.57
		Large Effect	**Large Effect**
	Total Diurnal Cortisol production at Follow Up/Baseline (AUC_G)	1.27	0.97
		Large Effect	**Large Effect**

Total Change in Diurnal Cortisol Production at Follow Up/Baseline (AUC_I)	0.61 **Medium Effect**	0.45 **Small Effect**

4.2.2.2. Spearman's Rank Correlations

Table 14 demonstrates that the associations between the outcome variables in this study can be regarded as weak (ρ not exceeding ± 0.5), with a statistically non-significant association. There was a positive association between maternal sensitivity and attachment security as well as between maternal sensitivity and both cortisol indices. Higher maternal sensitivity was therefore associated with higher attachment security, but also increased cortisol production and, to a lesser degree, change in cortisol over the course of the day. Attachment security was also positively associated with cortisol production, but was negatively associated with cortisol change. Rank correlation therefore indicates that attachment security was associated with an increase in cortisol production, and a decrease in cortisol variation throughout the day. Overall, attachment security and maternal sensitivity had an expected positive association with each other, but an unexpected positive association with cortisol production in this study. However, all p-values for the rank correlations fell above p=0.05, indicating that these results are non-significant, and may be due to chance rather than being directly related to the intervention.

Table 14

Spearman's Rank Correlations

Variable	*Spearman's Rho (ρ)*	*p-value***
Sensitivity/Security	0.46	0.08
Sensitivity/Cortisol Production	0.10	0.73
Sensitivity/Cortisol Change	0.20	0.47
Security/Cortisol Production	0.12	0.67
Security/Cortisol Change	-0.07	0.80

**p=0.05; 95% Confidence Interval

4.2.2.3. Tau-U Analysis

Table 15 outlines the analysis to determine whether a statistically significant baseline trend was present for the respective outcome variables using Tau-U and a power analysis (Lane & Gast, 2014; Tarlow, 2017). All baseline Tau values fell at or below 0.40, which suggests that there was no notable baseline trend for any of the variables, and therefore no baseline correction was necessary, despite visual signs of a potential baseline trend in the attachment security data and the cortisol measurements. However, Fingerhut et al., (2021) note the importance of acknowledging within-condition variability when interpreting Tau values. Given that the data in this study largely did not fall within 25% of the median for each condition, these Tau-U values may not necessarily be representative of the performance of each variable under the conditions of the ABC intervention. This is mirrored in the p-value for all measurements (except maternal sensitivity; p=0.02), which indicates statistically non-significant measurements of Tau. Maternal sensitivity may therefore be the only reliably measured variable using this approach, which indicates that the baseline trend for maternal sensitivity fell below the recommended threshold for a baseline effect, as well as a 'small' (.21 - .63) intervention effect, and can therefore be considered a reliable baseline (Wattanawongwan et al., 2022).

Table 15

Assessment of Baseline Trend

Variable	*Visual Sign of Baseline Trend?*	*Tau Value*	*p-value***	*Power Analysis*	*Significant Baseline Trend?*
Maternal Sensitivity	No	0.11	0.02	0.02	No
Attachment Security	Yes	0.40	0.46	0.06	No
Cortisol Production	Yes	-0.20	0.81	0.03	No
Cortisol Variation	Yes	0.40	0.46	0.06	No

**p=0.05; 95% Confidence Interval

Table 16 indicates the within-condition performance of each outcome variable before and during the ABC intervention. These results indicate that the ABC intervention had a small therapeutic effect on all variables except total cortisol production, which was non-significant, although still therapeutic (Wattanawongwan et al., 2022). Introduction of the ABC intervention was therefore therapeutic in all cases and consistently represented an improvement from baseline as measured by within-condition Tau-U.

Table 16

Within-condition Tau-U Values

Variable	Condition	Tau	Z	p-value**
Maternal Sensitivity	Baseline	0.11	0.24	0.02
	Intervention	0.25 **Small**	0.87	0.39
	Follow Up	-1.00	1.00	0.32
Attachment Security	Baseline	0.4	0.98	0.33
	Intervention	0.57 **Small**	1.98	0.04
	Follow Up	1.00	1.00	0.32
Stress Regulation	Total Diurnal Cortisol Production at Baseline	-0.20	-0.49	0.62
	Total Diurnal Cortisol Production at Intervention	-0.14 **Nonsignificant**	-0.49	0.62
	Total Diurnal Cortisol production at Follow-Up	-1.00	-1.00	0.32
	Total Diurnal Cortisol Variation at Baseline	0.40	0.98	0.33
	Total Diurnal Cortisol Variation at Intervention	-0.43 **Small**	-1.48	0.14
	Total Diurnal Cortisol Variation at Follow Up	1.00	1.00	0.31

**p=0.05; 95% Confidence Interval

Table 17 presents the between-condition and combined effect of introducing the ABC intervention. The results indicate that the ABC intervention had a moderate therapeutic effect on maternal sensitivity and attachment security. The impact on stress regulation was mixed, with a small contratherapeutic impact on cortisol production, and a small therapeutic impact on cortisol variation. Tau-U combined indicates that the ABC intervention had a moderate therapeutic effect on measurements of the attachment relationship between the mother and child included in the study, proxied by maternal sensitivity and attachment security. It had a non-significant, contratherapeutic, impact on stress regulation, proxied by salivary cortisol.

Table 17

Between-condition and Combined Tau-U Effect Sizes at 95% Confidence

	Dependent Variable	*Tau-U*	*Z*	*p*
Tau U	Maternal Sensitivity	0.73 **Moderate**	2.12	0.03
	Attachment Security	0.75 **Moderate**	2.20	0.03
	Cortisol Production	0.40 **Small**	1.17	0.24
	Cortisol Variation	-0.35 **Small**	-1.02	0.31
Tau-U Combined	Attachment Tau-U	0.74 **Moderate**	3.05	0.00
	Regulation Tau-U	0.03 **Nonsignificant**	0.10	0.92

4.2.3. Analyses of Process and Social Validity

4.2.3.1. Working Alliance

Figure 5 displays the mother's weekly ratings of the working alliance during the intervention. The total scale score is displayed as well as the scores on the goal, task and bond

subscales. The results indicate that the mother positively rated all three subscales throughout the duration of the intervention, indicating that the mother favourably evaluated the working alliance with the intervenor. The mother's rating on the bond subscale increased consistently after the first three sessions, suggesting that an affective bond between the mother and the intervenor gradually developed over time. Between the first two sessions, scores on the task subscale remained stable, while scores on the goal dimension decreased slightly, before increasing after the third session. This may imply that there was initially a lack of clarity regarding some of the expectations and objectives for the intervention. From session 3 through session 10 ceiling scores were recorded on all three subscales, indicating that after establishment, the working alliance was maintained throughout the course of the intervention. This is reflected in the average total of 59/60, indicating that the intervenor was deemed to have partnered with the mother in a way which she found to be in service of her aims for the intervention.

Figure 5

Working Alliance Throughout the Intervention Phase

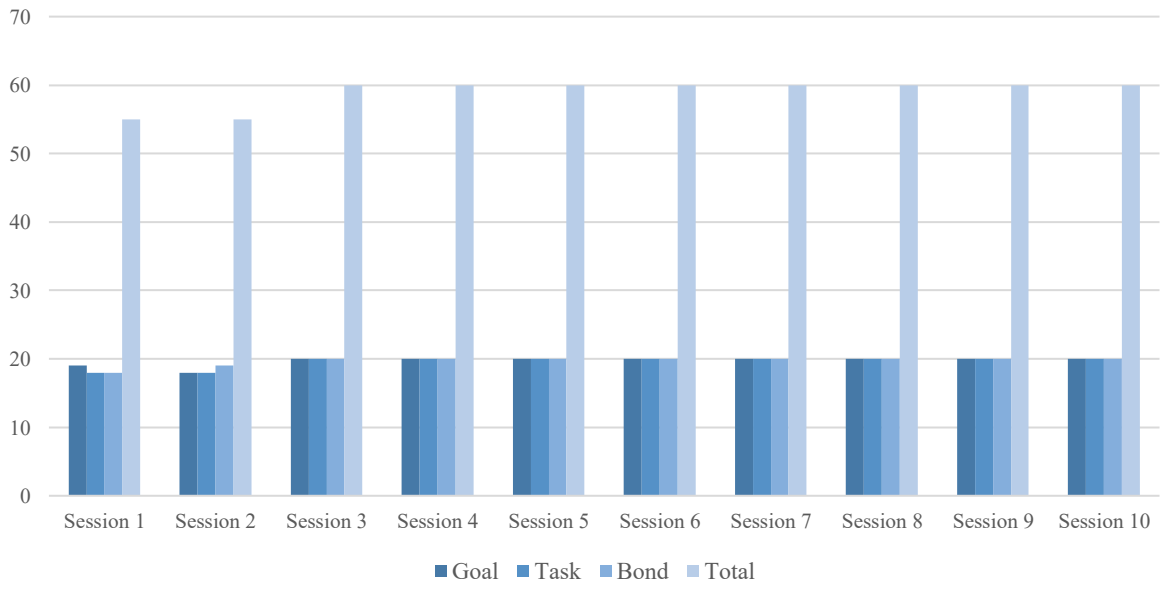


Table 18 displays the distribution of all working alliance scores provided during the intervention phase, and indicates a near-ceiling score for appraisals of goal, task and bond throughout the phase, with minimal variation.

Table 18

Mean, range and standard deviation of scores for each domain of the WAI-SR

	Goal	*Task*	*Bond*	*Total*
Mean	19.7	19.6	19.7	59
Range	2	2	2	5
Standard Deviation	0.67	0.84	0.67	2.11

4.2.3.2. Social Validity

Table 19 depicts the responses to each of the 21 items on the SVS, which collectively suggest that the mother strongly endorsed the intervention. Item responses indicate that the mother perceived the coaching from the intervenor to be “very useful” and regarded the whole experience of the ABC intervention as “very pleasant”. In addition to the relevance of the programme, the mother also highly evaluated the effectiveness of the intervention, noting “very positive” improvements in her own parenting behaviours, including the understanding of her child and her ability to respond to her child’s needs . The mother also reported “very positive” changes in her child’s behaviour throughout the course of the intervention and would recommend the programme to others. Regarding levels of stress and feelings of competency as a mother, the mother observed “positive” changes due to the intervention. The lowest scoring item referred to the duration of the intervention, which the mother noted was “just enough”, implying that more sessions may have been advantageous.

Table 19

Social Validation on the SVS

Adapted Social Validity Scale Item	Answer Code	Answer Code
I found that having the ABC parent intervenor come to my home each week was…	4	Pleasant
Having the parent intervenor with me once every week was…	4	Pleasant
I feel that 10 weeks for the intervention was…	3	Just enough
The homework exercises that were assigned each week were…	5	Very useful
Reviewing the homework exercised with my parent intervenor each week was…	5	Very helpful
Having the parent intervenor make direct comments about how my child and I were interacting was…	5	Very helpful
Receiving direct comments from the parent intervenor made me feel…	5	Very competent
Watching videos of myself interacting with my child during ABC sessions, with my parent coach, was…	4	Helpful
Having the parent coach's guidance and encouragement during the ABC sessions was…	5	Very pleasant
I find that my involvement in the ABC intervention had led to a _____ change in my understanding of my child.	5	Very positive
Through the ABC intervention I find that my ability to respond to my child's needs has changed in a _____ sense.	5	Very positive
Participating in the ABC intervention has resulted in me being _____ able to think about what my child may be thinking, feeling and/or needing.	5	Very effectively
What is your opinion of the ABC intervention?	5	Very good
What would your recommendation be to other parents/caregivers about the ABC intervention?	5	Very good
I found that participating in the research study was…	5	Very pleasant
As an intervention to help improve the relationship between parent/caregiver and child, the ABC intervention is, in my opinion…	5	Totally effective
I found the ABC intervention sessions…	5	Very easy

I have noticed over the course of the ABC intervention a _____ change in my child.	5	Very positive
I feel that my competence as a parent/caregiver has changed in a _____ sense by participating in the ABC intervention.	4	Positive
I feel that my stress levels about parenting a child with intellectual disability have changed in a _____ sense by participating in the ABC intervention.	4	Positive
I found that ending the ABC intervention sessions was…	4	Pleasant

4.2.3.3. Summary of Working Alliance and Social Validity Results

Ceiling scores on assessments of working alliance and social validity indicate that the mother included in the study felt that the intervention was personally and contextually useful. Measurement of the working alliance between the parent and intervenor indicated a strong degree of consensus regarding, and commitment to, the goals of the ABC intervention. In addition, there was a high degree of agreement regarding the value of the behaviours enshrined by the intervention, and a high degree of trust that the intervenor and the intervention would achieve these goals. The perceived value was similarly reflected in measurements of social validity, which indicated that the parent found the ABC intervention to be desirable, applicable and clear, with only minor concerns regarding the duration of the intervention – which was endorsed as being 'just enough'.

4.3. Qualitative Results

Using Braun and Clarke's (2006) thematic analysis framework, the transcribed interviews were selectively coded for the parent and coach's subjective experiences of the effects of the intervention on the infant-mother relationship, which formed the main theme for the following thematic description. The included theme, Shifts in the Infant-Mother Relationship, encapsulates the intervenor and mother's respective appraisals of the impact of

the intervention on the relationship between mother and child, and are each subdivided into a) Perceived Changes in the Child, and b) Perceived Changes in the Mother.

4.3.1. Post-Intervention Parent Interview

4.3.1.1. Shifts in the Infant-Mother Relationship Perceived by the Mother

4.3.1.1.1. Perceived Changes in the Mother

The mother included in this study alluded to several aspects of her relationship with her infant which she felt had improved following her adoption of the parenting behaviours promoted by the ABC. Initially, the behaviours encouraged by the ABC intervention were described as an adjustment, being somewhat counterintuitive compared to her own childhood experience:

> It's a little bit different yes because the way I grew up was [giggles] it's very different because a child is a child and if you can't you tell a child what to do, the child can't show you what to do because he's just a child, so it was different for me, that's why what important what I've learnt that [it's] okay … for them to gain confidence okay and also to be free

However, after adjusting to the novelty of this approach to relating to her child, the mother expressed the feeling that the ABC intervention had value for both of her prematurely born children. This sentiment was later expanded upon by the coach, but was articulated by the mother in the words:

> I have two prems the first, the is a boy this one was very small, so I feel like the intervention that I got now is more better than before, because before it was me, myself and him, the boy but now I feel like for prems if it can reach out to more.

On the basis of feeling more confident in knowledgably interacting with her prematurely born children, she expressed confidence that she would be able to maintain this improved relationship with her daughter, saying: "so I got an understanding, I know how to treat [my child]", and later elaborating on this point in saying:

> Ja, my expectation was to know my child better and to be able to, to be able to be closer to her more which I think it did help because now I know okay what to do, how to play with her, how to speak to her when observing her when she does something that is how to help her, so it does, it did help.

Having attachment-related insight was expressed as particularly important for this mother because of her infant's developmental delays, which she believed had made understanding her daughter's needs challenging:

> What I think the most that I've learnt is like this because you know she's a prem, so it was very very difficult for me to understand her, so and she's this quiet child, sometimes there will be something she's not happy about … she'll be quiet and I think you know she's fine but … now I can observe her and then I'll take her and then hold her and then she becomes like okay mommy's here, then she becomes happy. Sometimes I will be like she's just sitting there, she's okay, but ja. So it's helped me a lot just oh because now I'm more looking at her, ja then I'll think maybe she bump somewhere, or think she'll get away with it but then maybe she needs mommy but she's not saying it, she's just quiet and looking down.

Qualitatively, the mother most commonly appraised the evaluation as having improved feelings of competence in her interactions with her child and insight into the ways in which new behaviours can elicit new responses in their dynamic. Feeling more knowledgeable about the unique ways in which her child might be expressing needs, the mother felt an improvement in her ability to attend to her child's bids for care and respond appropriately.

4.3.1.1.2. Perceived Changes in the Child

After adjusting to the ABC's recommendations, she described happier and more engaged behaviour in her infant when they were together, saying "I think she also enjoys it a lot because she will start doing the things, when I come home, she will start doing the things which we do, like okay you can see that she enjoys them". The recognition of a change in her child's behaviour when she was around was linked by the mother to an improved confidence in her infant that she would be present when she was needed. This included noticing changes in her

daughter's likelihood of initiating engagement with her, saying that: "I think she also enjoys it a lot because she will start doing the things, when I come home, she will start doing the things which we do, like okay you can see that she enjoys them ja". Similarly, she described improved confidence in her infant's willingness to separate in the knowledge that a reunion would happen when she needed it to:

> I let her do what she wants and then I follow her and she will be so happy, she will be smiling and giggling because she can, so it gave her confidence that, okay, I can do this and my mommy's okay unless maybe something which will harm them, ja so but mostly like she will initiate something and then I will follow and then she becomes happy, so the confidence is there now.

The confidence to explore her environment described here was complemented by what was perceived as confidence in the child approaching her mother: "Ja and also they like they become, they open up they will come more often to you, to ja because they know okay mommy will respond". This mother felt that the ABC intervention provided insight into how to notice and help with the needs of her infant. She felt more secure in the confidence that her infant would approach her when she wanted to be cared for, and that her infant in turn had the same confidence that she would be appropriately present and responsive in these moments. These immediate benefits gave the mother confidence that there would be a long-term positive effect of the improvement in their relationship, saying, "I think maybe growing up it will be more beneficial for her because the confidence will be there and she knows that okay I can be heard".

4.3.2. Post-Intervention Intervenor Interview

4.3.2.1. Shifts in the Infant-Mother Relationship Perceived by the Intervenor

The intervenor included in this study described seeing a change in the way the mother and child related to one another.

4.3.2.1.1. Perceived Changes in the Mother

The intervenor reported that she noticed a positive improvement in the way the mother interacted with her daughter. Transition to a new pattern of interacting between the mother and her child appeared initially to be impacted by the mother's beliefs about raising an infant with developmental delays – an adjustment which the mother had attributed to culturally informed norms surrounding childrearing, noted in the previous theme. The intervenor felt that the mother's understandings of parenting a child with developmental delays initially informed her approach to interacting with her infant, saying: "What I felt was powerful here was it seems like if you are a mother with a child with developmental delays you are going to take even more of a lead", and attributing this to the mother feeling that she may have needed to compensate for her infant's developmental delays by:

> Be[ing] even more teachy with that child, and expect… I think you're expecting less of the child. So, and I did feel like I saw that initially, the mom would initiate all tasks, she would show [infant] what toys to show interest in.

The intervenor explained that this initial adjustment yielded to a new style of interacting with her child, in which she could see the mother "start to anticipate, and that is when I could start seeing change like she's now internalising these kinds of comments". Following this adjustment, the intervenor perceived significant changes in the way the dyad interacted, saying:

> …later on, it was as if she came alive. And I really feel from a clinical observation point of view, it had a lot to do with the fact that mom responded to [infant] initiating, or that mom was following the lead. Because this was really encouraging [infant], ... And the more mom saw [infant] initiating activities, the more she was backing off in terms of wanting to initiate tasks. And so now we see more of an independence, engaging kind of interaction style. So, I felt like that was very powerful.

Highlighting the mother's initial tendency to take the lead in her interactions with her child, the intervenor felt that she saw improvements in the mother's ability to notice and respond to engagement initiated by her child throughout the intervention.

4.3.2.1.2. Perceived Changes in the Child

Despite the initial adjustment period, however, the intervenor could see the impact of the mother's change in behaviour on her child as she began to anticipate and attend to her mother's new behaviour:

> So ja, the change that was mentioned was that I saw that [infant] was eventually having an expectation of seeing her mom respond. For instance, if she would push the button and mom doesn't start singing right away, she would look at mom and kind of like; 'when are you going to start singing?'

According to the coach, this new way of being together appeared to consolidate into a mutual trust that both the mother and her infant could rely on one another, and this appeared to lead to an improved confidence in the infant:

> So because mom was in her interaction style responding more to what [infant] was doing, I think [infant] started experiencing a … sense of control over her world or she started feeling like she's got more of an effect on her world and therefore initiated more, expecting mom to again respond and mom responds and then that kind of, we get this recursive pattern that starts to play out.

In sum, the intervenor felt that the ABC intervention resulted in a positive change in the way this mother and child engaged with one another. She highlighted what she saw to be improved confidence in both the parent and child and an improvement in how they paid attention to one another during interactions, which she felt created a new pattern of reciprocity in the pair, saying, "I'm attributing that change that I saw, to the fact that mom was encouraged to follow more, which then also encouraged [infant] to lead more and then mom follows more". Although she felt that this improvement was initially hampered by the mother's tendency to take the lead due to her child's developmental delays, this was not sustained during the course of the intervention.

4.3.2.2. Summary of Qualitative Results

Overall, the intervention was deemed to be a valuable and effective approach to improving the quality of the parent-child relationship in the dyad. Both the parent and intervenor agreed that the mother's transition to using the behaviours endorsed by the ABC intervention was an adjustment, whether informed by cultural norms or perceptions of raising a child with DD. The mother expressed feeling more insightful regarding the nuances of her daughter's behaviour and needs, and felt more confident in her ability to attend appropriately to these. Both commented that they saw an improvement in the infant's confidence around her mother, and noted changes in the way that she attended to and explored when around her mother. Both the mother and intervenor commented that they believed this would translate to a long term, sustained value for the child's emotional development.

4.4. Conclusion

This chapter described the visual analysis of the impact of the ABC intervention on maternal sensitivity, attachment security and stress regulation in an infant-mother dyad in which the infant has developmental delays. The visual analysis was supplemented by a triangulated statistical evaluation of these variables using standardised mean difference, rank correlation and Tau-U and an evaluation the intervention process using measurements of working alliance, social validity, and a semi-structured interview of both the mother and intervenor. Overall, a combined analysis of the results indicates that the intervention had a therapeutic impact on maternal sensitivity and attachment security in this dyad, despite limitations related to sample size and variability which caused some concern for the utility of each segment of the results when taken alone. Despite these challenges, analysis of both standardized and non-standardized appraisals of the intervention indicated that the ABC was personally and contextually valuable to the participant and was felt to have caused an improvement in the relationship with her infant daughter. Measurement of the impact of the intervention on stress regulation was inconclusive, and yielded mixed and contradictory results.

Chapter 5: Discussion

5.1. Introduction

This study sought to assess the efficacy of the Attachment and Biobehavioural Catch-up intervention on maternal sensitivity, attachment security and child stress regulation in a South African parent-infant dyad in which the infant has significant developmental delays. It was hypothesised that the intervention would result in a therapeutic improvement in all three of these variables. Evaluation of the impact of the ABC intervention on these outcomes were mixed, and are discussed individually below. Each of these will be discussed in reference to both the hypotheses and aims of the study, as well as in reference to existing comparable literature.

5.2. Maternal Sensitivity

The central target for the ABC intervention is the parent, and their ability to sensitively attend to the needs of their child. This study hypothesised that the introduction of the ABC would result in improvements in maternal sensitivity. Measurements of maternal sensitivity throughout the intervention constituted a stable and, therefore, reliable dataset, validating its use in the assessment of the ABC's efficacy. Maternal sensitivity improved following the introduction of the ABC intervention (observed in therapeutic changes in both level and trend), confirming this study's first hypothesis.

A combined perspective of the measures used to assess this impact yielded positive results for the impact of the ABC on maternal sensitivity. Despite the fact that the visual analysis guidelines proposed by Scruggs and Mastropieri (1998) indicate an ineffective (PND=37.5%) impact on maternal sensitivity, standardised mean difference indicates that the ABC intervention had a large (>0.80) effect on maternal sensitivity when compared to baseline, even when controlling for a small sample size. Additionally, it should be borne in mind that this method of effect measurement, although commonly used in single case research, is vulnerable

to variation, particularly in small samples such as this. As such, the impact of the ABC intervention on maternal sensitivity may most appropriately be indicated by a balanced consideration of the standardized mean difference (>0.80; large effect), Tau-U and the qualitative appraisal of the impact of the intervention described below, which combine to conclude that the intervention had a positive impact on maternal sensitivity. Although the results of this study exceed the small-to-medium effects computed in previous studies (O'Byrne et al., 2023), these were large-group studies that made use of alternative indicators of effect size which may account for the difference in the magnitude of effect. Further analysis of Tau-U validated the positive impact seen in the first two analyses, and indicated a small-moderate positive improvement in maternal sensitivity following the introduction of the ABC intervention. The slight categorical difference between standardized mean difference measurements and Tau-U might best be explained by the fact that Tau uses slope as a means to assessing impact, and was therefore less impacted by the variability seen in the sample. A combined perspective of the three methods used above would indicate that the data on maternal sensitivity constitutes a relatively stable and reliable basis for conclusions regarding the impact of the ABC intervention, which had a positive effect on maternal sensitivity.

This was later mirrored in the mother's appraisals of the intervention, wherein she repeatedly highlighted that she felt an improvement in her ability to "treat" her child. In one example, the mother suggested that the intervention helped her to become more attuned to her child's needs, as well as how to respond to them appropriately. She commented on feeling more capable of attending sensitively to 'differentiated' cues which she might otherwise have missed, such as, for example; "maybe she needs mommy but she's not saying it, she's just quiet and looking down". The ability to identify unique attachment signals which are not immediately identifiable is a poignant example of what Vandesande et al., (2022) emphasise as central in providing appropriate responses to children on the spectrum of ID.

Quantitative and qualitative findings on the impact of the ABC therefore converge to indicate an improvement in maternal sensitivity which is a promising outcome in this relatively novel analysis of an attachment intervention in a child with developmental delays, given protective role of maternal sensitivity (Manning, 2022). Qualitative feedback indicating increased caregiving competence in the mother is additionally encouraging as this may reduce the risk of the child's attachment signals remaining not responded to due to the mother's now-enhanced abilities to recognise these signals as a result of the ABC (Fletcher et al., 2016; Sterkenburg et al., 2008b; Vandesande, Bosmans, & Maes, 2019b). Chapter Two highlighted the current agreement that established risks associated with the spectrum of ID coalesce to place the development of healthy attachments at risk, and noted that maternal sensitivity holds as a significant mediator in such cases, as it does in neurotypical populations (Feniger-Schaal et al., 2019; Feniger-Schaal & Joels, 2018). The current findings on maternal sensitivity correspond with that of previous studies on the effects of the ABC intervention, which have yielded similar outcomes in at risk populations (Caron et al., 2016; Dozier & Bernard, 2017; Garnett et al., 2020). Further, the findings offer evidence that the ABC may hold value in attending to two key risk factors which characterize the unique attachment relationship in the case of ID/DD: the caregiver's ability to attend sensitively to differentiated bids for attachment (Vandesande, Bosmans, Schuengel, et al., 2019b; Vandesande et al., 2022) and, consequently, the protective and mediating role of sensitivity (Deans, 2020).

5.3. Attachment Security

Attachment security was hypothesised to increase as a result of the introduction of the ABC intervention. Visual analyses comprehensively indicated a positive, accelerating improvement in attachment security following the introduction of the ABC intervention, validating the second hypothesis for this research. This improvement in attachment security was mirrored in the supplemental statistical analyses. This study therefore joins existing

research in finding that the ABC facilitates an improvement in attachment security, (e.g. (Dozier & Bernard, 2017; Grube & Liming, 2018) albeit in a previously understudied population.

However, despite indicating a strong positive increase in attachment security, the proportion of the data which can be considered stable was minimal (13%), creating concern for the reliability of this data as an indication of the ABC intervention's impact on attachment security. Further, guidelines provided by Scruggs & Mastropieri (1998) indicate an 'ineffective' (PND=37.5%) effect size, however, the vulnerability of this method of evaluation to variation and small sample sizes such as this must be borne in mind, and statistical evaluation is perhaps a more reliable indication of the impact of the ABC on the outcome variables. Noting these concerns, statistical analysis suggested that the ABC resulted in a medium-large improvement in attachment security during the intervention condition when measured by both Cohen's *d* and Hedges' *g*, and a large overall effect when measured from baseline to follow-up. Similar to the results relating to maternal sensitivity, Tau-U analyses yielded a small-moderate impact on attachment security, validating the above results in favour of the ABC's impact on attachment security. Use of a single subject design and the application of this intervention in a novel population make comparison of these results challenging, partly due to the novel features of this study (application in South Africa in a single subject with developmental delays) and additionally because single subject designs historically have inflated effect sizes when compared to group-comparison studies (Lee Swanson & Sachse-Lee, 2000; Zhan & Ottenbacher, 2001). However, the effect of the ABC on attachment in this study slightly exceeds the results of a randomized controlled trial which found that the ABC yielded a 'medium' (d=0.52) effect size when using Cohen's *d* (Bernard et al., 2012). Further, they exceed the impact yielded in a recent cohort of review studies indicating a nonsignificant combined impact of attachment interventions on attachment security (Hedges g=0.22, p=0.14),

even when controlling for the potential interference of publication biases or sampling errors (Schoemaker et al., 2020). The ABC can, therefore, be identified as superior in its impact on attachment security compared to the parenting interventions included in the aforementioned review. This is promising, as it joins existing studies in finding that the ABC generally exceeds the impact of other parenting interventions on attachment security, the impact of which may explain the non-significant combined effect on attachment noted in the study by Schoemaker et al. (2020; Bernard et al., 2012; Wright & Edginton, 2016).

The results additionally indicate that improvements in maternal sensitivity were associated with more secure attachment behaviours in the child included in the study, which corresponds with studies identifying maternal sensitivity as a predictor for attachment security (e.g. Garnett et al., 2020). This appeared to confirm that the introduction of the ABC intervention led to an increase in secure attachment behaviours on the part of the infant; Spearman's rank correlation of the relationship between maternal sensitivity and attachment security in this dyad indicates a positive, albeit weak, correlation of 0.46. This mirrors the published evidence for interventions aimed at improving attachment, which have generally found that measurements of maternal sensitivity show more improvement than attachment security, and that while interventions aimed at maternal sensitivity do appear to impact attachment security, the extent of this impact is usually not as notable as attachment theory might imply (Deans, 2020; van IJzendoorn et al., 1995). Meta-analysis of the impact of attachment interventions on attachment security corroborates this, and has found that improvements in maternal sensitivity typically outperform those seen in attachment security as a result of interventions such as the ABC (Bakermans-Kranenburg et al., 2003). This was replicated in the present study.

In general, findings regarding the association between maternal sensitivity and the attachment behaviour it is purported to nurture are variable, and it is currently understood that maternal sensitivity is a significant, but not exclusive mediator of attachment security (de Wolff

& van IJzendoorn, 1997; Schoenmaker et al., 2015), evidence of which may therefore be at play in this study too. Indeed, Leerkes and Wong (2012) found that attachment security mediated infant distress independently of concurrent maternal sensitivity, and Bozicevic et al., (2016) found that maternal sensitivity at three months was unable to predict emotional regulation at age two years, identifying stronger associations with attachment security. In this study, this relationship may have been mediated by features unique to infants and children on the spectrum of ID. This population is historically over-represented in the category of insecure attachment, and it has been theorized that challenges with both the expression and interpretation of bids for attachment are the primary barriers to the effective development of healthy attachments because of the impact this has on maternal sensitivity (Hamadi & Fletcher, 2021). Finally, it may be that the improvement in attachment security historically associated with improvements in maternal sensitivity may in this case be mediated by a slightly extended period of integration of new attachment representations in the case of DD/ID, resulting in a delayed emergence of more secure attachment behaviours. It is possible, therefore, that enhanced attachment security may continue to emerge over time and beyond the timeline of the current study, which may be why the observed effects on attachment appear more attenuated despite more clear effects on maternal sensitivity.

Despite the potential that aspects of DD/ID may have played a mediating role in the emergence and measurement of changes in attachment in this study, it nevertheless conformed to the association between maternal sensitivity and attachment security noted in other attachment interventions in neurotypical populations (Manning, 2022; Raby et al., 2015). Qualitatively, both the mother and intervenor perceived an improvement in attachment behaviours during the intervention, noting that the infant was more likely to attend to her mother before and during play, and more confidently explored her environment; using her mother as a secure base, and attributed these improvements to an increase in the quality of the

mother's sensitivity towards her child's needs (for example, by spending more time following her daughter's lead during play). Theoretically, then, the intervention led to observable improvements in this child's secure base behaviour, from which we might conclude that she had developed an improved attachment representation of her primary caregiver as sensitive and responsive to her needs (Bretherton, 1992; Waters et al., 2002). Notwithstanding concerns about the representativeness of the data, both attachment security and maternal sensitivity were measured to have improved similarly during the intervention. A combined perspective which notes the statistically therapeutic result and positive qualitative feedback suggests that the ABC has caused improvements in this infant's attachment with her mother.

Low and variable changes in attachment security may additionally be a function of a mismatch between the AQS-3 measure and the population in question—the AQS-3 may be limited in its ability to sufficiently measure secure base behaviours in neurodiverse populations. This relates directly to the argument put forth by Vandesande et al. (2019a; 2022), that attachment behaviours in children on the spectrum of ID are often 'differentiated' and do not conform neatly to the standardised and typical repertoire of neurotypical children espoused by the assessment. Hence, it is a possibility that the AQS was not sensitive enough in its ability to detect attachment behaviours that may be more attenuated due to developmental delays and consequently how attachment behaviours are expressed in this population of children. As such, it may appear, on the surface, that children with ID/DD display fewer secure base behaviours—and hence, on the AQS, may achieve a lower score—which may make it more difficult to detect changes in secure base behaviours over time.

5.4. Stress Regulation

Finally, it was hypothesised that the introduction of the ABC would facilitate a more normative diurnal cortisol pattern through a decrease in cortisol production throughout the day (e.g.: Garnett et al., 2020; Grube & Liming, 2018). This study did not, however, yield

conclusive findings on the impact of the ABC on stress regulation, preventing the confirmation or rejection of this study's third hypothesis. The plotted data displaying cortisol production indicated a therapeutic, downward trend following the introduction of the ABC intervention, however a systematic visual analysis yielded mixed results, making it difficult to draw conclusions regarding the relationship between the ABC intervention and cortisol production. Calculations of level change offered similarly contradictory results, and a noted outlier impacted the accuracy of the use of a trend line.

Given the sample size of this study and the inconclusive results offered by the visual analysis, the median may be the most representative visually displayed measure, and indicates a small (contratherapeutic) increase in cortisol production following the introduction of the intervention. Where the data for cortisol production was considered a stable representation of the impact of the ABC on stress regulation, the measurements of cortisol variation were highly variable, and therefore not a reliable indication of the performance of stress regulation under this study's conditions. Similarly, measurements of the association between cortisol and attachment security and maternal sensitivity fell at a level of significance above p=0.05, making it likely that the association between these data segments is due to chance. With this concern in mind, this study expected to have found an inverse correlation between maternal sensitivity/attachment security and cortisol production and variation, as previous studies of the impact of the ABC have found that the intervention simultaneously caused increases in maternal sensitivity and attachment security, and commonly resulted in improvements in diurnal cortisol variation (Bernard et al., 2015; Dozier, Peloso, et al., 2006). However, this study unexpectedly found that increases in maternal sensitivity and attachment security were associated with increases in cortisol production. These associations occurred at a nonsignificant levels however, and are likely not indicative of the true performance of cortisol variation under the conditions of the ABC.

Noting the caution with which conclusions can be drawn using these findings, the impact of the ABC intervention on cortisol variation was the only outcome which conformed, albeit inconclusively, with the hypotheses of the current study. Median level change in diurnal cortisol variation during the intervention was generally therapeutic, a trend reflected by a decrease in the median from baseline to intervention, and attachment security (although not maternal sensitivity) was inversely and therapeutically associated with cortisol variation. Although not indicating a strong intervention effect, this reflects previous research on the therapeutic impact of the ABC intervention on stress regulation (Grube & Liming, 2018). Statistically, standardised mean difference additionally yielded positive results in the case of cortisol variation, and indicates a large therapeutic effect on diurnal cortisol variation (g = -0.94). This exceeds the results of previous studies measuring the impact of the ABC on cortisol production in foster children, which had effect sizes in the range of small- medium using Cohen's (1988) parameters. Previously, effect sizes of d= -.37 (Dozier, Peloso, et al., 2006) and d= -0.38. (Bernard et al., 2015) have been reported. This positive result may likely be a function of the small sample size and its variability, however, and replicates a pattern noted in previous studies using single case designs, which often yield inflated effect sizes when compared to group comparison studies (Lee Swanson & Sachse-Lee, 2000; Zhan & Ottenbacher, 2001).

The discrepancies seen in the cortisol measurements above, particularly cortisol production, might be understood in several ways. First, the infant's experience of the method of gathering salivary cortisol may have induced a cortisol response. More so than neurotypical populations, individuals on the spectrum of ID and DD often show a distinct preference for routine or sameness, and may show an intolerance for, or aversion towards, certain sensory stimuli. In this case, the experience of having a cotton swab in her mouth may have been somewhat stressful for the infant included in the study, an experience she may have come to

expect at certain times of day or when her mother gathered the equipment to gather the sample. This could, in turn, have potentially caused an increase in the secretion of cortisol both in response to and anticipation of her mother taking a sample. Second, the inconclusiveness of the cortisol data may be a function of the amount of data gathered, and may partially explain the inconclusive outcomes of both the production and variation results – as mentioned, Lane and Gast (2014) recommend the use of a stability envelope to ensure that a sufficient number of data points are gathered to reach a stable representation of a given phase of study. Third, Chapter 2 of this study comprehensively explored an intersectionality of factors which combine to make the life of a South African infant on the spectrum of ID/DD inherently stressful. It may be that due to diagnostic or contextual factors, this infant is particularly more reactive than the neurotypical populations upon whom much of the stress regulation data has historically been based. Fourth, emerging research is finding that the diurnal cortisol production of those on the spectrum of ID/DD departs somewhat from the normative pattern seen in typically developing individuals (Lundqvist et al., 2022; Taylor & Corbett, 2014) – it may be that this study's data is a reflection of this. Finally, it may be that the intervention did not have the hypothesised effect on stress regulation during the course of the study, but that this may emerge later as the child is consistently exposed to sensitive parenting. Given that the infant included in the study is neurodiverse, the regulatory benefits reported in neurotypical populations may emerge later in her case, or even emerge variably, as her mother continues to notice and sensitively respond to the infant's bids for attachment.

5.5. Conclusion

Chapter 5 explored the implications of results of the current study as they relate to its hypotheses and the outcomes of other similar studies. Noting concerns regarding the representativeness of the current data set, it confirmed the first and second hypotheses of the present study: that the introduction of the ABC would result in improvements in maternal

sensitivity and attachment security. Due to an inconclusive analysis of the stress regulation data, the third hypothesis, that the ABC would lead to a reduction in the production and variation of diurnal cortisol levels, was neither confirmed nor denied in the present study. Despite some concern with the representativeness of the data on attachment security and stress regulation, subjective evaluation of the intervention was comprehensively positive in terms of its effect on the mother-child relationship, which included commentary on improvements in maternal sensitivity and secure base behaviour by both the mother and the coach. Further, the ABC was deemed personally and contextually relevant by the mother included in the study, indicated by ceiling scores on measures of social validity and working alliance and indicating that the intervention's goals, procedures and outcomes held strong personal value for the mother included, despite a less significant quantitative impact on attachment security and stress regulation. This study therefore offers both standardised and subjective evidence that the ABC holds personal and contextual value to the included participant.

Chapter 6: Conclusion

6.1. Introduction

This final chapter opens with a summary of the key research findings before reviewing some of the limitations from the present study. Subsequently, the clinical implications of the findings as well as the recommendations for future research are discussed.

6.2. Overview of the Study

The present study was foregrounded by research indicating that children on the spectrum of ID may be at risk of developing insecure attachments (Feniger-Schaal & Joels, 2018; Janssen et al., 2002; van IJzendoorn et al., 2007). In South Africa, infants on the spectrum of ID face further compounding and intersectional risks for the development of both DD and insecure attachments, with minimal and poorly resourced infrastructure to support optimal development in or support for this population (Capri et al., 2018; Fieggen et al., 2019; Mkabile & Swartz, 2020). In this context, there is scant research on the efficacy of attachment interventions, such as the ABC intervention, for supporting the effective care of infants with DD.

This research therefore aimed to assess the impact of the Attachment and Biobehavioural Catch-up intervention on maternal sensitivity, attachment security and stress regulation in a mother-infant dyad in which the infant has been diagnosed with developmental delays. It offers evidence that the ABC is able to cause small-moderate positive improvements in maternal sensitivity and small-moderate positive improvements in attachment security in a dyad in which the infant has developmental delays, mapping similarly onto the outcomes of attachment based interventions in typically developing populations in this regard. Importantly, subjective evaluation of the impact of the ABC on these variables was comprehensively positive. Measurements of stress regulation were inconclusive, both due to concerns about variability, the size of the sample and a contratherapeutic or minimal change in stress regulation following the introduction of the ABC. The intervention was deemed to be a socially valid and therefore

personally valuable intervention to the mother included in the study, indicated by both standardised measurement and qualitative interview. This research constitutes a relatively novel application of the well-established ABC intervention and forms a unique contribution to the corpus of research on attachment in South Africa and in those with developmental delays.

6.3. Limitations

Several limitations to the study were identified. First, although the current dataset meets minimum criteria (5 or more baseline measurements) outlined by Horner et al. (2005), the dataset is nonetheless small (nA=5; nB=8; nA=2), which makes it vulnerable to outliers and increases the impact of variability within the data. This had a potential impact on the accuracy of the conclusions that can be drawn from this dataset, particularly in the case of the measurement of stress regulation. Collection of additional data may have made it easier to determine whether the noted variation in measurements of cortisol during the study reflected neuroendocrinological disorganisation in the infant, similar to that noted by Dozier et al., (2006), or were due to limited and non-representative dataset. Second, the follow-up condition comprised of only two measurements points, limiting its ability to inform reliable conclusions about the sustained impact of the intervention. Third, while the use of a single-case methodology is appropriate for novel applications such as this, it necessarily limits the generalisability of the results to what is a complex and intersectional child-rearing milieu. For example, the included parent had tertiary-level education and a nanny, protective factors which are distinctly uncommon in the South African parenting cohort, limiting the generalisability of these results to the general parenting population. In a context identified as including multiple risks to the development of healthy attachments, regardless of the impact of DD or ID, the inclusion of a more diverse range of cases may have been useful for the purposes of comparison and examination of how effects may, or may not, present differentially depending on degree of risk, or context. Fourth, collection of this data may have been impacted by a gap between the

populations they were designed to measure and the current sample. The AQS-3 may not be sufficiently sensitive to atypical attachment behaviours seen in those on the spectrum of ID/DD. Similarly, the AMSS may not have accounted for the caregiving adjustments necessitated by caring for a child on the spectrum of ID/DD, or indeed may not sensitively measure cultural nuances in caregiving styles, despite being the most applicable measure of the construct available for use in this study (Dawson et al., 2018). Both of these measurements may therefore not have sufficiently accounted for the dynamics of attachment potentially particular to those either in the South African milieu or caring for those/those on the spectrum of ID/DD.

6.4. Clinical Implications

Quantitative and qualitative assessment of the ABC in a South African parent-child dyad in which the child has developmental delays indicates strong support for its use in instances where caregiver sensitivity or the caregiver-child relationship is the primary target for those parenting a child with DD/ID. While the corpus of research on the utility of the ABC in improving attachment security and emotional regulation in neurotypical populations is robust, this study offers some preliminary evidence that the ABC could be an important interventional approach for the improvement of caregiver-child relationships in South African dyads in which the infant has developmental delays or an intellectual disability. The intervention may lead to improvements in both maternal sensitivity and attachment security in such dyads which has the potential to facilitate enhanced parenting competence but also improved socioemotional development in developmentally-compromised children. Findings on the impact of the ABC on stress regulation were inconclusive, limiting the degree to which this study can be used as an endorsement for the ABC in cases where stress regulation is an intervention target in a client with developmental delays. Larger group studies are, however, needed in order to address some

of the limitations of the current study to replicate and confirm, or disconfirm, the present findings.

6.5. Recommendations for Future Research

Given the scope of this project, analyses of the semi-structured interviews was necessarily focused on the infant-mother relationship. However, this excluded valuable feedback on the experience of implementing the ABC in the South African context provided by both the mother and intervenor included in the study. Both gave feedback on cultural and contextual aspects of implementing the intervention in the South African context which have value for the appropriate adaptation of the ABC intervention for our locale. An opportunity exists for the consolidation and analysis of this qualitative feedback, and the collection of additional data in this regard from other sources, in order to inform the contextually appropriate implementation of the ABC, and other parenting interventions in the future, as well as other global implementations of the same intervention (e.g. Caron et al., 2016).

Additionally, given the range of studies indicating that attachment interventions such as these result in long term benefits across a range of biopsychosocial outcomes, a future follow-up study including the same dyad, and other dyads in the larger study, would be of use. As mentioned, there is very limited research on the value of attachment interventions in infants with developmental delays or intellectually disabilities and their caregivers, and research on the sustained impact of the ABC in these populations is needed to strengthen the argument for its use and protective value. Future research on attachment in DD and ID groups in the South African setting may also benefit from the use of more diverse cases across the spectrum of socioeconomic status and culture, or indeed the use of a randomized-controlled methodology, in order to offer more robust conclusions regarding their efficacy.

Further, analysis of the current dataset has resulted in limitations which might be addressed by future research. First, this data set was limited by the number of data points it gathered, and

future research following the same methodology would be advised to use the stability envelope provided by Lane and Gast (2014) to collect data until a sufficiently stable representation of the performance of the dependent variables has been achieved, and can be corroborated by a power analysis (Cohen, 1988; Tarlow, 2017). Second, use of a measurement of attachment which has either been designed or adjusted to be sensitive to the nuanced attachment behaviours seen in children on the spectrum of ID is recommended, given that a potential barrier to the effective measurement of attachment security in the included infant may have been a lack of sensitivity to diagnosis-specific nuances in the expression of attachment behaviours. Although the focus of the ABC is on the primary caregiver, it does not exclude other caregivers from participating in the intervention process (Dozier & Bernard, 2017). This may be particularly valuable in South Africa where multiple caregivers are commonplace (Budlender & Lund, 2011; StatsSA, 2018). Future research on, and implementation of, the ABC in the local context may seek, therefore, to recruit multiple caregivers in the child's milieu to explore its effect not only on the sensitivity of the primary caregivers but also its effects on what has been dubbed 'received sensitivity' (Mesman, Minter, et al., 2016).

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Appendix A: Ethical Approval

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Humanities
Fakulteit Geesteswetenskappe
Lefapha la Bomotho

Humanities 100. Since 1919

11 August 2020

Dear Mr JG Yeatman

Project Title:	An attachment-based parenting intervention for an infant with mild-moderate developmental delays in South Africa: A single-case experimental study
Researcher:	Mr JG Yeatman
Supervisor(s):	Mr AR Mohamed
Department:	Psychology
Reference number:	13027272 (HUM034/0620)
Degree:	Masters

Thank you for the application that was submitted for ethical consideration.

The Research Ethics Committee notes that this is a literature-based study and no human subjects are involved.

The application has been **approved** on 30 July 2020 with the assumption that the document(s) are in the public domain. Data collection may therefore commence, along these guidelines.

Please note that this approval is based on the assumption that the research will be carried out along the lines laid out in the proposal. However, should the actual research depart significantly from the proposed research, a new research proposal and application for ethical clearance will have to be submitted for approval.

We wish you success with the project.

Sincerely,

Prof Innocent Pikirayi
Deputy Dean: Postgraduate Studies and Research Ethics
Faculty of Humanities
UNIVERSITY OF PRETORIA
e-mail: PGHumanities@up.ac.za

Fakulteit Geesteswetenskappe
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Research Ethics Committee Members: Prof I Pikirayi (Deputy Dean); Prof KL Harris; Mr A Bizos; Dr A-M de Beer; Dr A dos Santos; Ms KT Govinder Andrew; Dr P Gutura; Dr E Johnson; Prof D Maree; Mr A Mohamed; Dr I Noomè; Dr C Puttergill; Prof D Reyburn; Prof M Soer; Prof E Taljard; Prof V Thebe; Ms B Tsebe; Ms D Mokalapa