

**Attachment Styles, Parenting Styles and Theory of Mind: An Exploration of their relationships with Social Deficits in Autism Spectrum Disorder.**

NAKEETA CATHERINE BAILEY

BLYNAK001

Minor-Dissertation presented in partial fulfilment of the requirements for the degree of MA  
(Clinical Psychology) at the University of Cape Town.

Supervisor: Dr. Susan Malcolm-Smith

Word count:

Abstract: 443

Body: 25995

Faculty of the Humanities

University of Cape Town

September 2016

The copyright of this thesis vests in the author. No quotation from it or information derived from it is to be published without full acknowledgement of the source. The thesis is to be used for private study or non-commercial research purposes only.

Published by the University of Cape Town (UCT) in terms of the non-exclusive license granted to UCT by the author.

### Compulsory Plagiarism Declaration

1. This work has not been previously submitted in whole, or in part, for the award of any degree. It is my own work. Each significant contribution to, and quotation in this dissertation from the work, or works, of other people has been attributed, and has been cited and referenced.
2. I know that plagiarism is wrong. Plagiarism is to use another's work and pretend that it is one's own.
3. I have used the APA convention for citation and referencing. Each contribution to, and quotation in, this dissertation from the work(s) of other people has been attributed, and has been cited and referenced.
4. This dissertation is my own work.
5. I have not allowed, and will not allow, anyone to copy my work with the intention of passing it off as his or her own work.

Signature: 

Signed by candidate
---------------------

  
Signature removed

Date: 19 March 2017

## Acknowledgements

My ability to enroll for this Masters Degree and therefore this study was made possible through funding by the National Research Foundation and the Harry Crossley Foundation. I thank you for your generous support throughout these two years.

I would also like to thank the children, parents and schools for participating in this study. Your contribution has taught me such a beautiful understanding and empathy of all your unique experiences with ASD. I hope that I have helped start a new direction in the diagnosis and interventions for ASD to help your families.

I would like to thank Dr Susan Malcolm-Smith for allowing me to be part of your team, answering emails and so many meetings outside office hours. Thank you so much for your belief and faith in my capabilities, especially when I could not see them.

Katie Hamilton I could not have asked to have worked with a better, intelligent, diligent and tenacious PhD candidate than you. All the parallel working, long drives for recruitment and phone calls helped me achieve what I have. Most importantly, thank you for the amazing friendship that we have developed.

To my parents, all four of you, thank you for your unrelenting faith, support and secret prayers. I would also like to thank the rest of my family and friends for your patience, love and support throughout all my years of studying that took up so much time, and for still being in my life.

Lastly and most importantly, to my husband Wade Frank Petersen, you have been in my life right at the beginning of this journey, since my second year of University. Thank you for being a shoulder to cry on when things felt impossible, for reading my incoherent essays, and for always believing that I could achieve anything. I am so grateful that you are a part of every chapter in my book, I love you person!

## Table of Contents

List of Tables .....	6
Abstract .....	7
Introduction .....	9
Literature Review .....	10
Autism Spectrum Disorder (ASD) .....	10
Attachment Theory .....	12
Parenting Styles .....	19
Theory of Mind .....	24
Rationale for Present Study .....	28
Aims of the Present Study .....	29
Methods .....	31
Research Design .....	31
Participants .....	32
Measures .....	34
Procedure .....	40
Data Analysis .....	41
Results .....	42
Participants .....	42
Study 1: Attachment Styles, Parenting Styles and Social Deficits .....	45
Study 2: ToM in ASD and the Relationships with Parenting Styles and Social Deficits .....	52
Discussion .....	57
Study 1: Attachment Styles, Parenting Styles and Social Deficits in Children with ASD .....	57
Study 2: ToM and Its Relationships with Parenting Styles and Social Deficits .....	74
Limitations and Recommendations for Future Research .....	82
Conclusion .....	85
References .....	86
APPENDIX A .....	102
Roles and responsibilities of Research Team .....	102
APPENDIX B .....	103
Ethical approval from the Faculty of Science Ethics Board .....	103

APPENDIX C .....	104
Ethical approval from the Psychology Department Ethics Board at UCT .....	104
APPENDIX D .....	105
Ethical approval from the Western Cape’s Education Department .....	105
APPENDIX E .....	106
Information Sheet.....	106
APPENDIX F.....	108
Consent Form.....	108
APPENDIX G .....	110
Demographic Questionnaire .....	110
APPENDIX H.....	116
Attachment Style Classification Questionnaire (Adapted to parent interview).....	116
APPENDIX I.....	117
Parenting Style and Dimension Questionnaire .....	117
APPENDIX J .....	119
Assent for Psychological Assessment.....	119

## List of Tables

Table 1.	<i>Demographic Information for Preliminary Analyses, for Study 1 and Study 2.....</i>	42
Table 2.	<i>Attachment Styles in ASD Sample.....</i>	45
Table 3.	<i>Bivariate Correlations between Attachment Styles and Social Deficits.....</i>	46
Table 4.	<i>Parenting Styles in ASD Sample.....</i>	48
Table 5.	<i>Bivariate Correlations between Parenting Styles with Social Deficits for ASD Sample.....</i>	49
Table 6.	<i>Hierarchical Multiple Regression for Age, Total Attachment Styles and Total Parenting Styles with Social Deficits as the Outcome: For Verbal Subgroup.....</i>	50
Table 7.	<i>Means and Standard Deviations for Theory of Mind in ASD Sample: For Two Age Groups.....</i>	52
Table 8.	<i>Means and Standard Deviations for First-Order False Beliefs in ASD Sample: For Two Age Groups.....</i>	54
Table 9.	<i>Bivariate Correlations between Parenting Styles with ToM in Verbal Children with ASD.....</i>	55
Table 10.	<i>Bivariate Correlations between Authoritative PS and Subscales with ToM in Children with ASD.....</i>	55
Table 11.	<i>Hierarchical Multiple Regression for Age, Total Parenting Styles and ToM with Social Deficits as the Outcome.....</i>	56

## Abstract

Autism Spectrum Disorder (ASD) is fundamentally characterised by social deficits. It is thus important to understand social functioning and what contributes to social development in children on the spectrum. It is widely accepted that ASD has a neurobiological basis, however research on understanding the lack of social skills found in ASD individuals remains indefinite and controversial. In this thesis we explored attachment styles, parenting styles and ToM to discern how they relate to social deficits in ASD. The literature for typically developing children has illustrated important relationships however there is a lack of exploration in the ASD populace.

This protocol was divided into two studies. Study 1 assessed social deficits, attachment and parenting styles in 46 children with ASD aged 4 – 14 years and included both verbal (n = 19) and non-verbal (n = 27) children. The ADOS-2, Attachment Style Classification Questionnaire, and Parenting Style Dimension Questionnaire were used to measure these variables. Study 2 assessed ToM capacity and its relationship with parenting styles and social deficits in verbal children with ASD.

In Study 1 we found verbal and non-verbal subgroups differed on social deficits. The aims for exploring attachment and parenting styles were to discern 1) what style dominates; 2) whether attachment and parenting styles differ between verbal and non-verbal children and 3) whether these variables relate to social deficits. We found odd patterns of attachment with no clear dominant style in our full sample. Only the non-verbal subgroup showed a relationship between secure attachment and reduced social deficits. In terms of parenting, the authoritative style was reported to be mostly employed by our parents and it related to reduced social deficits in both the full sample and the verbal subgroup.

In Study 2 we explored 1) the extent of ToM deficits in ASD; 2) how parenting styles relate to ToM and 3) whether better ToM and parenting in combination related to reduced social deficits. We found severe ToM deficits in our sample which suggests delayed development. Authoritative parenting was significantly related to better ToM capacities. Furthermore, a regression of positive

parenting and ToM abilities in combination with social deficits indicated that only ToM and age predicted less social deficits.

This current study suggests that specifically authoritative parenting and ToM skills may be important underlying mechanisms for better social abilities in ASD. Most notably, it stresses that ASD cannot be regarded as a homogenous population as a clear distinction between the verbal and non-verbal subgroups is reported herein; a currently underestimated notion. Although still in its preliminary stages, the work reported in this thesis opens up a new line of thinking that could, in principle prove to be beneficial to research in the area of ASD.

## Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that becomes evident during early childhood, typically between the ages of twelve to twenty-four months (American Psychiatric Association, 2014). Notably, the symptoms of ASD vary between each child depending on the severity of the disorder and their developmental level and for this reason each child with ASD presents a unique manifestation of the disorder. Despite this diversity, social deficits constitute a core feature across all presentations of ASD.

ASD is fundamentally characterised by social deficits and therefore it is important to understand social functioning and what contributes to social development in children on the spectrum (American Psychiatric Association, 2014; Buitelaar, 1995; Fein et al., 1986; Kanner, 1943). It is widely accepted that ASD has a neurobiological basis however there is no universal agreement on specific biomarkers or cognitive reasons for the diverse symptoms characteristic of ASD (Happé, Ronald & Plomin, 2006). At present, the research on understanding the lack of social skills found in ASD individuals remains indefinite and controversial.

The literature for neuro-typical (NT) children has highlighted attachment styles, parenting styles and theory of mind (ToM) capacities as important contributors to social development (Ainsworth & Bowlby, 1991; Astington, 2005; Ayers, 2002; Baumrind, 1971; Gottman, 1997; Hutchins & Prelock, 2008). Although these three variables have been noted as fundamental to social abilities, there is only some support for relationships between social deficits and attachment styles, parenting styles, and ToM individually in ASD. Moreover, there is limited exploration of these relationships in combination, especially in the South African context. This gap in the literature is even more apparent regarding possible differences between verbal and non-verbal children with ASD. Hence this study is focused on exploring how these three variables present and how they relate to social abilities in children with ASD.

This study adopts a neurobiological framework for understanding ASD. It is therefore the intention of this study to explore social deficits in ASD and their relationship with attachment

styles, parenting styles and ToM abilities and to assess whether these associations differ across verbal and non-verbal children. Below I will describe the social deficits in ASD and discuss why verbal and non-verbal ASD children may form distinct subgroups. Thereafter the existing knowledge on attachment classification, parenting styles and theory of mind in ASD and more importantly, their relationships with social deficits will be presented.

## **Literature Review**

### **Autism Spectrum Disorder (ASD)**

ASD is characterised by impairments in social communication and interaction, and by repetitive behaviours and restricted interests. There is a special difficulty with social and affective stimuli. Kanner was the first to describe ASD as an “innate inability to form the usual affective contact with people” (Kanner, 1943, p. 250). Kanner (1943) proposed that ASD children demonstrate extreme aloneness, where from birth they do not react to social stimuli from the external world. It is probable that these social deficits could be considered a central and primary feature since they present early in a child’s development and are pervasive throughout the lifespan (American Psychiatric Association, 2014; Buitelaar, 1995; Fein et al., 1986; Kanner, 1943).

The *Diagnostic Statistical Manual – Fifth edition* (DSM-5) further describes these social deficits within three areas: social-emotional reciprocity, non-verbal communicative behaviours and the development, maintenance and understanding of relationships (American Psychiatric Association, 2014, p. 50). These three areas are closely interlinked as one affects the other. Moreover, the descriptions of these three areas (details below) should be viewed with the understanding that they are “common themes” and are not considered by the researcher to be entirely true for every ASD individual.

Deficits in *social-emotional reciprocity* are related to ASD individuals’ tendency to experience difficulties in engaging with people and/or the lack of a desire to share their thoughts, interests or feelings with others (American Psychiatric Association, 2014). This behaviour has been described as an “autistic aloneness” that tends to dominate their behaviour. It has been proposed

that this deficit illustrates a lack of development in social awareness (Kanner, 1943). The DSM-5 provides additional non-exhaustive examples, namely abnormal social approach or unusual responding to social interactions. In addition, people with ASD seem to struggle with initiating or maintaining two-way conversations and their communication is frequently used to attain information about the object of their interest (American Psychiatric Association, 2014; Fein et al., 1986).

*Non-verbal communicative behaviours* are considered important for social interaction and are often expressed very early in life. Typical examples include babies crying to express need or children pointing to objects they want a caregiver to give them. However in ASD there are difficulties in this area such as a deficiency in the integration of verbal and non-verbal communication (examples of non-verbal communication include poor eye contact, lack of facial expressions or use of gestures to express emotions, etc.; American Psychiatric Association, 2014).

The *development, maintenance and understanding of relationships* are often hindered as a result of ASD children being unresponsive to their social context. They tend to act as if the people around them are not present or they illustrate a lack of interest in others such as not responding to others' expressed feelings (American Psychiatric Association, 2014; Fein et al., 1986). Children with ASD often appear to be happiest when left alone and may also treat people who try and engage as intruders (Fein et al., 1986). This illustrates an inability to adjust behaviour to suit the social environment, which in turn leads to a difficulty in involving others in imaginative play or forming friendships (American Psychiatric Association, 2014).

It is important to recognise that while every child with a diagnosis of ASD would have deficits in their social abilities, there could be differences caused by other co-morbid variables and this would result in the formation of subgroups within the ASD populace. It is possible that verbal ability could be an example of such a variable. There is empirical evidence indicating that the development of language in the majority of children with ASD is delayed (Le Couteur, Rutter, Lord, Rios, Robertson, Holdgrafer, & McLennan, 1989; Lord & Rhea, 1997). An interesting

occurrence though is that while some children with ASD develop good verbal ability, others remain mostly nonverbal (Siller & Sigman, 2002). Approximately one third to one half of the ASD population do not have functional verbal language (Noens et al., 2006; Tager-Flusberg, Paul & Lord, 2005). Furthermore, despite years of interventions, approximately 25% of individuals never develop spoken language (Tager-Flusberg, Paul & Lord, 2005).

In spite of this substantial subgroup of non-verbal individuals in the ASD populace, the DSM-5 has not included this term in the diagnostic criteria. A possible reason for this could be that there is no clear distinction between what makes an ASD individual verbal or non-verbal (Mody, 2014). The non-verbal population is highly variable as individuals either have spoken language that is not used meaningfully or have no verbal language at all (NIH, 2010; Smith, Mirinda & Zaidman-Zait, 2007). Furthermore, there is no set characteristic that defines individuals as being non-verbal (NIH, 2010). It is very likely that the major limiting factor in research directly aimed at exploring this subgroup is the lack of verbal language since traditional standardised assessment tools often require spoken language and for this reason it is extremely difficult to assess these individuals (Mody, 2014; NIH, 2010). Nonetheless, a lack of language ability is likely to have profound effects on social interactions and development of theory of mind.

As ASD is characterised by poor social abilities, and specific difficulties with relationships, it is important to explore attachment. The reason for this is that how we interact with others, our understanding, maintaining and development of relationships is thought to be based on our attachment styles (Ainsworth & Bowlby, 1991).

### **Attachment Theory**

John Bowlby, the father of attachment theory, believed that the early relationship between the child and parents is key for the development of a child's personality (Ainsworth & Bowlby, 1991). This psychological model emphasises the importance of a strong relationship with the primary caregiver in the child's emotional and social development. Bowlby believed that a baby is genetically programmed to evince attachment behaviours (crying, clinging, proximity seeking) to

express their needs. After a few months, these behaviours are directed towards their primary caregiver for safety (Ainsworth & Bowlby, 1991).

Mary Ainsworth formulated the concept of the “secure base” symbolising the child’s use of the primary attachment figure as a secure base from which to explore their environment (Ainsworth & Bowlby, 1991). Ainsworth investigated her secure base theory using the Strange Situation Procedure and identified children as having either secure or insecure attachment. The findings suggested that these patterns of attachment were dependent on the child’s caregiving environment. This meant that attachment styles were reflections of how accessible and responsive mothers were to the babies’ signals and the extent to which they responded appropriately (Ainsworth & Bowlby, 1991). Fundamentally, early attachment patterns are thought to shape individuals’ future expectations and trust in relationships (Ainsworth & Bowlby, 1991).

Attachment theory initially identified three attachment styles; secure, anxious-ambivalent insecure and anxious-avoidant insecure. Bowlby (1980) described a securely attached individual as possessing a “representational model of attachment figure(s) as being available, responsive, and helpful” (Bowlby, 1980, p. 242). Securely attached individuals are confident that their caregiver is available even when out of sight, approach or seek their caregiver and are easily soothed when distressed (Main & Cassidy, 1988).

*Anxious-ambivalent insecure* attachment also called *insecure resistant attachment*, is where the child has an ambivalent (conflicting) behavioural style towards the caregiver; portrayed as being clingy and dependent as well as rejecting. A sense of security is undeveloped and consequently this child frequently fears separation from the caregiver. This preoccupation inhibits their ability to explore their environment (Ainsworth, 1969). This ambivalent behaviour has been related to inconsistent responses to the child’s needs from the primary caregiver.

Children who do not demonstrate any external attachment behaviours towards their caregivers are typically characterised as having *anxious-avoidant insecure* attachment. Their behaviour suggests a sense of emotional and physical independence where the child does not seek

comfort from the caregiver when distressed (Ainsworth, 1979; Behrens, Hesse, & Main, 2007). Internally though, they do display anxiety (such as increased heart rate, despite not externally displaying this distress by seeking comfort) when present in a distressing situation (Spangler & Grossmann, 1993). There is an association between this insecure attachment and caregivers who are rejecting (e.g. when babies sought contact), insensitive to the child's signals, unavailable during emotional distress and who withdraw from difficult tasks (Ainsworth, 1979; Stevenson-Hinde & Verschueren, 2002).

A later described style of attachment, the *disorganised (unresolved)* attachment style has been characterised as bizarre, overtly conflicted or dissociated where these behaviours reflect a breakdown of organised attachment strategy (Main & Solomon, 1986). This attachment style is believed to be in response to experiences of trauma and loss with their parents.

**Attachment styles in ASD.** Kanner (1943) described ASD as a developmental disorder where individuals fail to form affective contact with others. Essentially attachment pertains to the affective bond between mother (or primary caregiver) and child, however the nature of social impairments in ASD could hamper the ability to form attachment bonds. Specifically, it may be that the inborn social difficulties make it difficult for mothers of children with ASD to correctly interpret their signals (van Ijzendoorn et al., 2007).

This is in line with the hypothesis of *impaired attachment* which suggests that normal attachment behaviour is impaired in ASD (Bowlby, 1973; Buitelaar, 1995). Impairments in the attachment behavioural repertoire include failure to cuddle, lack of eye contact and responsiveness, indifference to physical affection or contact and failure to give socially directed smiles (Buitelaar, 1995; Rutgers et al., 2004). However there have been cases where parents reported that their child (with ASD) does display distress and clinging towards them during times of separation (Buitelaar, 1995).

Research seems to have varying findings regarding the presence, type and presentation of attachment in ASD. It was initially believed that attachment was non-existent in ASD (see Rutgers

et al., 2004) however studies have found both secure and insecure attachment present in ASD samples (Capps, Sigman, and Mundy, 1994; Marcu et al., 2009; Rutgers et al., 2004; Waters et al., 2000). When present however, attachment behaviour has sometimes been described as bizarre in ASD individuals (Buitelaar, 1995; Van Berckelaer- Onnes & Luncangeli, 1999).

Rutgers and colleagues (2004) conducted a meta-analysis using ten studies on observed attachment security in ASD children. These studies measured attachment in ASD using either the original Strange Situation Procedure (SSP) by Ainsworth, a modified SSP, or the Attachment Q-Sort. Overall, the meta-analysis (N = 287) found that children with ASD were less securely attached to their caregivers than children without ASD (Rutgers et al., 2004). Nonetheless it is important to review the studies that find support for both insecure and secure attachment in order to get a better understanding of attachment in ASD.

The studies included in the meta-analysis reporting insecure attachment found a significantly reduced number of securely attached children and a substantial difference in secure attachment when compared to non-ASD controls (Bakermans-Kranenburg, Rutgers, Willemsen-Swinkels, & Van IJzendoorn, 2003; Pechous, 2001; Spencer, 1993). In contrast, studies that made use of the Modified SSP and not the other measures mentioned above, found high levels of secure attachment ranging from 40% - 54%; rates of which were not significantly lower than the non-ASD comparison groups (Capps, Sigman, and Mundy, 1994; Rutgers et al., 2004; Shapiro, Sherman, Calamari, & Koch, 1987; Willemsen-Swinkels et al., 2000). In addition, a study conducted by Dissanayake & Crossley (1996, 1997) found no difference in response to short separations when compared to NT and Down-syndrome children (Rutgers et al., 2004). A recent meta-analysis by Kahane and El-Tahir (2015) reviewed ten studies published after the year 2004. This meta-analysis concluded that secure attachment is present among children with ASD though less prevalent than in NT children.

In addition to the contrasting results, these two meta-analyses also highlight the limited number of studies available on ASD and attachment. This lack of research impacts the statistical

power to find significant effect sizes regarding what type of attachment styles are found in ASD as well as what variables may influence attachment patterns in ASD and consequently our understanding on attachment styles in ASD is limited (Rutgers et al., 2004).

An important consideration is that different observational settings could well impact attachment results (Rutgers et al., 2007). Specifically the SSP, which is the gold standard for measuring attachment, could prompt anxiety and stress for children with ASD (Kahane & El-Tahir, 2015). This is based on the knowledge that children with ASD are affected by change in routine and have a strong emotional distress reaction (Kahane & El-Tahir, 2015). This suggests that a measure such as SSP might not be appropriate to measure the child's true attachment behaviour. For this reason Rutgers and colleagues (2007) suggested that attachment behaviours of children with ASD may be more context-dependent than attachment behaviours of non-ASD children.

In addition, most of the studies available do not indicate percentages of secure versus insecure attachment, nor do they specify type of insecure attachment (avoidant or anxious). A study that does provide this information was conducted by Marcu and colleagues (2009) who found that 42.2% of children with ASD were classified as secure, 20% insecure-avoidant, 15.6% insecure-ambivalent and 22.2% insecure-disorganised. Another study conducted by Karen-Karie and colleagues (2009) included 45 preschool boys with a diagnosis of ASD. They found that 42.2% were securely attached, 20% were insecure-avoidant, 15.6% were insecure-ambivalent and 22.2% were insecure disorganised. These results were found while controlling for three covariates, namely the child's level of functioning, severity of diagnosis and level of responsiveness. Apart from the limited knowledge in attachment there is also a gap regarding the specifics of attachment classifications in ASD.

Although the presence and appearance of attachment in ASD is variable and complicated, these findings do indicate that attachment in general is possible in ASD populations. Furthermore these contradictory findings appear to discredit the belief that insecure attachment is inevitable in

ASD as there is evidence indicating that it is possible for parents and children to form secure attachments.

There is also a gap in the literature as to what the social outcome is for ASD children in relation to their specific attachment style. Some studies do highlight the relationship between attachment and ASD symptoms but are typically from the perspective of ASD symptoms impacting attachment. Shapiro and colleagues (1987) found that attachment was not related to the severity of ASD symptoms. Conversely, Kahane and El-Tahir (2015) found that the severity of ASD and co-morbidities are important variables that appear to influence the security and organisation of attachment. They reported that children with co-morbid developmental disorders might need more time to develop a secure bond with their parents. In addition, they reported that the severity of ASD symptoms impacts parental sensitivity which in turn influences the security of the attachment bond between parent-child dyad (Kahane & El-Tahir, 2015). Another study by Ijzendoorn and team (2007) also found that less social deficits in ASD predicted more attachment security. The impact of attachment style on social functioning in the longer term appears to be unknown.

**Attachment in non-verbal ASD children.** As previously discussed, the information available on attachment in the ASD population is quite limited, even more so regarding comparisons between verbal and non-verbal children with ASD. A study conducted by Dissanayake and Crossley (1997) explored the responses of ASD (N = 16, both verbal and non-verbal), NT, and Down syndrome children to separation and reunion with their mothers. The verbal (N = 8) and non-verbal (N = 8) ASD groups were similar in their responses to separation, although they differed in their responses upon reunion with their mothers. Unlike the verbal group, the non-verbal group was more likely to show less intense responses upon reunification with their mothers.

In contrast, the verbal ASD children displayed reunion patterns that entailed approaching and maintaining proximity with their mothers. This is an interesting occurrence as even though the verbal group had superior verbal ability and greater ability to verbally interact with their mother from across the room, unlike that of the non-verbal group, they still chose this non-verbal behaviour

that resembles normal attachment behaviour in NT populace. The differences between these verbal and non-verbal groups in proximity and social behaviours directed to mothers are supported by previous research findings where ASD attachment security scores had a positive relationship with language ability (Rogers et al., 1991, 1993). In an attempt to explain this finding, Rogers and team (1991) suggested that it is possibly a more cognitively demanding task for the non-verbal children to construct an internal working model of their mother and that this could account for the non-verbal children displaying less responsive behaviours to their mothers upon reunification.

There are a few common characteristics found in non-verbal children with ASD such as: low IQ, poor socialisation scores, reduced motivation to communicate, deficits in joint attention and motor issues (Wodka, Mathy, & Kalb, 2013). IQ determines whether a child is high functioning (IQ > 70) or low functioning (IQ < 70) as seen in the previous DSM-IV-TR diagnostic criteria. As low IQ has been found to be a common characteristic in non-verbal children with ASD, they could be viewed as falling into the LF range (Carpenter et al., 2009). Furthermore, there are limited studies that specifically explore the non-verbal populace attachment styles and it is for this reason that a study on low functioning ASD children will be explored. Notably, we do recognise that it is not definitely proven that late language acquisition is an indication of low IQ. Although 'non-verbal' is not synonymous with 'LF', research suggests that most non-verbal children tend to fall in the LF range. There have been studies that delegated non-verbal ASD children under the term low-functioning as well (Bacon et al., 1998; Cole, Baron-Cohen & Hill, 2007; Rogers et al., 1991). Therefore, for the review purposes we will view LF subgroups in studies as similar to non-verbal subgroups.

A study conducted by Karen-Karie and colleagues (2009) included 45 preschool boys with a diagnosis of ASD, which included both LF (N = 34, 75.5%) and HF (N = 11, 24.4%) ASD children. They found that all of the LF ASD children were more disorganised or insecurely attached whereas 45% of HF ASD children were disorganised or insecurely attached and 54% of the HF children

were securely attached (Karen-Karie et al., 2009). These findings suggest that there is a possible relationship between the level functioning of the ASD child and their attachment style.

Overall it seems that non-verbal children with ASD are more likely to have insecure attachment scores. Admittedly the aforementioned studies had very small samples of non-verbal ASD children. Nonetheless, these findings indicate that there could be important differences in verbal and non-verbal children with ASD and that this may significantly influence attachment.

The question of how and to what extent attachment bonds develop in children with ASD remains unsettled. How is it possible that some children with ASD, despite their predisposition for social impairments, are still able to form secure attachment with their parents and exhibit normal attachment behaviour? Overall there have been conflicting findings regarding the prevalence of attachment types in ASD in general as well as whether there are further differences between non-verbal and verbal children in the ASD population.

In order to gain a better understanding of these contradictory findings regarding attachment and answer the question of “how”, it is important to explore another variable, namely parenting styles. Previous studies found that children with ASD who displayed secure attachment had mothers who displayed high levels of maternal sensitivity (Capps, Sigman, & Mundy, 1994; Kahane & El-Tahir, 2015). Therefore there is a need to explore parental behaviour as a possible positive factor in the development of secure attachment and more so social development.

### **Parenting Styles**

Baumrind’s (1971) model for parenting has been the most widely used and studied. He conceptualised three parenting styles; authoritative, authoritarian and permissive. Research indicates that the type of parenting style employed influences the socialisation of children (Ayers, 2002; Baumrind, 1971; Gottman, 1997).

*Authoritative parenting* is known as the more positive style of parenting and is associated with the best developmental outcomes for the child (Baumrind, 1989; Dyches et al., 2012; Hart, Newell, & Olsen, 2003). This type of parent is characterised as being rational, explains reasons,

respects the child's individuality, is warm and has balanced discipline that is consistent and regulates their child's behaviour within structure (Dyches et al., 2012; Robinson et al., 2001; Woolfson & Grant, 2005). Authoritative parents have been described as 'emotion coaches' as these parents demonstrate empathy towards their child by using soothing words of affection and by helping the child to label their emotions and feelings. In doing this they assist and teach their child how to regulate emotions (Ayers, 2002; Gottman, 1997). Additionally, they also encourage autonomy and value disciplined conformity (Mensah & Kuranchie, 2013). Their discipline is characterised by its supportive nature instead of being punitive (Mensah & Kuranchie, 2013).

An *authoritarian parent* is known as a directive, restrictive and controlling parent who places themselves as the authority figure in order to maintain obedience and respect for authority (Dyches et al., 2012; Turner et al., 2009; Woolfson & Grant, 2005). To this end, when the child exhibits self-will or beliefs and actions that are contrary to the authoritarian parent, it is controlled with reprimanding punitive measures (Ayers, 2002; Gottman, 1997; Mensah & Kuranchie, 2013; Woolfson & Grant, 2005). This parent believes that negative emotions displayed by the child are a form of manipulation and that it illustrates bad character traits (Ayers, 2002; Gottman, 1997). This parent doesn't engage or encourage a process of making mutual concessions or reasoning with their child as their word should be accepted as right (Mensah & Kuranchie, 2013).

The *permissive parent* is known as the indulgent and lenient parent. This parenting style is considered warm, responsive, accepting and does not place demands on their child (Dyches et al., 2012; Santrock, 2007). This parent lacks control and does not expect their child to regulate behaviour or behave appropriately (no rules or punishments; Dyches et al., 2012). Furthermore, they do not position themselves as an authority figure but more so as the friend of their child (Woolfson & Grant, 2005). This kind of parent is not an active agent in moulding their child's behaviour (Baumrind, 1991). Therefore, their children regulate their own desires and impulses as these parents do not direct or expect their child to obey external standards.

**Parenting styles in ASD.** Kanner (1943) proposed that the cause of ASD's characteristic social problems could either be innate or related to being raised by parents whose nature is cold and intellectual. In his cases he observed that children with ASD had parents who were emotionally detached or obsessed and this suggests that there is a link between the lack of affective contact in ASD and parenting styles (Kanner, 1943). This notion of the refrigerator mother (a mother considered emotionally cold) has long been discredited. Though Kanner's idea was highly controversial he did shed light on the possible relationship between parenting styles and social development.

It should be noted that it can be very challenging and stressful to parent a child with ASD (Dabrowska & Pisula, 2010; Davis & Carter, 2008; Estes et al., 2009). A previous study by Eisenhower and colleagues (2005) found that parents of ASD children had significantly higher stress levels compared to parents of children with other developmental disabilities. This could be a reflection of the impact of the ASD diagnosis as well as the continuous psychosocial, developmental and behavioural demands of raising a child who has ASD. These parents experience specific challenges in parenting that can be the result of the specific behavioural patterns exhibited by a child with ASD. It is possible that the social impairments in ASD may have an effect on parental interactive behaviour. Moreover, in addition to the skills required to raise a neuro-typically developing child, these parents fulfil multiple and demanding parental roles (National Research Council, 2001). These include having to be a teacher (parents are considered key to aiding in the transference of skills learnt at school to the home), they need to learn new skills to deal with the special needs of their child with ASD and advocate for suitable educational programs and legal rights of their child (National Research Council, 2001).

Instead of viewing parenting styles as 'to blame' for ASD symptoms, we could explore parenting behaviours (for example authoritative parenting style which features sensitivity and warmth) as possible protective factors or a tool in the social development of a child with ASD. This is especially probable since previous studies have investigated the influence that parental behaviour

has on the socialisation of neuro-typically developing children. Specifically, parenting styles impact on how children develop pertinent skills (i.e. social, emotional and cognitive) that allow them to function in their social environment (Grusec & Davidov, 2010).

This denotes that parenting may play an important role in the development of social competence by mitigating the social deficits in children with ASD. Unfortunately, research on the three parenting styles conceptualised by Baumrind and their relationship with social abilities and attachment in ASD are very scarce (Lambrechts et al., 2011). At present there is only extensive research available on parental perceptions, cognitions, coping mechanisms and other parental behaviour in the ASD population.

The relationship between parenting style and child development in the ASD population was first explored by Siller and Sigman (2002). They specifically investigated the role of parents in the development of their children's non-verbal and verbal communication. The participants were recruited into three groups for this study; ASD (N = 25), developmental delay (N = 18), and neuro-typical development (N = 18). They found that higher levels of parental synchronisation during initial play interactions were associated with the development of superior joint attention and communication across a time period of 1, 10 and 16 years. These findings shed light on a possible developmental link between parental sensitivity and the development of communication skills in children with ASD.

Dyches and team (2012) also found a relationship between parenting and child development in their meta-analysis. Specifically they found a moderate association between positive parenting and subsequent development for children with developmental disorders. Carter and colleagues (2007) found similar results that offered support for the previously discussed study. They found a relationship between maternal supportive engagement (provides a positive and encouraging environment where their child can explore) and cognitive engagement (reflecting efforts to stimulate verbal and non-verbal development and attunement to their child's interest) with language gains in young children with ASD over a period of one year (Carter et al., 2007).

Mahoney and Perales (2003) explored the efficacy of Relationship-Focused (RF) interventions on the social and emotional behaviour of children with ASD. The RF intervention is a developmental approach that assists parents in enhancing their utilisation of responsive and interactive strategies during routine interactions with their children, with the aim of promoting the development and social-emotional functioning of children (Mahoney & Perales, 2003). In this study they made use of *responsive teaching* that encompasses four developmental domains in its objectives; cognitive, communication, social-emotional functioning and motivation. Their findings indicated an increase in mothers' responsiveness, which was also associated with significant improvements in their children's social interaction. Mahoney and Perales (2003) suggest that when maternal responsiveness is enhanced it encourages children to learn and use behaviours they need in order to attain higher levels of development such as social-emotional functioning. The aforementioned information therefore emphasises the need to discern whether certain parental behaviours could be either protective factors or tools (or both) to encourage social development for children with ASD.

There are very limited studies that explore parenting styles explicitly for the ASD population. Baumrind proposed that parents of ASD children could be more prone to display authoritarian parenting styles than an authoritative style (Baumrind 1996). In a study that examined both parenting styles (authoritative and authoritarian) and attachment styles, they assessed parents of 27-32 month old children who were divided into four groups; ASD, mental retardation (MR), learning disorders (LD) and non-clinical (NT; Rutgers et al., 2007). They found that parents of NT children displayed higher levels of the authoritative parenting style, compared to parents of ASD children. This is congruent with other investigations which similarly indicated that the behaviour of parents of ASD children is more directive and controlling than that of parents of neuro-typically developing children (Siller & Sigman, 2002).

An aspect of parental behaviour that has been generously explored is parental or maternal sensitivity. Maternal sensitivity and insightfulness has been found to support the development of

secure attachment in children with ASD (Capps, Sigman & Mundy, 1994; Kahane & El-Tahir, 2015). Not only is this finding consistent with similar studies of typically developing children, but it also suggests the possibility that certain parental behaviours, such as sensitivity, may function as a protective factor and promote a better prognosis for social development in ASD (Capps et al., 1994; Kahane & El-Tahir, 2015; Willemsen-Swinkels et al., 2000). Notably, this behaviour is a characteristic of the authoritative parenting style and as a result offers support for the positive outcomes of this parental style in ASD.

A small number of studies have explored parenting styles in developmental disorders. One of these studies by Woolfson and Grant (2005) explored the relationship between parental stress and parenting styles in the DD (developmental disorders) populace and compared it to NT dyads. They explored four parenting styles and found the following scores in parents of children with a developmental disorder; authoritative (n = 13), authoritarian (n = 14), permissive (n = 17), and neglectful (n = 9). No inferential statistics were reported so we cannot deduce which parenting style was prominent, but descriptively it seems as though most parents were quite indulgent (permissive) in their parenting. In addition, they found that when parents employed the authoritative parenting style it was associated with more parental stress.

To the best of my knowledge there is not enough information on what parenting style parents in ASD typically demonstrate or whether this differs between verbal and non-verbal children. There is limited information about parenting styles, specifically which characteristics in each parenting style parents with ASD children tend to demonstrate. Although the aetiology of ASD is neurobiological there is evidence that parental behaviours play an important role in the subsequent development (in different domains) of their children who have ASD (Carter et al., 2007; Siller & Sigman, 2002; Wachtel & Carter, 2008). Therefore, there is also a need to gain more detailed insight into what aspects of parenting styles influence social development.

### **Theory of Mind**

Theory of mind (ToM) is a multifaceted construct that describes a range of unique human

abilities that are fundamental to the development of social understanding and social competence (Astington, 2005; Hutchins & Prelock, 2008). ToM refers to the ability to understand a person's mental states such as thoughts, feelings and beliefs, the ability to interpret and understand behaviour in relation to mental states and to adjust one's own behaviour according to this understanding (Baron-Cohen et al., 1985). Additionally, ToM includes the realisation that one's own and others' mental states are independent from one another (Baron-Cohen et al., 1985).

ToM underlies many abilities such as understanding desires, intentions, false beliefs, recognising and understanding causes of emotion, second-order thinking (eg. understanding what she thinks he thinks), engaging in pretend play as well as the understanding and production of mental state terms and speech acts (Hutchins, Bonazinga, Prelock & Taylor, 2008). Overall, ToM underlies people's competence to understand social situations and to predict the actions of others' which is integral to social functioning (Leslie, 1987).

**ToM in ASD.** ToM development has been found to occur in some individuals with ASD, though it may be slower and follow a different developmental course than in NT children. ToM deficits present themselves differently for every ASD case since they are dependent on a dimension of ASD severity. According to the ToM hypothesis, ASD individuals' inability to understand social situations and interact appropriately can be understood in relation to difficulties inferring mental states. For example, imagination deficits underpin the inability to attribute mental states that are different to reality and social impairments are related to ASD individuals' inability to understand the way in which other people's thoughts, feelings and desires affect behaviour (Yirmiya et al., 1998). Therefore, the impairments in social communication and social reciprocity that are characteristic of ASD have been theorised to stem from deficits in ToM (Baron-Cohen, 1995; Baron-Cohen, 2008; Frazier et al., 2012, Hoogenhout & Malcolm-Smith, 2014; Hutchins & Prelock, 2008).

To date, the ToM impairments in ASD are widely acknowledged and are considered by some to underlie the core social deficits. A meta-analysis conducted by Yirmiya and colleagues

(1998) found that ASD children performed significantly more poorly in ToM abilities than intellectually disabled and NT children. Studies that have explored the relationship between ToM and social competence have confirmed that there is a positive correlation between the two (Bosacki & Wilde Astington, 2001). It is possible then that ToM could be a factor in determining social abilities in ASD children. Studies that have explored the relationship between ToM performance and social performance in ASD will be discussed below.

Lam and Yueng (2012) investigated symbolic play (a social manifestation of ToM) in ASD children and NT children. Their findings illustrated that ASD children demonstrated significantly less symbolic play in comparison to the NT children. Furthermore they found significant deficits in ToM, suggesting that symbolic play deficits in ASD are strongly associated with theory of mind. The ToM deficits affecting symbolic play pertained to ASD children's difficulty in mentalising others' perspectives. This study demonstrated how ToM could directly impact social competence in ASD individuals.

A study by Frith and colleagues explored the relationship between ToM capacity and social behaviour in children with ASD, assessing their level of real-world social deficits (Frith, Happé & Siddons, 1994). They measured social adaptation using parent report via the Vineland Adaptive Behavior Scales. They found that children with ASD who passed false belief tasks illustrated better ToM related social abilities and displayed better communication abilities. In contrast, the children who failed ToM tasks showed minimal understanding of mental states in their daily interactions and high levels of learnt social behaviour.

Hutchins and Prelock (2008) had a preliminary exploration of the relationship between ToM interventions aimed at improving ToM capacity with an increase in social abilities in children with ASD. A case vignette illustrated how improved ToM abilities were related to better ability to; stay calm in frustrating situations, use words instead of hitting and understand another person's perspective (Hutchins & Prelock, 2008). Their study suggested that interventions should incorporate ToM interventions with the focus of understanding the relationship between ToM and

communicative and behavioural functioning in children with ASD (Hutchins & Prelock, 2008). Although this finding is based on one case and should be considered preliminary, it addresses an area in the literature where there is limited exploration of ToM interventions' relationship with better social abilities in ASD (Hutchins & Prelock, 2008).

Empirical investigations on the ToM ability of non-verbal children with ASD are extremely limited. This is due to it being incredibly challenging to assess ToM without verbal language. This is especially true when assessing higher order ToM, second order belief reasoning and labelling of emotions and their causes since non-literal language requires verbal representations. As a consequence, very little is known about ToM ability in this subgroup of ASD.

A previous study investigated ToM ability in the non-verbal populace using a modified false belief task. They included children with a maximum language production age of two years old, children with LF ASD (N = 12), children with specific language impairment (SLI, N = 15) and NT children (N = 15). They found that false belief understanding could be independent of language ability and that non-verbal children with ASD show specific impairment in ToM (Cole, Baron-Cohen & Hill, 2007). However, the false belief test used is very recent and is only capable of testing rudimentary ability.

Overall, there are studies indicating that ToM abilities are tools to enhance social competence. Therefore it is suggested that deficits in ToM are related to impairments in social competence and understanding. However, there is little to no knowledge in the literature in directly measuring ToM's association with overall social abilities in ASD and variables that could assist in the development of ToM competence will be reviewed.

**The role of parenting in ToM development.** It is important to understand how ToM develops in ASD. It is for this reason that parenting styles' relationship to ToM development will be reviewed below. Authoritative (responsive) parenting style is sensitive to the child's motives and mental states and appropriately translates them back to the child. This is a variable in ToM development as it gives children the opportunity to correctly learn about mental states (Symons &

Clark, 2002). Meins and team (1998) found in the NT populace that having parents who treated their children as having intentions and mental states at 6 months positively predicted ToM performance at the age of four years. In addition, parenting behaviours such as negative control (physical control or criticism), intrusiveness and power assertion (spanking or yelling) are negatively related to ToM performance (Guajardo, 2009; Hughes et al., 1999; Pears & Moses, 2003; Vinden, 2001). Essentially authoritarian behaviours such as control provide the child with little opportunity to learn about others' mental states (Vinden, 2001).

Slaughter, Peterson and Mackintosh (2007) explored how mother's narrative input related to ToM acquisition for both NT and children with ASD. In this study, mothers read wordless storybooks and their narratives were analysed for mental state language. They found that in children with ASD ( $N = 24$ ;  $M$  age = 6 years 7.5 months) their mothers' explanatory, causal and contrastive talk about emotions was related to ToM performance. This finding is similar to that found in NT population.

Parenting styles have been found to underlie the development of ToM in the NT populace. Overall parenting styles and ToM appear to have direct relationships with social development in NT children. However, there is limited exploration of these associations together in the literature for the ASD population.

### **Rationale for Present Study**

To date there is no pinpointed genetic or cognitive cause for ASD and as Happé, Ronald and Plomin (2006, p. 1218) said "its time to give up on a single explanation for ASD". This study accepts that ASD is a complex disorder and that there may be many variables that could cause or affect a facet of ASD such as social deficits. In order to improve our understanding of this core characteristic of ASD, we need to explore possible mechanisms that underlie social deficits.

The literature review emphasised the limited exploration of how attachment styles, parenting styles and ToM relate to social deficits in ASD. Given that the literature highlighted that all the aforementioned variables underlie social development in NT children, these variables could

serve as a mechanism in development of social abilities in children with ASD. Furthermore, there is a knowledge gap regarding whether there are subgroups within ASD based on verbal ability: verbal and non-verbal. This highlights the importance of dividing children within ASD according to verbal ability and exploring whether they differ in social deficits, a core feature of ASD, as well as in terms of attachment and parenting styles. Below, the rationale for the exploration of the aforementioned variables will be discussed.

For attachment, there is limited research exploring all three attachment styles and which one is most prominent in the ASD populace. Furthermore, there is limited knowledge of the differences in attachment styles between verbal and non-verbal children.

There has been very little research conducted on parenting styles in ASD, which could be a consequence of social deficits in ASD having a neurobiological cause. More importantly, where research has been conducted on parenting styles, researchers only explored facets of authoritarian and authoritative parenting styles. Therefore, there is no indication of what parenting style is predominant in ASD. Our study will aim to offer insight into complete parenting styles rather than simplified facets thereof. In addition we will explore the differences in parenting styles between caregivers of verbal and non-verbal children with ASD since this, to the best of our knowledge has not yet been explored.

For ASD children, deficits in ToM have been identified in various studies, so it is important to explore the extent of these deficits in the South African context. Moreover, it is important to explore whether a particular parenting style is associated with better ToM capacity in ASD, since this association has been shown in the NT population (Meins et al., 1998; Symons & Clark, 2002). Furthermore, it is important to investigate whether parenting and ToM together relate to better social abilities.

### **Aims of the Present Study**

This study aimed to explore to what extent attachment styles, parenting styles and ToM skills are associated with social deficits in ASD. This was done in two studies. In Study 1, the

researcher investigated the nature of attachment styles and parenting styles. These two variables were then explored between the verbal and non-verbal subgroups to discern differences. In Study 2, ToM deficits were explored in verbal children, as well as the relationship of parenting styles with ToM. Lastly and most importantly, in both studies the researcher explored associations between the aforementioned variables with social deficits to determine if they predict social deficits in ASD. Below the research questions and hypotheses of this study are stipulated.

#### Study 1: Attachment Styles, Parenting Styles and Social Deficits in children with ASD.

1. Is there a difference in social ability (social deficits) between verbal and non-verbal ASD children?

H1: The verbal subgroup will have fewer social deficits than the non-verbal subgroup.

2. What type of attachment style is mostly present in ASD children?

H2: Secure attachment will be greater than anxious-insecure and avoidant-insecure attachment in ASD.

3. Is there a difference in attachment between verbal and non-verbal children?

H3: The verbal subgroup will be more securely attached and less insecurely attached compared to non-verbal children.

4. Does attachment style relate to social deficits in ASD?

H4: Secure attachment will have an inverse relationship with social deficits and both insecure attachments will have a positive relationship with social deficits.

5. What type of parenting style is mostly present in parents of children with ASD?

H5: Authoritative parenting will be reported more than both authoritarian and permissive parenting.

6. Is there a difference in parenting styles between the verbal and non-verbal groups?

H6: Parents of the verbal subgroup will use more authoritative parenting as well as less authoritarian and permissive parenting compared to the non-verbal subgroup.

7. Does parenting style relate to social deficits?

H7: Authoritative parenting will have an inverse relationship with social deficits and authoritarian and permissive parenting will have a positive relationship with social deficits.

8. Do attachment and parenting styles together relate to social deficits?

H8: Attachment and parenting styles in combination will relate to social deficits.

Study 2: ToM and its relationships with Parenting Styles and Social Deficits

1. What are the ToM deficits in South African context?

H1: There will be severe deficits in ToM

2. Is there a relationship between parenting styles and ToM?

H2: More authoritative parenting will have a positive relationship with ToM abilities.

3. Do parenting styles and ToM together relate to social deficits?

H3: More authoritative parenting and better ToM in combination will predict less social deficits.

## Methods

### Research Design

The study reported here is nested within a larger ongoing study (see Appendix A). The UCT Autism Research Group are investigating the biological bases of Autism Spectrum Disorder phenotypes, with an emphasis on social difficulties. The study described herein focused on a subset of measures that tapped into social aspects related to ASD.

This quantitative study utilised a cross-sectional design that included interviews and tests. Furthermore, the design was correlational as our primary aim was to establish and describe relationships between variables. This allowed us to examine relationships between variables and draw inferences regarding the current associations between children with ASD's social deficits, attachment styles, parents' child rearing styles and ToM (Field, 2009).

This research was divided into two components. In Study 1 we explored attachment styles and parenting styles in relationship to social deficits. Firstly, we explored whether there were differences in social deficits between our verbal and non-verbal subgroups. We then explored whether there were differences between verbal and non-verbal subgroups in the variables and relationships of interest: We assessed the nature and presence of attachment styles and parenting styles as well as whether they related to social deficits.

In Study 2 we explored ToM abilities in only verbal children with ASD in a South African context. Like many other research studies, we excluded non-verbal children due to the nature of ToM testing that requires the children to have verbal ability (Cole, Baron-Cohen & Hill, 2007). First we explored the ToM capacities in our verbal sample. We then explored how parenting styles related to ToM abilities. We then proceeded to see if parenting styles together with ToM predict social abilities in ASD.

## **Participants**

Purposive sampling was used to recruit 46 male child/parent pairs from ASD-specific and special needs schools in the Western Cape as well as through the UCT Autism Research Group's database of families who were willing to participate in future ASD research. Demographic variables were recorded and considered in the analyses, but did not influence recruitment process. The context for data collection from the children was at their respective schools or homes and parents were interviewed either telephonically or at their homes.

*Inclusion and exclusion criteria.* All child participants had an existing ASD diagnosis that was confirmed by the ADOS-2 assessment in the larger protocol. We also considered language because at present the ADOS-2 can only be conducted in English. For this reason we limited children to those schooled in English and/or who practiced English as a home language. Children were excluded if they had a history of head injuries or any co-morbid neurological conditions (excluding ADHD). The focus of this study was on social impairment in childhood and early adolescence and therefore only children between the ages of 4 and 14 years were recruited.

There is a gender imbalance in ASD diagnosis as it is less likely for girls to be diagnosed with ASD than their male counterparts unless they have additional intellectual or behavioural difficulties (Dworzynski, Ronald, Bolton & Happé, 2012). Prevalence in ASD is approximately more than four-times greater in boys than girls. Moreover, ASD presents differently in girls than it does in boys and it has been reported that girls are more likely to have additional symptoms (e.g. hyperactivity and lower cognitive ability) thereby making it harder to recognise and diagnose (Dworzynski et al., 2012; Frazier et al, 2014; Head et al., 2014). For this reason, we only used male children to control for these potential confounds in the female ASD population (Dworzynski et al., 2012; Head, McGillivray & Stokes, 2014; Whiteley, Todd, Carr & Shattock, 2010).

Furthermore, children were excluded if parents refused to participate in interviews relating to the three survey questionnaires as these were important to measure attachment styles, parenting styles and parent-report of social deficits in their children for this study.

**Ethical considerations.** This study was conducted in line with the ethical guidelines for research with human subjects as outlined by the Health Professions Council of South Africa (HPCSA) and the University of Cape Town (UCT) Codes for Research. Ethical approval for the larger study within which the current research was nested had been obtained from both the Faculty of Science Ethics Board (Appendix B) as well as the Psychology Department Ethics Board at UCT (Appendix C). Permission was also obtained from the Western Cape's Education Department (Appendix D) and was obtained from school principals to approach students and their families for recruitment. All data obtained for this study were used solely for research purposes and confidentiality was maintained at all times. All data were securely stored at the UCT Department of Psychology.

Parents were sent an information sheet fully informing them of all aspects of the study (see Appendix E); the researchers' contact details were also provided for any further questions prior to expressing their consent to participate. Thereafter written informed consent (see Appendix F) was obtained from the participants' parents or legal guardians at initial recruitment. Parents were

assured that their data would be kept strictly confidential and that when published, no individuals will be identified. Parents and children were assured that they could withdraw from the study at any point without consequence.

As we were working with a vulnerable population, the data collection process was made as easy and comfortable as possible for both the children and parents. The safeguards that were put in place included the following: We set up schedules for each school so that each child knew when they would be interviewed so that they were not overwhelmed by the change in their routine (something autistic children are especially sensitive to) and as children may become fatigued during testing we controlled this by splitting testing over a number of sessions. Assent to participate from every child was obtained at the beginning of the first testing session. Overall, this study did not harm the child, family or school in any way.

A study found that parents from low and middle income countries regard their participation in a study personally and view the first interview with the researcher as the beginning of a relationship; it is thus ethical to make the parents feel valued through reporting back to them and thanking them (Daley, Singhal & Krishnamurthy, 2013; Mackenzie et al., 2007). For this reason, once this study is completed the researcher will compile a short summary of all findings and this will be given to the participating parents. The researcher has also offered to give a presentation regarding the study at each school and this will allow parents and teachers to ask any questions they may have.

## **Measures**

**Demographic questionnaire.** Demographic data (see Appendix G) was collected for each child and their parent/caregiver. The questionnaire pertained to information about each child's age, sex, ethnicity, home language, ASD diagnosis, other diagnosis or difficulties, head injuries and medical conditions (i.e. neurobiological problems). In addition, this survey requested information about the parents pertaining to total monthly household income, highest education level achieved and employment. In order to establish the family's socio-economic status we made use of an SES

index to calculate material and financial resources of the household. Myer and colleagues (2004) proposed that an index provides a better indicator in LMIC (low middle income countries) countries because just considering income is misleading. Therefore, variables such as maternal education and household resources (which may be shared) are helpful to consider in LMIC countries.

**Screening for language comprehension deficits.** *Developmental Neuropsychological Assessment, Second Edition (NEPSY-II;* Brooks, Sherman & Strauss, 2012). The subtest *Comprehension of Instructions* that is appropriate for children aged 3 - 16 years old was used to assess language comprehension. This was administered to all children to discern if there were any comprehension difficulties that would undermine performance on ToM tasks (Brooks et al., 2012). This measure required children to follow two-stage commands: they were shown a picture with several different images of bunnies and were asked to follow a one-stage command and thereafter a two-stage command. Participants who passed were classified as *verbal*. When a child failed this test they were classified as *non-verbal* for this study, as failure inferred poor receptive language, poor linguistic or semantic knowledge or impairment in following multi-step instructions (Brooks et al., 2012). For this study non-verbal children were defined and characterized as having an inability to follow 2-stage instructions.

The NEPSY-II has good psychometric properties and the subtest *Comprehension of Instructions* has good test-retest reliability ranging from  $\alpha = .71$  to  $\alpha = .82$ , which is dependent on the age of the sample (Brooks et al., 2012). There is no individual validity of this subtest although it is derived from the NEPSY-II. This measure has illustrated good psychometric properties in non-Western samples (Abedi, Malekpour, Oraizi, Faramarzi, & Paghale, 2012; Mulenga, 2001). A study by Mulenga (2001) explored how Zambian children performed on the NEPSY in comparison to a US population. They concluded that it is clinically useful albeit the results should be interpreted with caution. Therefore, this test was deemed suitable to this study's sample in a South African context.

**Social deficits.** *The Autism Diagnostic Observation Schedule, Second Edition* (Lord et al., 2012). The ADOS-2 is a standardised behaviour observation and coding measure that indicates the level of functioning in ASD pertaining to social interaction, communication and repetitive behaviours. This measure can accurately assess and diagnose across the entire lifespan. To ensure this, the ADOS-2 consists of five modules that are appropriate to the chronological age, developmental level and language ability of individuals.

The children in this study were assessed using modules 1, 2, or 3, as these were most appropriate for our sample both for their chronological age (4 to 14 years old) and verbal ability (non-verbal to verbal). The assessment took approximately 40-60 minutes to complete. These modules provided comparison scores for the overall presence and degree of ASD-related symptoms. These modules provided an overall social affect score that was used to represent social deficits in this study.

The ADOS-2 may only be administered by appropriately trained and certified individuals. In the case of being used for research purposes, the administrator must be certified as research reliable. The primary researcher for this sub study could not administer this measure and therefore the PhD student who met the aforementioned requirements and led the bigger study was the administrator of the ADOS-2.

In previous research this measure had sensitivity ratings in the upper 90% range and specificity in the upper 80% to lower 90% range (Lord et al., 2008). Internal consistency ranged from  $\alpha = .47$  to  $\alpha = .96$ , but all lower scores were for non-social domains (Lord et al., 2008). Test-retest reliability was high for social domains and acceptable for non-social domains (Lord et al., 2008).

**Attachment styles.** *The Attachment Style Classification Questionnaire* (ASCQ; Finzi, Har-Even, Weizman, Tyano & Shnit, 1996; see Appendix H) is an adaptation from the Hebrew version (Mikulincer et al., 1990). This 15-item measure (scaled from 0 = *Not True* to 2 = *True*) produced scores which classified to which of three attachment styles a child belonged in the traditional way

(categorical coding). These scores were also used along a continuum for data analysis purposes. We calculated a total attachment score where higher scores reflected more secure attachment and lower scores reflected more insecure attachment (negative and positive style scores were summed; positive secure scores were doubled to put them on the same scale as the negative styles). Respondents were asked questions pertaining to each attachment category, for example securely attached (“My child makes friends with other children easily”), anxious-ambivalent attached (“Sometimes my child is afraid that other kids won’t want to be with him/her”) or anxious-avoidant attached (“My child doesn’t feel comfortable trying to make friends”).

The ASCQ was developed to be administered directly to children from 7 years to 14 years old. However as children with ASD have limitations in understanding social behaviour, this could inhibit their ability to provide satisfactory self-report for this questionnaire. Therefore, for this study the ASCQ was adapted to be answered by parents or caregivers via a telephonic interview. To the best of my knowledge there are no published studies that have used parent-report for this measure.

Finzi and team (1996) using the original self-report version found that this measure had a test re-test reliability that ranged from  $\alpha = .87$  to  $\alpha = .95$  and an internal consistency from  $\alpha = .69$  to  $\alpha = .81$ . The validity of the ASCQ has been successfully demonstrated in both clinical and non-clinical samples (Al-Yagon & Mikulincer, 2004; Finzi et al., 1996). A study conducted on an Israeli sample of children (N = 98) with learning disorders and NT children (N = 107), reported an internal consistency ranging from  $\alpha = .64$  to  $\alpha = .73$  over the three attachment styles. At present the ASCQ is being used in the South African context by a larger ongoing study run by Dr Susan Malcolm-Smith examining social cognitive development in NT developing children. Although there are not any psychometric data indicating how the ASCQ performs in the South African context, both of the aforementioned studies have used non-western samples, which suggests a probable applicability to our local context.

**Parenting styles.** *The Parenting Style and Dimension Questionnaire- Short Version* (PSDQ; Robinson et al., 2001; see Appendix I) was used. It was adapted from the 62-item PSDQ (Robinson

et al., 1995) that had been derived from the 133-item measure by Baumrind (1991; Robinson et al., 1995). This measure had 32 items that made use of a 5-point Likert scale (0 = *Never* to 1 = *Always*) and produced scores for three parenting styles namely; authoritative, authoritarian and permissive. All three categories had individual dimensions and internal structures, which will be discussed below. The reliability estimates that are provided below are as cited in Robinson and team study (2001).

*Authoritative:* This 15-item subscale assessed the authoritative parenting style and had an overall reliability of  $\alpha = .86$ . It is comprised of three sub-factors; warmth and support (5 items), reasoning or induction (5 items) and democratic participation (5 items).

*Authoritarian:* This 12-item subscale examined the authoritarian parenting style and had an overall reliability of  $\alpha = .82$ . It is made up of three sub-factors; physical coercion (4 items), verbal hostility (4 items), non-reasoning and punitive punishments (4 items).

*Permissive:* This parenting style was examined by an indulgent dimension that consisted of 5 items, that had an overall reliability of  $\alpha = .64$ .

Previous studies conducted in Eastern Europe (Istanbul and Russia) that encompassed various cultures, ethnicities and languages, found this measure to have acceptable validity and reliability (Hart et al., 1998; Onder & Gulay, 2009). Additionally, previous studies conducted in Asia, such as Hong Kong, China and other non-western populations found the measure appropriate in assessing parenting styles cross-culturally (Calzada & Eyberg, 2002; Chan, Bowes & Wyver, 2009; Chen & Luster, 2002; Wu et al., 2002). Two studies in South Africa made use of this measure (Latouf, 2008; Pretorius, 2000): one found that the reliability of the questionnaire was  $\alpha = .81$  for the fathers and  $\alpha = .79$  for the mothers (Pretorius, 2000). Therefore, this scale should be appropriate for use in our context.

**ToM.** *University of Cape Town ToM Battery (Hoogenhout & Malcolm-Smith, 2014).* The UCT ToM battery is an adaptation from different well-used tasks in the literature (Baron-Cohen, Leslie & Frith, 1985; Steele et al., 2003) for use with South African respondents. This measure had

fourteen tasks that were divided into four modules namely: early, basic, intermediate and advanced. These modules are of increasing difficulty in accordance with each progressing developmental stage (Hoogenhout & Malcolm-Smith, 2014). In our study we started younger children on the *basic module* and older children on the *intermediate module*. Children who failed a starting module then completed a previous module; those who passed moved onto the following module. If during first task of starting module it was apparent that this task was much too easy or much too complex for the child, a more appropriate starting point was selected (e.g. if the child was clearly overwhelmed by the first task of the basic module, this module was abandoned and the early module was administered).

The *early module* (children aged 3 - 4 years old) assessed the ability to engage in pretend play, understand other's intentions and development of precursors to false belief reasoning. It consisted of the Desire task (scaled from 0 to 4), Pretend Play task (scaled from 0 to 4), Perception-Knowledge task (scaled from 0 to 4), Diverse Desires task (scaled from 0 to 3), and Diverse Beliefs task (scaled from 0 to 3). The *basic module* (children aged 4 - 5 years old) focused on false belief reasoning, deception and understanding emotions. This module consisted of the Location-Change False Belief task (scaled from 0 to 12), the Unexpected-Contents False Belief task (scaled from 0 to 12), Sticker Hiding task (scaled from 0 to 22), Belief-Emotion task (scaled from 0 to 6), and Real-Apparent Emotion task (scaled from 0 to 6). The *intermediate module* (children aged 6 - 7 years old) was more difficult as it looked at second order false belief. This module consisted of the Second-Order False Belief task (scaled from 0 to 8) and the Strange Stories task (scaled from 0 to 12). The *advanced module* (children aged from 8 years and older) tapped into children's understanding of non-literal language and social norms, therefore consisted of the Lies-Jokes task (scaled from 0 to 16) and the Children's Version of the Faux Pas task (scaled from 0 to 40).

Most tasks, excluding the Pretend Play and Sticker Hiding tasks, included control and test questions. All tasks made use of dolls, toys or pictures to minimise linguistic and memory demands on the respondents, except for the Faux Pas task. The ToM subtests were scored as either pass or

fail but we also included continuous scores that provided a total ToM score for each respondent. As each module was developmentally sensitive and modules increased in difficulty, the respondents progressed through the battery until they either completed all tasks or failed a module. Children who passed the starting module were given full credit for all earlier tasks.

The tasks in the battery have been extensively used in various cultures. A meta-analysis conducted by Liu, Wellman, Tardif and Sabbagh (2008) which explored whether ToM develops universally cross-culturally, found parallel developmental trajectories of false belief understanding for children in China and North America. Therefore, this meta-analysis showed that the tasks within ToM batteries are cross-culturally relevant. In order to further affirm that this measure is appropriate to our South African context, a version adapted to the South African context created by Hoogenhout and Malcolm-Smith (2014) has been used in this study.

## **Procedure**

**Screening and recruitment.** Subsequent to ethical approval (see Appendix B and C) and WCED permission (see Appendix D) and school approval, we sent letters to the parents of children with ASD through the Autism-specific and special needs schools their children attended. The letters sent home included an information sheet (see Appendix E), consent form (see Appendix F) and demographic survey (see Appendix G). These documents were returned to the researcher via the school.

**Data collection from parents.** Parents who consented to participate were contacted to set up interview appointments. These interviews were conducted telephonically or at parents' homes, depending on what was suitable for parents. The interview comprised of the ASCQ, PSDQ and EQ-C and took 30 minutes to complete.

**Data collection from children.** Firstly, we provided the school with the names of children whose parents agreed to participate in the study. The school then provided a schedule for when we would be able to see each child. We ensured that the environment was quiet and free from distractions before we met with each child. The child's willingness to participate was ascertained

via an assent sheet (see Appendix J) at the beginning of the first session. First each child was administered the NEPSY-II to determine their verbal ability and then we classified them as either verbal or non-verbal. We then proceeded to assess each child with the ADOS-2, using the appropriate modules according to their age and verbal ability. This was done in one session that took approximately 30 - 60 minutes. The verbal children then commenced completing the ToM battery that was administered on a one-on-one basis with the children at their respective schools. Like many other research studies, we excluded non-verbal children from ToM testing as it requires the children to have verbal ability (Cole, Baron-Cohen & Hill, 2007). Each of the ToM modules was administered in its own session, this allowed for up to four sessions, where necessary. If the child lost focus or experienced fatigue they were either given a break or that level was completed across two shorter sessions.

### **Data Analysis**

This is an exploratory study; we must note therefore that, given the small sample size and the number of inferential analyses conducted, there is an inflated risk of family-wise error (Type 1 errors; false positives). However, a small sample also increases the risk of Type 2 errors (false negatives; Field, 2009). Thus, due to the exploratory nature of this study and trying to ascertain an initial picture of relationships, we decided to keep alpha at .05, but to interpret findings with caution as preliminary or suggestive rather than conclusive. All statistical analyses were run using IBM SPSS Statistics, Version 23 (SPSS Inc., 2013).

For the *preliminary data analysis* all of the variables were recoded (rescored) accordingly such that high scores reflected high levels of ToM and social deficits. Parenting styles and attachment were coded categorically; we looked at the categories at a descriptive level to see what the distribution looked like in ASD. Additionally, attachment and parenting were also coded as continuous variables for the correlation and regression analysis. We calculated a total attachment score where higher scores reflected more secure attachment and lower scores reflected more insecure attachment (negative and positive style scores were summed; positive secure scores were

doubled to put them on the same scale as the negative styles). We created a total parenting score (positive authoritarian scores were doubled to put them on the same scale as negative scores; these and the negative scores for authoritarian and permissive parenting were totalled). Higher scores thus represented more positive parenting and lower scores illustrated less positive parenting.

Thereafter we checked the data for normality. The primary aim was to examine probability plots to see if any scores deviated markedly from normality. Through analysing descriptive statistics we examined frequencies of a) attachment styles and b) parenting styles in our ASD sample. For the ToM data we assessed if there was the expected correlation between total ToM score and child's chronological age.

In Study 1 for the *main data analysis*, we ran ANCOVA analyses to discern whether there were any substantial differences in variables of interest between our two subgroups (verbal vs. non-verbal children). We then conducted Pearson's correlations to look for associations of attachment styles and parenting styles with social deficits in ASD. Thereafter, we ran multiple regressions to discern if attachment styles and parenting styles together predicted social deficits. In Study 2 we conducted Pearson's correlations to look for associations between parenting styles with ToM deficits in ASD. Later we ran a multiple regression to discern if parenting styles and ToM together predicted social deficits in ASD. The assumptions for multiple regression were assessed namely; multivariate normality, no or little multicollinearity and homoscedasticity. These were all found to be within acceptable limits.

## Results

### Participants

In our sample we included only male children with a current diagnosis of ASD, which was confirmed by assessment with the ADOS-2. We had a total of 46 participants that were all included in preliminary analyses and were then divided into two groups according to verbal ability: verbal ( $n = 19$ ) and non-verbal ( $n = 27$ ). Of these, four children had some incomplete data: two non-verbal children were missing ADOS-2 scores and two verbal children had missing ToM scores. As they

had other valuable information from measures that had been completed, they were only excluded from analyses that required the data they were missing.

**Table 1.**

*Demographic Information for Preliminary Analyses, for Study 1 and Study 2.*

	Total ASD (%)	Verbal (%)	Non-Verbal (%)	<i>t</i>	<i>p</i>
<i>N</i>	46 (100)	19 (41.3)	27 (58.7)		
<i>Age (yrs.)</i>					
Mean (SD)	8 (3.29)	9.37 (2.41)	7.04 (3.52)	- 2.50	0.016*
Range	3 – 14	6 – 14	3 – 14		
<i>Home Language</i>					
English	34 (73.90)	16 (88.89)	18 (94.74)		
Afrikaans	1 (2.20)	1 (5.56)	0 (0.00)		
isiXhosa	2 (4.30)	1 (5.56)	1 (5.26)		
<i>Race</i>					
White	13 (28.30)	7 (38.89)	6 (31.58)		
Black	3 (6.50)	1 (5.56)	2 (10.53)		
Coloured	19 (41.30)	9 (50.00)	10 (52.63)		
Indian	1 (2.20)	0 (0.00)	1 (5.26)		
Asian	1 (2.20)	1 (5.56)	0 (0.00)		
<i>Total Income (ZAR)</i>					
Mean (SD)	42723.36 (26249.35)	43067.81 (25466.89)	42397.05 (27663.96)	- 0.08	0.939
Range	4649.50 - 75000.00	8399.50 - 41625.00	4649.50 - 37499.50		

*Note.* Most participants were white or coloured English speakers; Chi-square analyses could not be run on the Home Language or Race data due to low frequencies in multiple categories (expected values < 5).

\* $p < .05$

**Age.** The children recruited for this study were between 3 and 14 years of age. An independent *t*-test found that the verbal children were significantly older than the non-verbal ASD children in our sample (see Table 1) with a large effect size  $d = 0.79$ .

**Home language.** This study included children who had English as a home language (73.9%), were educated in English or were proficient in this language since the ADOS-2 has not been translated and validated in other South African languages. There were only 3 children from homes that had a different primary language, although these children attended schools that taught in English only. Between groups differences in language were examined descriptively due to small sample size (i.e. expected cell values  $< 5$ , therefore not possible to run chi-square analysis) and the groups were not notably different in their language distribution (see Table 1).

**Race.** The majority of children were Coloured, with the second largest racial group being White (see Table 1). As this study was conducted in the Western Cape, where the majority of the population is Coloured, this was expected. The proportion of races across the verbal and non-verbal groups seems similar. Between group differences were again examined descriptively due to the small sample size (i.e. expected cell values  $< 5$ , therefore not possible to run chi-square analysis).

**Total income.** The average total monthly home income in the families of the children included in this study was R42 723.36 ( $SD = 26\ 249.36$ ). A *t*-test found no between group difference in income for verbal ( $M = 43067.81$ ) vs. nonverbal ( $M = 42397.05$ ) children,  $t(35) = -0.08$ ,  $p = 0.939$  with negligible effect size of  $d = 0.03$ . Therefore there was no difference in income between verbal and non-verbal subsamples (see Table 1).

The verbal and non-verbal subsamples in this study were therefore similar in home language, race and socioeconomic status. However they differed significantly in age. Due to difficulties recruiting sufficient numbers of children from this clinical population we decided to work with the samples despite this pre-existing difference. However, to account for the effects of age, analyses to follow will control for age in Study 1.

## Study 1: Attachment Styles, Parenting Styles and Social Deficits

In the first part of this study we explored three variables: attachment styles, parenting styles and social deficits (ADOS-2 social affect scores) of children with ASD. Thereafter, we compared these variables between two groups: verbal children and non-verbal children with ASD.

**Social deficits.** We examined the hypothesis that verbal children would have fewer social deficits than the non-verbal group (Research question 1) using sub-scores from the ADOS-2. The ADOS-2 term is social affect, but what it indicated was social deficits. Therefore, high scores for social affect reflect higher levels of social deficits. Descriptively, our non-verbal participants evidenced higher social deficits ( $M = 64.69$ ,  $SD = 16.55$ ) than the verbal group ( $M = 36.32$ ,  $SD = 21.01$ ). When we ran ANCOVA analysis there remained a significant effect of verbal ability on social deficits after controlling for age,  $F(1, 42) = 19.17$ ,  $p = .0001$ , partial  $\eta^2 = .32$ . This ANCOVA in fact indicated that there was no significant effect of age on social deficits  $F(1, 42) = .02$ ,  $p = .886$ , partial  $\eta^2 = .00$ . Therefore our verbal subgroup had significantly less social deficits than the non-verbal subgroup. Thus, in addition to examining the full sample, the analyses below will look at these groups individually and compare them to one another.

**Attachment styles.** We explored the attachment styles of the entire ASD sample by examining scores for secure attachment, anxious attachment and avoidant attachment (see Table 2). Thereafter we compared attachment styles across the verbal and non-verbal subgroups (see Table 2). Before we began analyses we checked normality, which was acceptable for all above-mentioned variables.

**Attachment in the full sample.** We explored the attachment style found in our full sample and the hypothesis that secure attachment would be mostly present in ASD (Research question 2). A one-way repeated-measures ANOVA indicated no significant differences in the full sample between the three attachment style means,  $F(2, 90) = 0.37$ ,  $p = .695$ , partial  $\eta^2 = .01$ . This means that no attachment style predominated.

*Attachment in verbal vs. non-verbal children.* We explored whether there was a difference in attachment between verbal and non-verbal children and examined the hypothesis that the verbal subgroup would be more securely attached compared to non-verbal children (Research question 3).

**Table. 2**

<i>Attachment Styles in ASD Sample</i>					
	Total ASD	Verbal	Non-verbal	F	<i>p</i>
<i>N</i>	46	19	27		
<i>Total Attachment Score</i>					
Mean (SD)	.54 (8.61)	.63 (9.38)	.48 (8.22)	.43	.515
Range	-12 – 18	-12 – 18	-10 - 18		
Age				2.91	.095
<i>Secure</i>					
Mean (SD)	5.37 (2.71)	6.11 (2.28)	4.85 (2.91)	3.57	.066
Range	0 – 10	2 – 10	0 – 10		
Age				1.38	.246
<i>Anxious-Insecure</i>					
Mean (SD)	4.85 (3.35)	6.53 (2.55)	3.67 (3.39)	6.66	.013*
Range	0 – 10	2 – 10	0 – 10		
Age				.85	.361
<i>Avoidant-Insecure</i>					
Mean (SD)	5.35 (3.40)	5.05 (3.57)	5.56 (3.33)	1.08	.305
Range	0 – 10	0 – 10	0 – 10		
Age				2.64	.112

\*  $p < .05$

In terms of total attachment an ANCOVA analysis indicated that there was no significant effect of verbal ability after controlling for age,  $F(1, 44) = .43, p = .515$ , partial  $\eta^2 = .01$  (see Table 2). In terms of secure attachment an ANCOVA analysis indicated that there was no significant effect of verbal ability after controlling for age,  $F(1, 44) = 3.57, p = .066$ , partial  $\eta^2 = .08$  (see Table 2). In terms of anxious-insecure attachment an ANCOVA analysis indicated that there was a significant effect of verbal ability after controlling for age,  $F(1, 44) = 6.66, p = .013$ , partial  $\eta^2 =$

.13 (see Table 2). This indicates that our verbal and non-verbal groups significantly differed for this attachment style: Verbal children had significantly higher levels of anxious-insecure attachment style. In terms of avoidant-insecure attachment an ANCOVA analysis indicated that there was no significant effect of verbal ability after controlling for age,  $F(1, 44) = 1.08, p = .305$ , partial  $\eta^2 = .02$  (see Table 2). Note that the ANCOVA's indicated that for all the above relationships age did not have a significant effect on attachment styles (see Table 2), so further analysis for attachment will not include age.

**Table. 3**

*Bivariate Correlations between Attachment Styles and Social Deficits*

	Total ASD		Verbal		Non-verbal	
	Social deficits Score	<i>p</i>	Social deficits Score	<i>p</i>	Social deficits Score	<i>p</i>
1. Total Attachment Score	.03	.838	.36	.131	-.34	.097
2. Secure	-.26	.092	.31	.197	-.53	.006**
3. Anxious-Insecure	-.44	.003**	-.07	.790	-.34	.095
4. Avoidant-Insecure	-.07	.665	-.50	.029*	.22	.286

\* $p < .05$ . \*\*  $p < .01$

**Association between attachment styles and social deficits.** We explored whether attachment style influences social deficits in ASD and the hypothesis that secure attachment would have an inverse relationship with social deficits (Research question 4). We found that there was no association in the full sample between total attachment score and social deficits,  $r = .03, p = .838$  (see Table 3). For the full ASD sample we found that anxious-insecure attachment style had a significant inverse association with social deficits  $r = -.44, p = .003$  (see Table 3). This indicated that reduced anxious-insecure attachment is associated with more social deficits and vice-versa. In the verbal subgroup we found that avoidant-insecure attachment had a significant inverse relationship with social deficits,  $r = -.50, p = .029$  (see Table 3). This indicated that less avoidant-

insecure attachment was associated with more social deficits and vice-versa. For the non-verbal subgroup we found that secure attachment had a significant inverse association with social deficits  $r = -.53, p = .006$  (see Table 3). This indicated that higher secure attachment was associated with reduced social deficits and vice versa.

**Parenting styles.** The parental behaviour of mothers of children with ASD was explored, specifically three parenting styles; authoritative, authoritarian and permissive. We explored which parental style was mostly employed. Normality for all variables was again acceptable.

**Parenting in the full sample.** We examined which parenting style is most employed in ASD and hypothesised that authoritative parenting would be most employed in our ASD sample (Research question 5). A one-way repeated measures ANOVA on the three parenting styles in the full sample indicated their means differed significantly from one another,  $F(2, 90) = 91.24, p = .001, \eta^2 = .67$ . We then ran pairwise Tukey's HSD post hoc tests that indicated that all three parenting style means differed significantly from each other (all  $p < .001$ ). These results indicated that caregivers mostly employ positive authoritative parenting styles as indicated by the high mean ( $M = 3.63$ ). The second most common parenting style was permissive ( $M = 2.47$ ), and authoritarian the least commonly used ( $M = 1.74$ ).

**Parenting verbal vs. nonverbal children.** We explored whether there was a difference in parenting between verbal and non-verbal children and examined the hypothesis that more authoritative parenting would be employed for the verbal subgroup compared to non-verbal children (Research question 6). In terms of parenting total an ANCOVA analysis indicated that there was no significant effect of verbal ability after controlling for age,  $F(1, 44) = 2.72, p = .106$ , partial  $\eta^2 = .06$  (see Table 4). In terms of authoritative parenting an ANCOVA analysis indicated that there was no significant effect of verbal ability after controlling for age,  $F(1, 44) = 3.23, p = .079$ , partial  $\eta^2 = .07$  (see Table 4). In terms of authoritarian parenting an ANCOVA analysis indicated that there was no significant effect of verbal ability after controlling for age,  $F(1, 44) = .55, p = .462$ , partial  $\eta^2 = .01$  (see Table 4). In terms of permissive parenting an ANCOVA analysis

indicated that there was no significant effect of verbal ability after controlling for age,  $F(1, 44) = 1.44$ ,  $p = .235$ , partial  $\eta^2 = .03$  (see Table 4). Therefore, these analyses indicated that there was no difference in parenting styles between our two subgroups.

The ANCOVA's indicated that the group age difference did not have a significant effect on total parenting, authoritative or permissive parenting. However, the ANCOVA analysis indicated a significant effect of age on authoritarian parenting,  $F(1, 44) = 7.15$ ,  $p = .011$ , partial  $\eta^2 = .14$ . Therefore, the age of the children in our sample influenced the extent to which this parenting style was employed. The means indicated that more authoritarian parenting was employed for the younger, non-verbal group.

**Table. 4**

<i>Parenting Styles in ASD Sample</i>					
	Total ASD	Verbal	Non-verbal	F	<i>p</i>
<i>N</i>	46	19	27		
<i>Parenting Total</i>					
Mean (SD)	70.18 (33.80)	82.69 (39.46)	61.37 (26.54)	2.72	.106
Range	8 – 144	19 – 144	8 – 128		
Age				1.37	.249
<i>Authoritative PS</i>					
Mean (SD)	77.28 (12.10)	81.82 (13.36)	74.07 (10.19)	3.23	.079
Range	56 – 99	59 – 99	56 – 99		
Age				.644	.427
<i>Authoritarian PS</i>					
Mean (SD)	34.98 (9.55)	34.64 (9.48)	35.22 (9.77)	.55	.462
Range	20 – 62	22 – 56	20 – 62		
Age				7.15	.011*
<i>Permissive PS</i>					
Mean (SD)	49.39 (15.00)	46.32 (14.00)	51.56 (15.55)	1.44	.235
Range	24 – 88	24 – 68	32 – 88		
Age				.11	.740

\*  $p < .05$

**Association between parenting styles and social deficits.** We explored whether parenting styles were associated with social deficits in ASD and the hypothesis that authoritative parenting would have an inverse relationship with social deficits (Research question 7). Furthermore, although the verbal and non-verbal groups did not differ in parenting, they did differ on age and in social deficits; therefore the groups are considered separately as well.

We explored the relationship between total parenting score with social deficits for the full ASD sample (see Table 5). We found that total parenting score had an inverse relationship with social deficits,  $r = -.39$ ,  $p = .009$ . This means that more positive parenting was associated with lower social deficits. In addition we found that authoritative parenting had a significant inverse relationship with social deficits for the full sample,  $r = -.48$ ,  $p = .001$ . This means that more authoritative parenting was associated with lower social deficits and vice-versa.

In the verbal subgroup we found that total parenting score had a significant inverse association with social deficits,  $r = -.52$ ,  $p = .023$  (see Table 5). This means that more positive parenting was associated with lower social deficits. Secondly, we found that authoritative parenting had a significant inverse relationship with social deficits in the verbal subgroup,  $r = -.60$ ,  $p = .008$  (see Table 5). This means that more authoritative parenting was associated with less social deficits. These associations were not found in the non-verbal subgroup.

**Table. 5**

*Bivariate Correlations between Parenting Styles with Social Deficits for ASD Sample*

	Total ASD		Verbal		Non-verbal	
	Social deficits Score	<i>p</i>	Social deficits Score	<i>p</i>	Social deficits Score	<i>p</i>
1. Parenting Total	-.39	.009**	-.52	.023*	.09	.677
2. Authoritative	-.48	.001**	-.60	.008**	-.07	.749
3. Authoritarian	-.12	.457	-.18	.452	-.21	.315
4. Permissive	.21	.163	.45	.051	-.11	.613

\* $p < .05$ . \*\*  $p < .01$

**Attachment and parenting styles' relationship with social deficits.** We explored whether attachment and parenting styles together impact social deficits and the hypothesis that attachment and parenting styles in combination would have an inverse relationship with social deficits (Research question 8). The verbal and non-verbal groups were explored separately because they differed significantly in social deficits.

For the verbal subgroup a hierarchical multiple regression was run using age, total attachment styles and total parenting styles as the predictors and social deficits as the outcome (see Table 6). Age was entered first, followed by attachment and parenting together in the second step. The model was significant  $R = .59$ ,  $R^2 = .35$ ,  $F(2, 15) = 3.79$ ,  $p = .047$ . This indicated in combination these variables significantly predict social deficits. However, when examining the betas, it is clear that only parenting style significantly predicted social deficits ( $p < .046$ ; See Table 6).

**Table. 6**

*Hierarchical Multiple Regression for Age, Total Attachment Styles and Total Parenting Styles with Social Deficits as the Outcome: For Verbal Subgroup.*

	B	<i>B</i>	SE	t	<i>p</i>
Constant	–	39.52	18.38	2.15	.048
Age	.24	2.13	1.92	1.11	.287
Attachment Style	.12	.27	.53	.50	.624
Parenting Style	-.53	-.28	.13	-2.18	.046*

For the non-verbal subgroup a hierarchical multiple regression was run using age, total attachment styles and total parenting styles as the predictors and social deficits as the outcome. Age was entered first, followed by attachment and parenting in the second step. The regression model was not significant  $R = .46$ ,  $R^2 = .21$ ,  $F(2, 21) = 2.58$ ,  $p = .100$ .

## Study 2: ToM in ASD and the Relationships with Parenting Styles and Social Deficits

The second study included only verbal participants, as the ToM tasks required verbal skills and the ability to follow verbal instructions. We recruited 19 verbal participants, however two children were missing ToM scores and for this reason only 17 participants were included in analyses for Study 2. We investigated ToM using a battery that comprised of 4 modules namely; *early*, *basic*, *intermediate* and *advanced*, each module is scored out of 100. Summing the scores across all modules attained an overall ToM score as a percentage. By means of correlations we found a significant positive correlation between age and total ToM score,  $r = .44$ ,  $p = .039$ . This means that an increase in age is associated with better ToM. As ToM develops over childhood, we split the sample into two age groups and then explored how our sample fared in ToM. We then conducted Pearson's correlations to look for associations between parenting styles with ToM deficits in ASD. Later we ran a multiple regressions to discern if parenting styles and ToM together predicted social deficits in ASD. We checked the normality for our variables of interest, which was once again acceptable.

**General ToM abilities.** We explored the state of ToM deficits in the South African context and the hypothesis that there would be severe deficits in ToM (Research question 1). Below we explored ToM using the 4 modules discussed above and thereafter false beliefs by examining the means and standard deviations scored for each of our two age groups (see Table 7).

**6 - 8 year old group.** Six children attempted the *early* module. Five children passed; three children received perfect scores (of which two children were credited due to having passed a more advanced start module), and two children received 58% and 75% respectively. One child failed with a 32% score. Five children attempted the *basic* module. Three children passed; two were credited perfect scores due to having passed a more advanced start module, one received a score of 56%. Two children failed with scores of 49% and 0% respectively. Three children attempted the *intermediate* module. Two children passed with a score of 58% and 88% respectively. One child failed with a score of 35%. Two children attempted the *advanced* module and passed with a score

of 61% and 68% respectively. What was observed descriptively for this group is that there is a visible decline in scores and number of children able to attempt each progressive module (see Table 7).

**Table. 7**

<i>Means and Standard Deviations for Theory of Mind in ASD Sample: For Two Age Groups</i>		
	6 - 8 year olds	9 - 14 year olds
<i>N</i>	6	11
<i>Early</i>	<i>n</i> = 6	<i>n</i> = 11
Mean (SD)	77.43 (28.33)	92.27 (19.92)
Range	32 – 100	35 – 100
<i>Basic</i>	<i>n</i> = 5	<i>n</i> = 10
Mean (SD)	58.07 (37.93)	79.93 (35.36)
Range	0 – 100	0 – 100
<i>Intermediate</i>	<i>n</i> = 3	<i>n</i> = 9
Mean (SD)	30.15 (36.93)	49.61 (29.67)
Range	0 – 88	0 – 85
<i>Advanced</i>	<i>n</i> = 2	<i>n</i> = 7
Mean (SD)	21.53 (33.42)	36.72 (24.38)
Range	0 - 68	0 – 59

*Note.* The *n* provided in table represents the number of children within each group who had attempted or were credited perfect scores for the module.

\*The means and standard deviations are scores that have been converted into percentages. A score of 50% would constitute a pass, and a perfect score is 100%.

**9 - 14 year old group.** Eleven children attempted the *early* module. Ten children passed; nine received perfect scores (of which seven children were credited due to having passed a more advanced start module) and one child received 80%. One child failed this module with a 35% score. Ten children attempted the *basic* module. Nine children passed; seven were credited perfect scores

due to having passed a more advanced start module and two received 80% and 77% respectively. One child failed this module with a score of 22%. Nine children attempted the *intermediate* module. Seven children passed and two children failed with a score of 40% and 27% respectively. Seven children attempted the *advanced* module. Five children passed and two children failed with a score of 41% and 48% respectively (see Table 7).

Like that of the younger group, this group had a noticeable decline in scores and number of children able to attempt each progressive module. Furthermore, from a descriptive level the older group, as expected, performed better in ToM than the younger group (see above Table 7).

**False belief reasoning.** Below we explored false belief reasoning using two tasks namely location change and unexpected contents. Each group's performance is reported below (see Table 8).

**6 - 8 year olds.** In this age group five children attempted all the false belief tasks described below. For the *Location Change control* questions five children passed; four children received perfect scores (of which two children were credited due to having passed a more advanced start module) and one received a score of 75%. In the *Location Change ToM* task, two children passed, as they were credited perfect scores due to having passed a more advanced start module. Three children failed; two received 16.67% and one received 8.33% (see Table 8).

In the *Unexpected Contents control* questions five children received perfect scores of which two children were credited due to having passed a more advanced start module. For the *Unexpected Contents ToM* task two children were credited perfect scores due to having passed a more advanced start module. Three children failed with scores of 8.33%, 16.67% and 0% respectively (see Table 8). The children therefore showed consistently lower ToM scores than control scores, indicating that their poor ToM performance is reflective of a specific ToM deficit.

**9 - 14 years old.** In this age group ten children attempted all the false belief tasks described below. In the *Location Change control* questions ten children passed; nine received perfect scores (of which seven children were credited due to having passed a more advanced start module) and

one received 75%. For the *Location Change ToM* questions nine children passed; eight received a perfect score (of which seven children were credited due to having passed a more advanced start module) and one received 66.67%. One child failed with a score of 0% (see Table 8).

In the *Unexpected Contents control* questions ten children passed with perfect scores of which seven children were credited due to having passed a more advanced start module. For the *Unexpected Contents ToM* questions nine children passed; seven were credited perfect scores due to having passed a more advanced start module and two received a score of 83.33% and 91.67% respectively. One child failed with a score of 8.33% (see Table 8). This group also performed more poorly on the ToM questions than the control questions, indicating they understood the task and their poor ToM performance reflects a specific deficit. The older group performed better than the younger group, again indicating the developmental nature of ToM.

**Table. 8**

<i>Means and Standard Deviations for First-Order False Beliefs in ASD Sample: For Two Age Groups</i>		
	6-8 year olds	9- 14 year olds
N	6	11
Location Change Control	<i>n</i> = 5	<i>n</i> = 10
Mean (SD)	79.17 (40.05)	88.64 (30.34)
Location Change ToM	<i>n</i> = 5	<i>n</i> = 10
Mean (SD)	40.28 (46.67)	78.79 (40.20)
Unexpected Contents Control	<i>n</i> = 5	<i>n</i> = 10
Mean (SD)	83.33 (40.82)	90.91 (30.15)
Unexpected Contents ToM	<i>n</i> = 5	<i>n</i> = 10
Mean (SD)	37.50 (48.81)	80.30 (38.06)

*Note.* The *n* provided in table represents the number of children within each group who had attempted or were credited perfect scores for the module.

\*The means and standard deviations are scores that had been converted into percentages. A score of 50% would constitute a pass and a perfect score is 100%.

**Parenting styles' relationship with ToM.** We examined the relationship between parenting styles and ToM and the hypothesis that authoritative parenting will have a positive relationship with ToM (Research question 2). We then explored how total (positive) parenting and the three parenting styles relate to ToM (see Table 9). We found that authoritative parenting style had a significant positive association with ToM. This means that more authoritative parenting is related to higher ToM abilities.

**Table. 9**

*Bivariate Correlations between Parenting Styles with ToM in Verbal Children with ASD.*

	ToM Score	<i>p</i>
Total Positive Parenting	.45	.070
Authoritative	.48	.049*
Authoritarian	-.05	.859
Permissive	-.37	.143

\* $p < .05$

As the relationship between authoritative parenting and ToM was significant we explored its subscales to better understand what facet of this parenting style relates significantly to ToM (see Table 10). We found that reasoning/induction has a significant positive relationship with ToM. This means that more reasoning is associated with better ToM skills. We also found that democratic participation was significantly associated with ToM. This means that where parents promoted more democratic participation it was related to better ToM abilities.

**Table. 10**

*Bivariate Correlations between Authoritative PS and Subscales with ToM in Children with ASD.*

	ToM Score	<i>p</i>
Authoritative PS	.48	.049*
Warmth and Support	.05	.422
Reasoning/Induction	.52	.017*
Democratic Participation	.51	.018*

\* $p < .05$

**ToM and parenting styles' relationship with social deficits.** We examined whether parenting styles and ToM together impact social deficits (Research question 3) and the hypothesis that authoritative parenting and ToM in combination will have an inverse relationship with social deficits (Hypothesis 3). By means of a hierarchical multiple we regressed age (step 1), total parenting styles and ToM (entered together in step 2) as the predictors and social deficits as the outcome (see Table 11). We found that the model was significant  $R = .78$ ,  $R^2 = .61$ ,  $F(3, 13) = 6.78$ ,  $p = .005$ . Although the model was significant, we found that only ToM ( $\beta = -.63$ ) and age ( $\beta = .46$ ) were significant predictors of better social abilities and total parenting ( $\beta = -.35$ ) was not.

**Table. 11**

*Hierarchical Multiple Regression for Age, Total Parenting Styles and ToM with Social Deficits as the Outcome.*

	B	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Constant	–	40.95	15.82	2.59	.023*
Age	.46	4.044	1.69	2.39	.033*
Parenting Style	-.35	-.19	.10	-1.81	.093
ToM	-.63	-.12	.04	-2.99	.011*

\* $p < .05$

## Discussion

The purpose of this study was two-fold: firstly it examined the relationships between attachment styles, parenting styles and social abilities in children with ASD, with a focus on differences between verbal and non-verbal children. Secondly, it aimed to explore the extent of ToM deficits in verbal children as well as the relationships between ToM, parenting styles and social deficits.

### Study 1: Attachment Styles, Parenting Styles and Social Deficits in Children with ASD

This first study focused on attachment styles, parenting styles and social deficits in ASD, and examined how these variables were associated with one another. Furthermore, we identified a shortage in knowledge about how verbal and non-verbal children compare to one another as

measures typically require spoken language. Therefore, through the use of parent interviews, we explored all three variables within these two subgroups to discern whether there were any substantial differences or similarities between them. The pattern of attachment styles found in our sample will be discussed below, followed by its relationship with social deficits. Thereafter, the same format will be followed for parenting styles. Lastly, attachment styles and parenting styles will be discussed in terms of their combined impact on social deficits.

**Social deficits in children with ASD.** We found that non-verbal children displayed significantly more social deficits than verbal children, even when controlling for age using ANCOVA. In addition, the ADOS-2 module that was sensitive to the sample's verbal ability and age was used to measure social deficits. The ADOS-2 measure is deemed the gold standard tool for measuring the severity of ASD; it provides a score for social deficits that is comparable across all modules. This finding therefore answers our first research question, indicating that the subgroups do differ significantly in social deficits, and supports the first hypothesis that verbal children display less social deficits than non-verbal children with ASD. This result suggests the subgroups have marked differences in presentation, so to consider them as a single group could be unreliably oversimplified, especially since social impairment is a core diagnostic feature of ASD.

**Attachment styles.** For the full sample we found that all three attachment styles are equally present in children with ASD. When comparing our two subgroups we found a significant difference in attachment patterns, suggesting that verbal children display more anxious-insecure behaviour than the non-verbal subgroup. Due to this difference, interpreting the full sample as representative of both groups could, once again, be problematic as it does not provide meaningful information about the particular patterns of attachment within each of our two subgroups. In view of the fact that verbal and non-verbal children are predominantly considered as a single group, it is crucial to consider the implications this might have on research on attachment in ASD. A discussion of the full sample, followed by the differences between our two groups will be presented below.

For the full sample, we aimed to discern what type of attachment style is mostly present in ASD (Research question 2). A repeated-measures ANOVA analysis on the ASCQ scores showed that there was no significant difference between secure, anxious-insecure and avoidant-insecure attachment styles. These children were therefore not predominantly categorised within a single attachment style category. This suggests that all three attachment patterns are displayed equally and/or simultaneously in children with ASD. For this reason our hypothesis that secure attachment would be present more than avoidant or anxious insecure attachment is not supported (Hypothesis 2).

This finding highlights two important points for discussion. First, the considerable possibility that attachment patterns are different to those found in NT children and secondly the highly complex nature of attachment in ASD. These two points will be discussed separately.

*Attachment styles in ASD vs. NT children.* Previous research has shown that NT children usually have one predominant attachment style. It seems that our finding might be in line with previous descriptions of attachment in ASD as seeming “bizarre” or “strange”, possibly due to the changes between attachment modalities (Buitelaar, 1995; Van Berekelaer-Onnes & Luncangeli, 1999). What our finding emphasises is the importance of not trying to fit attachment in ASD into NT parameters, as unlike an NT child, there appears to be no clear-cut category into which a child with ASD should be placed. A consequence of such attempts has resulted in conflicting conclusions for attachment in ASD and an especially a high proportion of children with ASD being perhaps incorrectly categorised as both disorganised and insecurely attached (Kahane & El-Tahir, 2015; Rutgers et al., 2004).

It is important to unpack why the common finding in the literature is that this population is disorganisedly attached. Disorganised attachment is defined as “children not having the ability to organise their attachment behaviour according to any unitary/coherent pattern or momentary breaks in the attachment strategy” (Liotti, 2004, p. 3; Solomon & George, 1999). This definition describes precisely what we found - our sample displayed a mixture of all three attachment styles, thereby

explaining why there has been a high proportion of ASD children classified as disorganised-insecure (Capps et al., 1994; Willemsen-Swinkels et al., 2000).

However, this attachment classification is based on the notion that this pattern is an outcome of children being highly distressed due to abusive parents and that this distress inhibits their ability to organise how they relate to their parents and others (Carlson, Cicchetti, Barnett & Braunwald, 1989). This classification is clearly inappropriate for the ASD populace as these children's inconsistent attachment patterns are not a result of trauma or abuse related distress, but likely a result of an inherent difficulty with social abilities.

Instead of viewing this pattern of attachment in ASD as 'an inability to organise' we have now learned that there may be an intriguing uniqueness in attachment in ASD which needs to be unearthed. It must be stressed that these results emphasise the need to further examine attachment in ASD in order to improve both our understanding as well as the description of attachment patterns in this population.

*Complexity of attachment in ASD.* Within the ASD populace, it is possible that behaviour associated with each of these three attachment styles is dependent on the context and the individual with whom the child interacts. The parents in our sample had articulated that they had observed their children's behaviour being influenced by context or person. This highlighted the possibility that the apparent security or insecurity of a child with ASD is quite sensitive to the environment. This interpretation is supported by Rutgers and colleagues (2007) who suggested that attachment behaviour in ASD could be context-dependent. This suggests that it is important for researchers to consider adapting to the environmental sensitivity of children with ASD when exploring their attachment styles due to the possible impact of the observational setting on attachment results. Some researchers who conducted the SSP in the homes of children with ASD, arguably an environment that would be more comfortable for them, have illustrated this practice.

This sensitivity to the context and person raises concern as attachment style is meant to be stable, internalised and to enact its effects across the lifespan. One possible explanation for this

sensitivity is that the nature of ASD, which often includes inflexibility to change and always presents with social deficits, limits their capacity to display securely attached behaviours to any individual within any context. Therefore, their lack of a predominant attachment style is likely not because they are incapable of being secure, but instead due to their rigidity in what they like and dislike or becoming highly anxious in response to change in context and person. Another possibility is that their attachment styles' internalisation and stability are individual-specific. For example, a child could be predominantly secure with parents in all interactions but does not generalise this to anyone else. This has not been explored in this study or previous studies, therefore we cannot say with certainty that their attachment styles are or are not stable and internalised.

Admittedly the above interpretations of our findings for the full sample could be compromised since, like many other studies, we considered the ASD sample as a singleton, which is problematic as we found two distinct subgroups within ASD. Therefore, our finding is not representative for particular patterns within the verbal and non-verbal groups especially when considering the difference in attachment found between them (discussed below). Unfortunately, we could not run the above analysis within each group as our sample was too small. For this reason it is strongly suggested that future studies explore the patterns of attachment within each group to discern if there is indeed a correlation between observations made in the full sample and those within each subgroup.

*Critique of ASCQ.* The findings and interpretations made for the full ASD sample's attachment styles highlighted some limitations of the ASCQ measure. Firstly, the measure comprised of questions pertaining to the children's attachment styles towards their peers with the premise that this is related to the primary attachment style with caregivers. This proved difficult on two levels: first, the ASCQ did not measure the attachment patterns with parents directly across different contexts and second, attachment in ASD appears complex and different compared to NT populace. It is therefore difficult to generalise attachment towards peers to attachment with primary caregivers.

Unlike the SSP, the ASCQ is a parent-report with no observation segment. This makes it susceptible to parental bias with no objective perspective from the researcher to support or challenge the parents' reports. Furthermore, a similar concern is found for the SSP where, like the ASCQ, limited studies have explored the validity of these measures for the ASD population. This is in contrast to the NT population, for which these measures were designed (Marcu et al., 2009). For these reasons, the ASCQ may not have been able to provide a full understanding of attachment styles in ASD. This resulted in a few unanswered questions and consequently made it difficult to draw any conclusions since there is uncertainty as to whether attachment patterns are actually being tapped into for the ASD populace. This measure did however provide insight into the variability of attachment styles, an advantage that categorical measures like the SSP could not provide. It also provided an opportunity to explore attachment at a later age, which is an important consideration with a clinical population characterised by life-long social deficits.

***Comparing attachment in verbal and non-verbal children with ASD.*** We aimed to explore whether there were any differences in attachment between our verbal and non-verbal groups (Research question 3). When comparing our two subgroups, we found that the verbal group only significantly differed from the non-verbal group in the anxious-insecure attachment style. No significant differences in the secure or avoidant-insecure attachment style were found. Thus our hypothesis that that the verbal group would be more securely and less insecurely attached than our non-verbal group was not supported (Hypothesis 3). In fact, we found that the verbal group was more insecurely attached in the anxious-insecure attachment style.

Interestingly, ANCOVA analysis (controlling for age) of our sample group revealed that verbal children experienced significantly more anxious-insecure attachment behaviour than non-verbal children ( $p = .013$ ). Items used to measure this attachment style pertained to anxiety around social interactions with others. For example: "*sometimes my child is afraid that other kids won't want to be with him*" and "*my child sometimes feels that others don't want to be good friends with him as much as he does with them*". The presence of greater anxiety in such situations could be

attributed to verbal children being higher functioning. Therefore it is likely that they have more awareness of their social difficulties and that they are 'different' to other children. This could account for verbal children being more prone than non-verbal children to experiencing anxiety and concerns in social situations.

Our finding is consistent with previous research that illustrated that children and adolescents with HF ASD were prone to having social anxiety and mood difficulties, suggesting an overlap in verbal ability and higher functioning children with anxiety (Gillot et al., 2001; Green et al., 2000; Kim et al., 2000; Kuusikko-Gauffin, 2008). Gillot and colleagues found that higher functioning children with ASD experienced higher levels of social anxiety and social concerns than children with specific language impairments without ASD (Gillot et al., 2001; Kuusikko-Gauffin, 2008). This could be considered comparable to our finding that verbal children with ASD had higher levels of anxiety than their non-verbal counterparts.

Our finding further highlights the importance of understanding a child with ASD's inner world regarding their social concerns and to not merely assume social aloofness. It also raises the possibility that social anxiety should often be considered as a co-morbid or co-occurring symptom. A previous study by Chalfant and colleagues (2007) provided Cognitive Behavioural Therapy (CBT) to 47 children with HF ASD with co-morbid anxiety disorders. They found that after the CBT treatment, 71.4% of the children no longer met the diagnostic criteria for an anxiety disorder. This study not only illustrated that children with ASD are responsive to treatment for anxiety symptoms, but also that social concerns exist in the child's world and that they have more awareness than is often believed. Therefore it is possible that the reason for verbal children scoring higher on the anxious-insecure attachment style could be related to 1) their anxiety regarding not understanding how to interact socially and 2) their awareness of their social deficits.

An alternative possibility, that is both a potential limitation of the ASCQ and that could account for the verbal subgroup scoring higher for anxious-insecure attachment is the following: three of the five items measured the inner thoughts of the child and thus could be compromised by

parental bias. Specifically, “*sometimes my son is afraid that other kids won’t want to be with him*”, “*my son feels that others don’t want to be good friends with him as much as he does with them*” and finally “*my son is sometimes afraid that no one really loves him*”.

It is possible that parents’ bias could result from them projecting their own anxieties onto their children. In the case of verbal children, they could over report their children’s previous verbalisations of the above concerns. On the other hand, non-verbal children are not able to express these inner concerns to their parents. For this reason, the non-verbal children who did in fact score on these items, it is possible that parents, when answering these questions on their child’s behalf, could have perceived their own emotions to be the emotions experienced by their child.

In addition, it is possible that parents of both verbal and non-verbal children could be misinterpreting a lack of interest in others (withdrawal) as social anxiety. In line with this interpretation a previous study by Gillot and colleagues (2001) gave questionnaires measuring the social anxiety (social concerns) of the child to both the children and their parents. They found that parents indicated higher scores for their children’s social concerns than did their children. This is not meant to say that parents do not know what goes on in their child’s mind, but highlights the importance of designing a more appropriate and valid measure for children with ASD.

We have discussed attachment patterns in ASD as well as the differences between verbal and non-verbal subgroups. We were then interested to explore how attachment relates to social deficits as this is the core deficit in ASD.

**Attachment styles’ relationship with social deficits.** Here we were interested in exploring whether attachment styles relate to social deficits in ASD (Research question 4). In order to answer this research question, we explored the full sample since our results indicated that there was no difference in secure and avoidant-insecure attachment styles between the two subgroups (verbal and non-verbal). We did however also explore the verbal and non-verbal groups separately as they differed significantly in their levels of social deficits and anxious-insecure attachment style. Our hypothesis for this relationship was two-fold: 1) secure attachment would have an inverse

relationship with social deficits. This was only seen in the non-verbal group; 2) both insecure attachment styles would have a positive relationship with social deficits. This was not supported as an inverse relationship was found in the full sample and verbal group (Hypothesis 4). The findings will be discussed below.

For the full sample, by means of correlations we found that there was a significant inverse relationship between anxious-insecure attachment styles and social deficits. This means that more anxious-insecure attachment was associated with less social deficits. This is contrary to our hypothesis that insecure attachment would have a positive association to social deficits (Hypothesis 4). However this finding is in line with what we found above, namely that verbal children were more anxious-insecurely attached than our non-verbal group. This was an unexpected finding and is not supported by the literature. It should therefore be explored in more detail in order to understand why it is more strongly associated with social ability than secure attachment. This finding is not in line with the literature that has found that secure attachment is related to better social abilities in NT populace (Ainsworth & Bowlby, 1991).

It is important to note that we found different relationships within the verbal and non-verbal groups than in the full sample. This suggests that because particular patterns were found within the subgroups, the finding for the full sample illustrates that treating ASD as a homogenous group is too simplistic as it appears that viewing verbal and non-verbal groups together results in a loss of specific characteristics inherent within the different subgroups. Furthermore, this also illustrates that the difference in social deficits that distinguishes our two subgroups may also impact on how attachment relates to social deficits within each group.

***Comparing the relationship of attachment styles with social deficits in verbal and non-verbal subgroups.*** For the verbal subgroup we found by means of correlations that avoidant-insecure attachment had a significant inverse relationship with social deficits and indicated that higher avoidant-insecure attachment is associated with less social deficits. This is contrary to our

hypothesis that insecure attachments would have a positive relationship with social deficits (Hypothesis 4).

This was a very unexpected finding since the literature notes that secure attachment is related to better social abilities (Ainsworth & Bowlby, 1991). Bowlby regarded secure attachment as an important aspect in the development of a child's social abilities. It is for this reason that we explored attachment to understand social impairments that are core characteristics of ASD. However, our finding appears to contradict Bowlby's (1988) psychological model that has been extensively studied in NT children and has been supported in various social domains. Our finding suggests the opposite where more insecure attachment is related to less social deficits. This however should be interpreted tentatively as it appears that our measure for attachment might not be tapping into the primary parent-child relationship.

For the non-verbal subgroup, by means of correlations, we found that secure attachment had a significant inverse relationship with social deficits and this is in line with our hypothesised relationship (Hypothesis 4). This pattern where secure attachment relates to better social ability is also in line with the literature in the NT population and with attachment theory (Ainsworth & Bowlby, 1991). It does however remain peculiar that our non-verbal subgroup has more social deficits but yet they have been able to achieve this hypothesised inverse relationship.

It appears that differences are found between our two subgroups when correlating attachment with their social deficits. This suggests that they may have been similar in attachment styles (with the exception of anxious-insecure) but the manner in which attachment relates to their social deficits is different. This may be due to them significantly differing in their levels of social deficits. It is important to understand why we were not able to illustrate a clear link between secure attachment and social ability in the verbal subgroup, as it was present in the non-verbal subgroup. Three possible reasons for this are: firstly, that there could be another variable influencing the relationship between attachment and social deficits; secondly, that attachment styles in ASD may not reflect attachment styles in the NT population and lastly, it is possible that the primary model

for the caregiver-child bond may not be generalising into peer relationships, as seen in NT populace.

In conclusion of our investigation of attachment styles in ASD, our findings provided more insight into the uniqueness of attachment styles in ASD. We found the absence of a single dominant style within each child as they appeared to display all three attachment patterns simultaneously. Whether this pattern will be found within each subgroup still needs to be explored with a bigger sample. Pertaining to the differences between our two subgroups, there were interesting findings where, contrary to our hypothesis, the verbal group was not more securely attached and were in fact more anxious-insecurely attached than the non-verbal group. Moreover, for the other two attachment styles the subgroups did not differ. This was interesting as they differed in social deficits and it was suspected that their attachment would also differ as there is literature precedence which indicates that the nature of ASD compromises attachment patterns.

When we explored the link between secure attachment and social abilities we found that the hypothesised link between these two variables was found in the non-verbal group but was compromised for the verbal group. This is interesting as attachment is thought to be crucial in social development and universal. Overall, we suggest more research into redefining attachment styles that are sensitive to the ASD populace. Moreover, evaluation of the measurement tools is required to assess their validity in measuring attachment in the ASD populace. This is further discussed in the 'Limitations and Recommendations for Future Research' section.

**Parenting styles.** We were interested in looking at parenting styles as neither Baumrind's three parenting styles have been explored in ASD nor has their association with levels of social deficits been examined. We found that overall parents reported employing more positive and authoritative parenting towards their child with ASD than other parenting styles. Furthermore, the parents of the verbal and non-verbal subgroups did not differ in their parenting styles. Finally, we found that authoritative parenting was significantly and inversely related to social deficits in our verbal subgroup, but not in the non-verbal group. This difference in how parenting relates to our

two subgroups' social deficits again highlights that viewing ASD as a homogeneous group is potentially problematic. I discuss these findings in detail below.

We explored what type of parenting style is mostly present in parents of children with ASD (Research question 5). A one way repeated measures ANOVA was found to be significant and post hoc tests indicated the three parenting styles all significantly differed from one another: authoritative parenting was the most reported parenting style, permissive the second, while authoritarian was the least reported parenting style in our sample. Thus, our hypothesis that authoritative parenting would be mostly reported is supported (Hypothesis 5). To the best of our knowledge, this is the first report that examines how the three parenting styles are employed in ASD.

Overall, parents in this study reported that they chose to remain warm, empathetic, responsive, foster their child's emotional growth and regulate behaviour by providing good structure. This was despite their children's behavioural difficulties, and the stressors and challenges that are associated with raising a child with a developmental disability. Notably, having a child with ASD has previously been found to negatively impact parenting style (Dyches et al., 2012).

Our finding that authoritarian parenting is least reported contradicts Baumrind's (1996) claim that parents of children with ASD were more inclined to exhibit authoritarian parenting. In support of Baumrind's (1996) finding, observations of parent-child interactions found parents to be more directive and controlling, traits that are indicative of authoritarian parenting (Siller & Sigman, 2002). Similarly, in a non-western context Gau and colleagues (2010) found, using a questionnaire called *Chinese Version of the Parental Bonding Instrument*, that Chinese children with ASD are raised primarily under an authoritarian parenting style. We do acknowledge that without observation it is hard to know how reliable the parent report is; in our study authoritative parenting could be most reported, and authoritarian least reported, due to social desirability bias.

The second most reported parenting style in our ASD sample is the permissive type, particularly the *indulgent* dimension measured in our questionnaire. This kind of parenting has been

described as indulgent, non-demanding and associated with a lack of control over children. A possible explanation for this finding could be that parents have lower expectations of their children due to their ASD diagnosis. As a consequence, it is possible that they are uncertain about appropriate discipline and what their child is able to understand or manage and are therefore permissive. Another possibility is that parents might become indulgent in discipline when faced with meltdowns or overwhelming tantrums, or that parents are at times exhausted from having to be so vigilant. During the interviews, parents spoke about the difficulty in regulating a child with ASD's behaviour all day and every day, which could account for the lapse into permissive parenting from time to time. Woolfson and Grant (2005) came to a similar conclusion where they found that the implementation of authoritative parenting is stressful for parents of children with developmental disabilities. For this reason there is a decrease over time in the utilisation of authoritative parenting. It is possible that in the present study the decrease over time is better understood as parents utilising permissive parenting at times such as 'giving in' to their child's tantrum.

We explored whether there were any differences in parenting styles between our verbal and non-verbal group (Research question 6). However, we found that the parents of the verbal and non-verbal subgroups did not differ in their parenting styles. Thus our hypothesis that parents of verbal children would use more authoritative, and less authoritarian and permissive parenting than parents of non-verbal children was rejected (Hypothesis 6). For this reason no comparative discussion between our two groups is required. Although differences were not found, this does not mean that the patterns of parenting styles employed within groups from most to least is the same as that found for the full sample. This caution is based on the finding (below) that indicated that the ways in which parenting related to social deficits in verbal and non-verbal groups were different. Therefore, future studies with bigger samples should be carried out in order to discern the patterns of parenting received within each subgroup so that it may be possible to establish if our finding for the full sample is true for each group.

**Parenting styles' relationship with social deficits.** Here we aimed to discern whether there was a relationship between parenting styles and social deficits (Research question 7). We explored the full sample and both subgroups as they differed in social deficits. Our hypothesis for this section was two-fold: 1) authoritative parenting would have an inverse relationship with social deficits. This was supported in both the full sample and in the verbal group, 2) Authoritarian and permissive parenting would have a positive relationship with social deficits – we found no evidence for this relationship.

For the full sample, when exploring the relationship between total (higher scores indicate more positive parenting) parenting and social deficits by means of correlations we found that more positive parenting was associated with significantly less social deficits. This was expected. By means of correlations, we also found that more authoritative parenting is associated with less social deficits in our full ASD sample. This suggests that in ASD more positive and authoritative parenting is associated with fewer social deficits or visa-versa (we cannot discern the direction of the relationship).

However, this finding is not a good representation of both subgroups because these relationships between positive, authoritative parenting with less social deficits were only found in the verbal subgroup. As these relationships are not present in the non-verbal subgroup, it is possible that the observation made for the full sample may be an artefact of the verbal group considered on its own. This will be discussed in more detail.

***Comparing the relationship of parenting styles with social deficits in verbal and non-verbal subgroups.*** For our verbal subgroup, we found the same results as above; a higher total parenting score (indicating more positive parenting) was significantly associated with less social deficits. More importantly, we found a specific association between more authoritative parenting and less social deficits. It is possible that having higher verbal ability could be allowing the link between parenting and better social ability to occur. This would suggest that a child who is verbal may be able to understand when parents are reasoning and mentalising their child's emotions and

experiences. This would in turn allow the child to benefit from this parenting style and subsequently reassure the parents of a continued use of the style.

The aforementioned finding is in line with the known literature in NT populations that authoritative parenting style is related to better social competence (Baumrind, 1989; Dyches et al., 2012; Hart, Newell & Olsen, 2003). The current study found that despite the social difficulties seen in ASD, the relationship seen in NT children is also seen in our verbal group. The link between parenting styles and social abilities in NT children is clear and our findings indicate this may also be the case for the verbal ASD populace.

A possibility is that instead of being directive, parents (particularly of verbal children) employed parenting methods that aided their child with skills to better understand the world and how to be in the world, thereby providing their children with the opportunity to enhance their social skills. Another possibility could be that better verbal and social abilities in a child could facilitate more positive parenting behaviours towards the child.

In line with a potential interpretation that parenting behaviour could stimulate better social ability, there are interventions that use parents as coaches to improve functioning in various social domains in children with ASD (Gustein, 2005). The Relationship Development Intervention (RDI) aims to improve children with ASD's ability to naturally interact reciprocally and spontaneously in everyday interactions. The authors found that 70% of children with ASD who participated in this intervention for a period of 16 months improved in their ADOS-2 diagnosis in at least one category (Gustein, 2005; Gutstein & Sheely, 2002). Another intervention is the Early Start Denver Model (ESDM), a behavioural approach that aims to improve children (12 - 48 months) with ASD's social-emotional, cognitive, and language development (Rogers et al., 2012). It is an individualised parent-child education program that provides parents with skills to engage and communicate with their child. Authors found that children participating in the ESDM had a decrease in ASD symptoms (Rogers et al., 2012). In addition, a meta-analysis that explored the impact of

authoritative parenting on the development of children with developmental difficulties, found a moderate association between this parenting style and fewer social deficits (Dyches et al., 2012).

In conclusion and contrary to other studies that found parents to be more directive (authoritarian), we found that parents in our sample reported to primarily employ authoritative parenting despite their children's social deficits. Whether this pattern is the same in both verbal and non-verbal subgroups needs to be explored in larger samples. Furthermore, we found that in contrast to our hypothesis, parents of our two subgroups did not differ in reports regarding which parenting styles they employed. We found that as with NT children, a positive parenting style does relate to better social ability in our verbal group. However, this association was not present in the non-verbal group and should be explored further. We do acknowledge that the PSDQ is a self-report measure and for this reason the results may be impacted by social desirability bias in parents' answers. This study is exploratory so our findings simply suggest that further investigation is needed that includes a measure to observe how parents interact with their children who have ASD.

**Attachment styles' and parenting styles' relationship with social deficits.** We explored the combined association between attachment and parenting styles with social deficits (Research question 8). A hierarchical multiple regression indicated that in combination; age, attachment styles and parenting styles were significantly associated with social deficits in our verbal subgroup, but not in the non-verbal group. However in the significant model for the verbal group, betas indicated that of the three variables, only parenting style predicted social deficits. Therefore our hypothesis that attachment and parenting in combination would have an inverse relationship with social deficits was not supported, as although the overall model was significant the betas indicate that only parenting was acting as a predictor (Hypothesis 8).

This finding for the verbal group is contrary to the foundation of attachment theory that was developed for the NT population, where the caregiving environment impacts the child's attachment styles that subsequently translates to promoting social development (Ainsworth & Bowlby, 1991). Moreover, this regression highlights and reiterates our previous finding that positive parenting has a

strong association with reduced social deficits. Pertaining to attachment not being a significant predictor in the model, it is possible that the problems associated with measuring and classifying attachment in ASD could perhaps play a role in not finding a significant contribution to social abilities.

**Study 1 - Conclusion.** The terms *verbal* and *non-verbal* are used a lot in conversations among professionals who work with children with ASD. However, there has not been an exploration of whether their differences go beyond a language impairment: our results suggest they may in fact be two distinct subgroups according to their level of social deficits. We have found that verbal and non-verbal children differ significantly on one of the core diagnostic criteria of ASD, social deficits. Interestingly, when merging them into one group our finding showed that these two subgroups did not differ in attachment or the parenting they receive, which is peculiar. What we have discerned is that when treating ASD as a single homogeneous group we may get misleading findings that are not representative of the patterns within each group. These patterns were evident when exploring how these variables related to each subgroup's unique social deficits. Therefore future studies with larger samples are needed so that it may be possible to discern whether the findings seen here for the full sample correlate with those for the subgroups.

The attachment patterns in our sample have suggested that it differs from NT. When looking at the contradictory research available, it seems many children with ASD are inappropriately characterised as disorganised. Our finding suggests a need to build a conceptualisation and measurement of attachment for this population from scratch. Only once this has been accomplished can we truly understand how attachment relates to social ability in ASD.

Contrary to other research, we have found that parents of children with ASD reported to mainly employ authoritative parenting styles. Furthermore, we have found that more authoritative parenting is associated with better social abilities in verbal children. This is promising and in line with interventions that target parental behaviour in order to decrease social deficits. However,

further research needs to be dedicated to discern the relationship's direction as obviously a child with less social deficits may be more amenable to more authoritative parenting.

### **Study 2: ToM and Its Relationships with Parenting Styles and Social Deficits.**

This second study had a specific focus on the theory of mind capacities in verbal children with ASD. We limited this study to children in the sample without comprehension difficulties. In order to be classified as “verbal” children were required to be able to consistently follow two-stage instructions. This was done to ensure that comprehension difficulties did not falsely present as ToM deficits. We first looked at ToM development in ASD. In addition, verbal children's capacity in first-order false beliefs was explored separately from overall ToM, as researchers commonly use false belief tasks as a gold standard measure of the presence of ToM capacities (Baron-Cohen et al., 1985). Thereafter we explored how different parenting styles were associated with ToM abilities. We excluded attachment from Study 2 as Study 1 found that the ASCQ does not appear to measure attachment well, as it may not be the same as in the NT populace. Moreover, Study 1 indicated that attachment styles did not appear to be acting as an important predictor compared to parenting styles. Lastly, we explored how parenting styles and ToM in combination were related to social deficits.

**The ToM capacities of children with ASD.** We aimed to explore the state of ToM deficits in the South African context (Research question 1). We found a positive and substantial association between age and ToM abilities in our sample. The positive correlation between age and ToM was recognised in NT and ASD children, and has been supported extensively in the literature where there was a positive developmental change in ToM as age increased (Happe, 1995; Hoogenhout & Malcolm-Smith, 2014; Steele, Joseph & Tager-Flusberg, 2003). For this reason we divided our sample into two age groups for descriptive purposes: We then explored general ToM capacities and false belief reasoning, and found ToM deficits. Therefore, our hypothesis that there would be severe deficits in ToM abilities was supported (Hypothesis 1).

**ToM general performance.** ToM capacities were measured using a battery comprising of four modules. Below each subgroup's performance will be discussed for each module where a pass

is 50% score. The younger group started on the *basic module* and older group on the *intermediate module*. Children who failed a starting module then completed a previous module; those who passed moved onto the following module.

In the *early* module both age groups passed where the 6-8 year olds averaged 77.43% and the 9-14 year olds scored 92.27%. Here we see that the older group performed better than the younger group. This module included the following tasks; understanding intention, pretend play, perception-leads-to-knowledge, diverse desires and diverse beliefs. The early battery measures precursors to ToM and was designed for NT children who are 3-4 years old. Children aged 6 – 8 years would be expected to perform at ceiling (i.e. score 100%) and therefore anything below this indicates delayed development of ToM (Wellman, Fang & Peterson, 2011). The scores on the early module, especially when considering the age difference between our sample and that of normal development in NT, highlighted the severe deficits in our sample.

In the *basic* module, on average, both groups passed. The 6-8 year olds passed with 58.07% and the older group scored 79.93%. This module was comprised of the following tasks: location-change false belief, unexpected-contents false belief, a deception task (sticker hiding), belief-emotion and real-apparent emotion. The false beliefs will be discussed individually later. Previous international studies, including meta-analysis, have found that NT children are able to achieve successful performance in the age range of 4-6 years of age (Frith & Frith, 2003; Liu et al., 2008; Wellman, Cross & Watson, 2011). When comparing our sample scores, they scored lower than South African NT children in a study by Hoogenhout and Malcolm-Smith (2014) for sticker hiding, location-change false belief and unexpected-contents false belief. Here we can see that the ASD children showed substantial differences to NT children, suggesting severe deficits in ToM, where even our older sample was not scoring at ceiling.

In the *intermediate* module both groups failed: the younger group scored 30.15% and the older 49.61% on average. The tasks included in this module were second order false belief and strange stories. The original task by Perner and Wimmer (1985) that measured second-order false

beliefs found that by 10 years of age all NT children were able to pass at ceiling. However studies that used a simpler version found that NT children understood this form of false belief from 6 years to 8 years old (Astington, Pelletier & Homer, 2002; Frith & Frith, 2003; Hayashi, 2002). Here we can see that our younger group was at the same chronological age as these norms, however are clearly not at the same ToM level. The older children achieving well below the ceiling further highlights the ToM deficits present in ASD.

In the *advanced* module our younger group scored 21.53% and older group 36.72% on average. This module included two tasks, namely lie-joke and faux pas. Baron-Cohen and colleagues (1999) designed the faux pas test for NT children aged 7 - 11 years old, where they found that this ability to detect faux pas improved with age, and NT children between 9 -11 years old have mastered this. Therefore when comparing NT children's ToM capacities to our sample, we found clear deficits in ToM in our ASD sample.

***First-order false belief.*** Theory of Mind was originally researched using false belief tasks such as the *Sally-Anne False Belief Task* (Tager-Flusberg, 2007). The reason the task is so popular is that it unequivocally illustrates a mental state inference. We therefore specifically explored performance on false belief tasks in our sample. Our sample performed much better in the control questions and indicated that the ToM scores they received were not simply a reflection of generalised cognitive deficits, where they don't understand or struggle to make any inferences. Therefore, their ToM scores being worse than control scores can be interpreted as a specific ToM deficit.

***Location-change false belief task.*** In the 6-8 year old age group two children passed who were credited perfect scores and the other three children failed; two received 16.67%, and one received 8.33%. In the 9-14 year old age group nine children passed; eight received a perfect score (of which seven were credited perfect scores due to having passed a more advanced module) and one received 66.67%. There was one child who failed with a score of 0%. Therefore, across the sample only eleven children out of seventeen children passed this ToM task.

This profoundly contrasts to the NT population where by the age of 3 years they start developing this ability, and by 6 years old the majority of children have mastered this ToM ability (Bibby & McDonald, 2005; Gopnik & Astington, 1988; Hollebrandse, Van Hout & Hendriks, 2012; Matsumoto, 2013; Naito, Komatsu & Fuke, 1994b; Wimmer & Perner, 1983). In meta-analysis it has been found that 2-3 year olds would already have successful performance in mental-state understanding (Liu et al., 2008; Wellman, Fang & Peterson, 2011). This highlighted the severity of the deficits where children with ASD struggle to master first-order false belief reasoning at both the same age as NT children as well as at much older ages. Our findings in relation to previous studies in the NT populace highlighted the deficits in children with ASD, where they struggle to distinguish between reality and how it might be perceived (incorrectly) in another person's mind.

*Unexpected-contents false belief task.* In the 6-8 year old age group, two children passed who were credited perfect scores due to having passed a more advanced module. There were three children who failed with a score of 0%, 8.33% and 16.67% respectively. In the 9-14 year old age group nine children passed; seven were credited perfect scores due to having passed a more advanced start module, and two received 83.33% and 91.67% respectively. There was one child who failed with a score of 8.33%. Therefore, across the sample only eleven children out of seventeen children passed this ToM task.

Gopnik and Astington (1988) found that most NT children who are 5 years old do not make an error for this false belief task. Matsumoto (2013) who used the *smarties test* which is the same as our *unexpected contents task*, found that approximately 54% of NT 6 year olds passed. We have again found profound deficits in first-order false belief reasoning in our sample. Previous research had found that ToM development in ASD could be delayed yet still fully develop; or could be stunted so that there is a plateau in development (Hoogenhout & Malcolm-Smith, 2014). Our study was consistent with findings where ToM skills are under-developed in ASD.

In conclusion, our study confirmed that in ASD, ToM capacities were strongly related to the child's developmental stage (age). Furthermore, our results highlighted the severe ToM deficits

found in the ASD populace, where they were performing well below what is expected in NT children. This suggests a delayed development when compared to NT children as their ToM capacities are not at the same developmental level.

**How parenting styles relate to ToM capacities.** The aim of this section was to explore whether there is a relationship between parenting styles and ToM (Research question 2). By means of correlations we explored the relationships between total (higher scores indicate more positive parenting) parenting and the three parenting styles with ToM. We found that only authoritative parenting was significantly associated with better ToM abilities. Thus our hypothesis that authoritative parenting would have a positive relationship with ToM capacities was supported (Hypothesis 2). Baumrind (1996) defines authoritative parents as caregivers who place emphasis on child autonomy within an environment that is structured, and often encourage children to openly reflect, question, and challenge differing perspectives on the world while negotiating family rules together.

It is possible that by being less directive and using parenting methods that aided their child with skills to better understand the world and how to behave in the world, they may have aided in the association with better ToM abilities in our sample. However it is also possible that a child with better verbal ability or better social cognitive abilities could be more amenable to this type of parenting.

Our finding was consistent with a study conducted by Symons and Clark (2000) who found that the authoritative (responsive) parenting style was sensitive to the child's motives and mental states and appropriately reflects them back, which is a contributing factor in ToM development as it gave children the opportunity to correctly learn about mental states. In addition, Meins and team (1998) found that having parents who treated their children as having intentions and mental states at 6 months positively predicted ToM performance at the age of four years.

In order to understand how authoritative parenting is associated with better ToM abilities, by means of correlations we explored its subscales in relation to ToM. We found that both

reasoning/induction and democratic participation had a positive relationship with ToM, whereas warmth and support had no significant relationship with ToM. Below the significant results are discussed.

We found that more reasoning/induction was significantly associated with better ToM abilities. The questions for this subscale pertained to whether parents provided reasons, explain their mental states to their child and help their child to understand purposes which gave their child the opportunity to learn how other's (and their own) thoughts, feelings and desires impacted behaviour.

This suggested that although children with ASD had impairments in ToM, their skills in this domain could be aided through parents treating their child as having their own mental states and providing an environment that is reflective and communicative. In support of the above finding, previous studies found positive associations between authoritative parenting behaviours and ToM development. It has been suggested that this was an outcome of this parenting style being sensitive to children's motives and mental states and reflection thereof, thereby providing the opportunity to learn about other people's mental states (Symons & Clark, 2000; Meins et al., 1998). However, it is also possible that children with better ToM skills are better able to understand this kind of communication, so more of this parenting could be seen in such children.

In addition, there is a review by Pavarini and colleagues (Pavarini, de Hollanda Souza & Hawk, 2013) that analysed 78 studies that explored the relationship between parental characteristics and ToM abilities. One of the recommendations they deduced from their review was that parents should elaborately discuss mental states by: highlighting what the origin or reason was for them and outcomes thereof, as well as explaining that these may differ for other people (e.g., Dunn et al., 1991a, b; Ensor and Hughes, 2008; Slaughter et al., 2007; Van Bergen et al., 2009). In addition, they emphasised that important opportunities for mentalising ToM arise from children's misbehaviours and conflicts (e.g., Ruffman et al., 1999).

A study by Ensor and colleagues (2014) found that mothers' cognitive (a category of mental states) references observed with their children at 2 years old predicted their child's false belief understanding at 6 years old and their performance in strange stories at 10 years old. In this study cognitive references referred to mother's using terms (i.e. think, imagine, mean) to describe the thoughts, memories, or knowledge of herself, her child or another person. This suggested that the more parents describe others' mental states, the better ToM skills developed.

We found that democratic participation was significantly associated with better ToM abilities. Democratic participation was measured using the following questions where parents; *“shows respect for child's opinions by encouraging child to express them”*, *“encourages child to freely express himself even when disagreeing with parents”*, *“allows child to give input into family rules”*, *“takes child's desires into account before asking the child to do something”*, and *“takes into account child's preferences in making plans for the family”*.

It is possible that by allowing their child to develop an independent mind and engage in conversations regarding other's mental states, for example about family rules or opinions, this allows their child to develop an ability to understand how their family views rules. This in turn may aid in the development of ToM capacities. Various studies have found that when parents treated their child as an intentional agent and were responsive to their child's mental states it aided in the development of ToM (e.g., Ensor et al., 2011; Erekly-Stevens, 2008; Fabes et al., 2002; Pavarini et al., 2013). We acknowledge that the opposite direction is also possible, as having a child who is better able to understand social norms and how people's mental states influence behaviour could mean parents are more able to make use of democratic participatory parental behaviour.

In conclusion, we found that authoritative parenting was significantly associated with better ToM in our sample. This finding is in line with NT findings that illustrated that the development of ToM capacity is associated with parenting styles. This finding suggests that empirical exploration of interventions that aim to improve ToM capacities in ASD by focusing on teaching parents authoritative skills encompassing reasoning/induction and democratic participation are needed.

**The relationship between ToM and parenting styles with social deficits.** We aimed to discern if parenting styles and ToM together related to social deficits (Research question 3). A hierarchical multiple regression indicated that in combination age, parenting styles and ToM were significantly associated with social deficits. Although the model was significant, the betas indicated that only ToM and age were acting as predictors of social deficits. Therefore, our hypothesis that parenting and ToM in combination would have an inverse relationship with social deficits was not supported (Hypothesis 3). To the best of my knowledge this has not previously been explored in ASD.

This finding suggests that it is possible that ToM has an influence on social ability in children with ASD. Meaning the better their ability to understand that people have different feelings, thoughts and desires (from their own) the more it will subsequently influence behaviour and improve social competence, specifically social communication and reciprocity. This is supported by the knowledge base in the NT populace that ToM underlies people's competence to understand social situations and predict the actions of others that is integral to social functioning (Leslie, 1987).

This direction was expected in our sample because difficulties in developing, understanding and maintaining relationships is a core diagnostic criteria for social deficits in ASD. There is robust support for our result where it is widely believed that deficits in ToM underlie the social impairments and directly impact the social competence of individuals with ASD (Baron-Cohen, 1995; Baron-Cohen, 2008; Bosacki & Wilde Astington, 2001; Frazier et al., 2012, Hoogenhout & Malcolm-Smith, 2014; Hutchins & Prelock, 2008; Lam & Yueng, 2012; Yirmya et al., 1998). Therefore it is possible that better ToM abilities could underlie a decrease in social deficits in ASD.

Furthermore, our finding suggested that better ToM abilities and older chronological age is related to less social deficits. This was not surprising since we had previously found that ToM capacity was significantly related to age, supporting the notion that ToM is developmental. The relationship between age and social deficits suggested that social abilities are also developmental.

Meaning, when the child gets older there is an improvement in ToM deficits and social deficits. Our finding further suggested that as a child becomes older they develop a better ability to understand how mental states influences behaviour, which is therefore related to better social abilities in ASD.

It is peculiar that parenting was not a significant predictor of social deficits in this model, especially considering it was significant in Study 1 for the verbal group. Considering that in this study we found that authoritative parenting was associated with better ToM, is it possible that parenting styles' role in this model could be to promote better ToM capacity, as seen in our previous finding. In turn ToM could underlie better social abilities in ASD. Alternatively if we were to assume the opposite, it would suggest that a child with better ToM capacity could be promoting more positive parenting from their parents, which then may relate to less social deficits in ASD. This interpretation highlights a need to conduct a mediation analysis. Due to the limited sample size ( $N = 17$ ), we anticipated that this analysis would not produce a reliable result and for this reason was not carried out.

**Study 2 - Conclusion.** Our hypothesis that there would be severe deficits in ToM capacities was supported. In terms of the relationship between parenting styles and ToM, we found very promising results where authoritative parenting, and specifically reasoning/induction and democratic participation was significantly related to less social deficits. Furthermore, we found that authoritative parenting and ToM in combination did not predict less social deficits. However, we found that in this model ToM and age were predictors of less social deficits, suggesting that as children become older, their ToM improves and this is related to less social deficits. In addition, this finding highlighted a need to explore parenting as a mediator of the relationship between ToM and less social deficits in ASD.

### **Limitations and Recommendations for Future Research**

**Sample size.** A limitation that impacted both studies equally is the small sample size used: this has implications for the reliability of the results. Having a small sample may lead to sampling error where the sample is not large enough to get reliable estimates of what is going on in the

population. In addition, Type 2 error likelihood is a problem where there is a risk of false negatives. The multiple inferential tests also inflated the risk of Type 1 errors (false positives). However, it was important to conduct this study to get a preliminary picture of attachment styles, parenting styles and their relationship with social deficits in ASD. For this reason we decided to keep our significance threshold at .05 but the results must be interpreted with caution: as preliminary, suggestive but not conclusive findings.

The significant results we found must thus be regarded as suggestive, rather than definitive. It will be important to do this study on a much larger scale in order to confirm whether these associations exist in the population. The relationships we explored are all under researched, but are important and may have implications for interventions.

***Attachment classification and measurement.*** The ASCQ provided a picture of attachment in ASD by indicating a score for the three-original attachment styles; disorganised attachment was not an option. Classifying children with ASD as disorganisedly attached is likely inappropriate as this category is dedicated to children who come from traumatic and abusive households. Our finding using ASCQ suggested that all three attachment styles occur simultaneously and that no specific style dominates in each child. However, the subgroup difference in anxious-insecure attachment invalidates this interpretation, as the patterns found in the full sample may not represent the specific patterns of attachment in the verbal vs. non-verbal subgroups. Our interpretation, in line with other studies is that 1) attachment appears to be different to NT and should not be forced into NT parameters; 2) it is more complex as it could be sensitive or dependent on context. Therefore we make two recommendations.

Firstly, dedicate more resources to conducting longitudinal studies on infants with ASD and their relationships with their parents for both verbal and non-verbal groups. In addition, discern whether the mother-infant relationship translates into relationships with peers. This will enable us to get a comprehensive picture of what attachment development and patterns are like in ASD. This

may prove challenging as ASD is usually only diagnosed later than the age at which attachment is typically assessed (i.e. 12 month to 18 months).

Our second recommendation pertains to the need to redefine or characterise attachment styles that is sensitive to the social deficits in ASD, specifically the unique social deficits for verbal and non-verbal subgroups in ASD. Our findings, along with those of other researchers (Capps, Sigman & Mundy, 1994; Rutgers et al., 2004; Shapiro, Sherman, Calamari & Koch, 1987; Willemsen-Swinkels et al., 2000), indicated that children on the spectrum are able to form secure attachments, but this may manifest differently to the NT populace.

In addition, we recommend the creation of new measures, developed specifically for children with ASD that are sensitive to the group differences (verbal and non-verbal). This recommendation is also substantiated by the fact that hardly any studies have explored the validity of attachment measures for the ASD populace (Marcu et al., 2009).

***Parenting styles measure.*** The PSDQ is a measure designed by Robinson and colleagues, which has good validity and reliability for a self-report measure. However, we have to acknowledge that social desirability may have greatly impacted how parents reported their parenting styles. In line with this limitation we recommend that an observational measure be used in addition to the PSDQ in future.

***Parenting styles relationship with social deficits.*** There was a brief discussion, due to small sample size of this study, on possible reasons why parenting style does not contribute to the regression to explain social deficit, despite been related to ToM. It is suggested that future research explores this phenomena with a larger sample to discern if the same result would be found and the mechanisms underlying the finding.

***ToM in non-verbal children.*** We had to exclude non-verbal participants from Study 2, as the available measures for ToM require verbal ability. It is recommended that measures be developed that are appropriate for non-verbal children with ASD. There is a non-verbal ToM assessment for false beliefs (FB) though rudimentary; hopefully in the future all of the ToM

modules would be less dependent on language (Cole, Baron-Cohen & Hill, 2007). However, it may be given the strong association of ToM with verbal abilities in ASD and with language abilities in NT (Slaughter, Peterson & Mackintosh, 2007) that ToM cannot develop beyond rudimentary abilities in children without language.

### **Conclusion**

This exploratory study was pursued to provide a preliminary picture of attachment styles, parenting styles and ToM, as well as their relationships with social deficits in children with ASD. These variables have not previously been explored in this detail or in combination in the existing literature. Due to the limitations addressed above our findings are not conclusive, but should be considered as suggestive and a topic for further research in aid of better understanding how these variables may relate to better social ability in ASD.

Our study highlighted that ASD should not be treated as a homogeneous group, as there are two distinct groups *verbal* and *non-verbal* based on significant differences in social deficits, a core diagnostic feature of ASD. We found that attachment patterns in our sample are different from NT children, and further that they differ somewhat between verbal and non-verbal children with ASD. In contrast to the literature, parents of children with ASD in this study reported to mainly employ authoritative parenting style. More importantly attachment and parenting related to social deficits uniquely across the groups. In regards to the social abilities of children with ASD, parenting (Study 1) and ToM abilities (Study 2) were significant predictors of better social abilities.

Overall, our study provided a preliminary understanding of social functioning and what factors may contribute to social development in children with ASD. Although it is widely accepted that ASD has a neurobiological basis, this current study suggests that specifically authoritative parenting and ToM may be important underlying mechanisms for better social abilities in ASD.

## References

- Abedi, A., Malekpour, M., Oraizi, H., Faramarzi, S., & Paghale, S. J. (2012). Standardization of the Neuropsychological Test of NEPSY on 3-4 years old children. *Iranian Journal of Psychiatry and Clinical Psychology, 18*(2), 52–60.
- Ainsworth, M. D. (1979). Infant-Mother Attachment. *The American Psychologist, 34*(10), 932–937.
- Ainsworth, M. D. S., & Wittig, B. A. (1969). Attachment and exploratory behaviour of one-year-olds in a strange situation. In B. M. Foss (Eds.), *Determinants of infant behaviour* (4<sup>th</sup> ed., pp. 111-136). London: Methuen.
- Ainsworth, M. D., & Bowlby, J. (1991). An ethological approach to personality development. *The American Psychologist, 46*(4), 333–341.
- Al-Yagon, M., & Mikulincer, M. (2004). Patterns of close relationships and socioemotional and academic adjustment among school-age children with learning disabilities. *Learning Disabilities Research and Practice, 19*(1), 12–19. DOI:10.1111/j.1540- 5826.2004.00085.x
- American Psychiatric Association. (2013). *Diagnostics and statistical manual of mental disorders*. (Author, Ed.) (5th ed.). Washington, DC: American Psychiatric Publishing.
- Astington, J. W. (2005). Introduction: Why language matters. In J. W. Astington & J. A. Baird (Eds.), *Why language matters for theory of mind* (pp. 3–25). New York: Oxford University Press.
- Astington, J. W., Pelletier, J., & Homer, B. (2002). Theory of mind and epistemological development: The relation between children's second-order false belief understanding and their ability to reason about evidence. *New Ideas in Psychology, 20*, 131-144.
- Ayers, H., & Prytys, G. (2002). *An A to Z practical guide to emotional and behavioural difficulties*. London: David Fulton Publishers.
- Bacon, A.L., Fein, D., Morris, R., Waterhouse, L., & Allen, D. (1998). The responses of autistic children to the distress of others. *Journal of Autism and Developmental Disorders, 28*(2), 129–142. DOI:10.1023/A:1026040615628

Bakermans-Kranenburg, M. J., Willemsen-Swinkels, S. H. N., & van IJzendoorn, M. H. (2003).

*BASQ: Brief Attachment Screening Questionnaire*. Leiden: Leiden University.

Baron-Cohen, S. (1995). *Mindblindness: An essay on autism and theory of mind*. Cambridge, MA: MIT Press.

Baron-Cohen, S. (2008). Autism, hypersystemizing and truth. *The Quarterly Journal of Experimental Psychology*, *61*, 64–75.

Baron-Cohen, S., Leslie, A. M., & Frith, U. (1985). Does the autistic child have a theory of mind? *Cognition*, *21*, 37–46.

Baron-Cohen, S., O’Riordan, M., Stone, V., Jones, R., & Plaisted, K. (1999). A new test of social sensitivity: Detection of faux pas in normal children and children with Asperger syndrome. *Journal of Autism and Developmental Disorders*, *29*, 407-418.

Baumrind, D. (1971). Current Patterns of Parental Authority. *Developmental Psychology Monographs*, *4*, 1-103. DOI:10.1037/h0030372

Baumrind, D. (1989). *Rearing competent children*. In W. Damon (Ed.), *Child development today and tomorrow* (pp. 349–378). San Francisco, CA: Jossey-Bass.

Baumrind, D. (1991). *Effective parenting during the early adolescent transition*. In P. A. Cowan & M. Hetherington (Eds.), *Family transitions*. Hillsdale, NJ: Erlbaum. pp. 111-163.

Baumrind, D. (1996). The discipline controversy revisited. *Family Relations*, *45*, 405-414.

Behrens, K. Y., Hesse, E., & Main, M. (2007). Mothers' attachment status as determined by the Adult Attachment Interview predicts their 6-year-olds' reunion responses: A study conducted in Japan. *Developmental Psychology*, *43*(6), 1553-1567.

Bibby, H., & McDonald, S. (2005). Theory of mind after traumatic brain injury. *Neuropsychologia*, *43*(1), 99–114. DOI:10.1016/j.neuropsychologia.2004.04.027

Bosacki, S., & Wilde Astington, J. (2001). Theory of mind in preadolescence: Relations between social understanding and social competence. *Social Development*, *8*(2), 237– 255.

DOI:10.1111/1467-9507.00093

- Bowlby, J. (1973). *Attachment and loss, Vol. 2: Separation*. New York: Basic Books.
- Bowlby, J. (1980). *Attachment and loss*. New York: Basic Books.
- Bowlby, J. (1988). *A secure base: Parent-child attachment and healthy human development*. New York: Basic Books.
- Brooks, B. L., Sherman, E. M. S., & Strauss, E. (2012). NEPSY-II: A Developmental Neuropsychological Assessment, Second Edition. *Child Neuropsychology, 16*(1), 80– 101. DOI:10.1080/09297040903146966
- Buitelaar, J. (1995). Attachment and social withdrawal in autism: Hypotheses and findings. *Behaviour, 132*, 319–350.
- Calzada, E. J., & Eyberg, S. M. (2002). Self-reported parenting practices in Dominican and Puerto Rican mothers of young children. *Journal of Clinical Child and Adolescent Psychology, 31*, 354-363.
- Capps, L., Sigman, M., & Mundy, P. (1994). Attachment security in children with autism. *Development and Psychopathology, 6*, 249–261.
- Carlson, V., Cicchetti, D., Barnett, D., & Braunwald, K. (1989). Disorganized/disoriented attachment relationships in maltreated infants. *Developmental Psychology, 25*, 525–531.
- Carpenter, L. A., , Soorya, L., & Halpern, D. (2009). Asperger's Syndrome and High-Functioning Autism. *Pediatric Annals, 38* (1), 30-35. DOI:10.3928/00904481-20090101-01
- Carter, A.S., Grossman, S.A., & Wachtel, K. (2007). *Parenting behaviors promote language gains in toddlers with autism spectrum disorders*. Manuscript submitted for publication.
- Chalfant, A., Rapee, R., & Carroll, L. (2007). Treating anxiety disorders in children with high functioning autism spectrum disorders: A controlled trial. *Journal of Autism and Developmental Disorders, 37*, 1842–1857.
- Chan, S. M., Bowes, J., & Wyver, S. (2009). Parenting style as a context for emotion socialization. *Early Education and Development, 20*(4), 631-656.

- Chen, F. M., & Luster, T. (2002). Factors related to parenting practices in Taiwan. *Early Child Development and Care, 172*, 413–430.
- Colle, L., Baron-Cohen, S., & Hill, J. (2007). Do children with autism have a theory of mind? A non-verbal test of autism vs. specific language impairment. *Journal of Autism and Developmental Disorders, 37*(4), 716–23.
- Dabrowska, A., & Pisula, E. (2010). Parenting stress and coping styles in mothers and fathers of pre-school children with autism and Down syndrome. *Journal of Intellectual Disability Research, 54*, 266–280.
- Daley, T. C., Singhal, N., & Krishnamurthy, V. (2013). Ethical considerations in conducting research on autism spectrum disorders in low and middle income countries. *Journal of Autism Developmental Disorder, 43*(9), 2002–2014. DOI: 0.1007/s10803-012-1750-2
- Davis, N. O., & Carter, A. S. (2008). Parenting stress in mothers and fathers of toddlers with autism spectrum disorders: Associations with child characteristics. *Journal of Autism and Developmental Disorders, 38*, 1278–1291.
- Dissanayake, C., & Crossley, S.A. (1996). Proximity and sociable behaviours in autism: Evidence for attachment. *Journal of Child Psychology and Psychiatry, 37*, 149–156.
- Dissanayake, C., & Crossley, S.A. (1997). Autistic children's responses to separation and reunion with their mothers. *Journal of Autism and Developmental Disorders, 27*, 295–312.
- Dunn, J., Brown, J., & Beardsall, L. (1991a). Family talk about feeling states and children's later understanding of others' emotions. *Child Development, 27*, 448–455.
- Dunn, J., Brown, J., Slomkowski, C., Tesla, C., & Youngblade, L. (1991b). Young children's understanding of other people's feelings and beliefs: Individual differences and their antecedents. *Child Development, 62*, 1352–1366.
- Dworzynski, K., Ronald, A., Bolton, P., & Happé, F. (2012). How different are girls and boys above and below the diagnostic threshold for autism spectrum disorders. *Journal of the American Academy of Child Adolescent Psychiatry, 51*, 788–797.

- Dyches, T. T., Smith, T. B., Korth, B. B., Roper, S. O., & Mandlco, B. (2012). Positive parenting of children with developmental disabilities: A meta-analysis. *Research in Developmental Disabilities, 33*, 2213–2220.
- Eisenhower, A. S., Baker, B. L., & Blacher, J. (2005). Preschool Children with Intellectual Disability: Syndrome Specificity, Behavior Problems, and Maternal Well-Being. *Journal of Intellectual Disability Research, 49*, 657-671.
- Ensor, R., & Hughes, C. (2008). Content or connectedness? Mother-child talk and early social understanding. *Child Development, 79*, 201-216.
- Ensor, R., Devine, R. T., Marks, A., & Hughes, C. (2014). Mothers' cognitive references to 2-year-olds predict theory of mind at ages 6 and 10. *Child Development, 85*(3), 1222-1235.
- Ensor, R., Spencer, D., & Hughes, C. (2011). 'You feel sad?' Emotion understanding mediates effects of verbal ability and mother- child mutuality on prosocial behaviors: Findings from 2 years to 4 years. *Social Development, 20*, 93-110.
- Ereky-Stevens, K. (2008). Associations between mothers' sensitivity to their infants' internal states and children's later understanding of mind and emotion. *Infant and Child Development, 17*, 527-543.
- Estes, A., Munson, J., Dawson, G., Koehler, E., Zhou, X., & Abbott, R. (2009). Parenting stress and psychological functioning among mothers of preschool children with autism and developmental delay. *Autism, 13*, 375-387.
- Fabes, R., Poulin, R., Eisenberg, N., & Madden-Derdich, D. (2002). The coping with children's negative emotions scale (CCNES): Psychometric properties and relations with children's emotional competence. *Marriage and Family Review, 34*, 285-310.
- Fein, D., Pennington, B., Markowitz, P., Braverman, M., & Waterhouse, L. (1986). Toward a neuropsychological model of infantile autism: are the social deficits primary. *Journal of the American Academy of Child Psychiatry, 25*, 198-212.
- Field, A. (2009). *Discovering Statistics Using SPSS*. London, England: SAGE.

- Finzi, R., Har-Even, D., Weizman, A., Tyano, S., & Shnit, D. (1996). The adaptation of the attachment styles questionnaire for latency-aged children. *Psychologia: Israel Journal of Psychology*, 5(2), 167-177.
- Frazier, T. W., Youngstrom, E. A., Speer, L., Embacher, R., Law, P., & Constantino, J., et al. (2012). Validation of proposed DSM-5 criteria for autism spectrum disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*, 51(1). 28.e3–40.e3.
- Frazier, T. W., Georgiades, S., Bishop, S. L., & Hardan, A. Y. (2014). Behavioral and cognitive characteristics of females and males with autism in the simons simplex collection. *Journal of the American Academy of Child and Adolescent Psychiatry*, 53(3), 329-340.
- Frith, U., & Frith, C. D. (2003). Development and neurophysiology of mentalizing. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 358(1431), 459-473.  
DOI:10.1098/rstb.2002.1218
- Frith, U., Happe, F., & Siddons, F. (1994). Autism and theory of mind in everyday life. *Social Development*, 3, 108-124.
- Gau, S. S. F., Chou, M. C., Lee, J. C., Wong, C. C., Chou, W. J., Chen, M. F., Soong, W. T., & Wu, Y. Y. (2010). Behavioral problems and parenting style among Taiwanese children with autism and their siblings. *Psychiatry and Clinical Neurosciences*, 64, 70-78.  
DOI:10.1111/j.14401819.2009.02034.x
- Gillott, A., Furniss, F., & Walter, A. (2001). Anxiety in high-functioning children with autism. *Autism*, 5(3), 277-286.
- Gopnik, A., & Astington, J. W. (1988). Children's understanding of representational change and its relation to the understanding of false belief and the appearance-reality distinction. *Child Development*, 59(1), 26-37.
- Gottman, J. (1997). *The heart of parenting: How to raise an emotionally intelligent child*. London: Bloomsbury.

- Green, J., Gilchrist, A., Burton, D., & Cox, A. (2000). Social and psychiatric functioning in adolescents with Asperger syndrome compared with conduct disorders. *Journal of Autism and Developmental Disorders*, 30(4), 279-293.
- Grusec, J. E., & Davidov, M. (2010). Integrating different perspectives on socialization theory and research: A domain-specific approach. *Child Development*, 81, 687-709.
- Guajardo, N. R., Snyder, G., & Petersen, R. (2009). Relationships among parenting practices, parental stress, child behaviour, and children's social- cognitive development. *Infant and Child Development*, 18, 37- 60. DOI:10.1002/icd.578
- Gustein, S. E. (2005). Relationship development intervention: Developing a treatment program to address the unique social and emotional deficits in autism spectrum disorder. *Autism Spectrum Quarterly*.
- Gutstein, S. E., & Sheely, R. K. (2002b). *Relationship development intervention with older children, adolescents and adults: Social and emotional development activities for asperger syndrome, autism, PDD and NLD*. London: Jessica Kingsley Publishers.
- Happé, F., Ronald, A., & Plomin, R. (2006). Time to give up on a single explanation for autism. *Nature Neuroscience*, 9(10), 1218-1220. DOI: 10.1038/nn1770
- Hart, C. H., Nelson, D.A., Robinson, C. D., Olsen, S. F., & McNeilly-Choque, M. K. (1998). Overt and relational aggression in Russian nursery-school-age children: Parenting style and marital linkages. *Developmental Psychology*, 34, 687-697.
- Hart, C. H., Newell, L. D., & Olsen, S. F. (2003). *Parenting skills and social/communicative competence in childhood*. In J. O. Greene & B. R. Burlison (Eds.), *Handbook of communication and social interaction skills* (pp. 753-797). Mahwah, NJ: Lawrence Erlbaum.
- Hayashi, H. (2002). Children's understanding of recursive mental states. *Japanese Journal of Educational Psychology*, 50, 43-53.

- Head, A. M., McGillivray, J. A., & Stokes, M. A. (2014). Gender differences in emotionality and sociability in children with autism spectrum disorders. *Molecular Autism, 5*, 19.
- Hollebrandse, B., Van Hout, A., & Hendriks, P. (2012). Children's first and second-order false belief reasoning in a verbal and a low- verbal task. *Synthese, 191*(3), 321-333.  
DOI:10.1007/s11229-012-0169-9
- Hoogenhout, M., & Malcolm-Smith, S. (2014). Theory of mind in autism spectrum disorder: Does DSM classification predict development. *Research in Autism Spectrum Disorders, 8*(6), 597-607. DOI:10.1016/j.rasd.2014.02.005
- Hughes, C., Deater-Deckard, K., & Cutting, A. L. (1999). Speak roughly to your little boy? Sex differences in the relations between parenting and preschoolers' understanding of mind. *Social Development, 8*, 143-160.
- Hutchins, T. L., & Prelock, P. A. (2008). Supporting theory of mind development: Considerations and recommendations for professionals providing services to individuals with autism spectrum disorder. *Topics in Language Disorders, 28*, 340-364.
- Hutchins, T. L., Bonazinga, L. A., Prelock, P. A., & Taylor, R. (2008). Beyond false beliefs: The development and psychometric evaluation of the perceptions of children's theory of mind measure- experimental version (PCToMM-E). *Journal of Autism and Developmental Disabilities, 38*(1), 143-155.
- Kahane, L., & El-Tahir, M. (2015). Attachment behavior in children with Autistic Spectrum Disorders. *Advances in Mental Health and Intellectual Disabilities, 9*(2), 79-89.
- Kanner, L. (1943). Autistic disturbances of affective contact. *Nervous Child, 2*, 217-250.
- Kim, J. A., Szatmari, P., Byrson, S. E., Streiner, D. L., & Wilson, F. J. (2000). The prevalence of anxiety and mood problems among children with autism and Asperger syndrome. *Autism, 4*(2), 117-132.
- Koren-Karie, N., Oppenheim, D., Dolev, S., & Yirmiya, N. (2009). Mothers of securely attached children with autism spectrum disorder are more sensitive than mothers of insecurely

attached children. *Journal of Child Psychology and Psychiatry*, 50(5), 643-650.

DOI:10.1111/j.1469-7610.2008.02043.x

- Kuusikko, S., Pollock-Wurman, R., Jussila, K., Carter, A. S., Mattila, M. L., Ebeling, H., Pauls, D. L., & Moilanen, I. (2008). Social anxiety in high-functioning children and adolescents with autism and asperger syndrome. *Journal of Autism and Developmental Disorders*, 38, 1697-1709. DOI 10.1007/s10803-008-0555-9
- Lam, Y. G., & Yueng, S. S. (2012). Cognitive deficits and symbolic play in preschoolers with autism. *Research in Autism Spectrum Disorders*, 6, 560-564.
- Lambrechts, G., Van Leeuwen, K., Boonen, H., Maes, B., & Noens, I. (2011). Parenting behaviour among parents of children with autism spectrum disorder. *Research in Autism Spectrum Disorders*, 5, 1143-1152. DOI:10.1016/j.rasd.2010.12.011
- Latouf, N. C. D. S. (2008). *Parenting styles affecting the behaviour of five-year olds*. Unpublished master's thesis, University of South Africa, Cape Town, South Africa.
- Le Couteur, A., Rutter, M., Lord, C., Rios, P., Robertson, P., Holdgrafer, M., & McLennan, J. (1989). Autism Diagnostic Interview: A standard investigator-based instrument. *Journal of Autism and Developmental Disorders*, 19(3), 19363-19387.
- Leslie, A. M. (1987). Pretence and representation: The origins of theory of mind. *Psychology Review*, 94, 412-426.
- Liotti, G. (2004). Trauma, dissociation, and disorganized attachment: three strands of a single braid. *Psychotherapy: Theory, research, practice, training*, 41, 472-486
- Liu, D., Wellman, H. M., Tardif, T., & Sabbagh, M. A. (2008). Theory of mind development in Chinese children: a meta-analysis of false belief understanding across cultures and languages. *Developmental Psychology*, 44(2), 523-531.
- Lord, C., & Rhea, P. (1997). *Language and communication in autism*. In D. J. Cohen & F. R. Volkmar (Eds.), *Handbook of autism*. New York: Wiley & Sons.

- Lord, C., Rutter, M., DiLavore, P. C., & Risi, S. (2008). *Autism Diagnostic Observation Schedule Manual*. Los Angeles: Western Psychological Services.
- Lord, C., Rutter, M., DiLavore, P. C., Risi, S., Gotham, K., & Bishop, S. (2012). *Autism Diagnostic Observation Schedule: ADOS-2*. Torrance: Western Psychological Services.
- Mackenzie, C., McDowell, C., & Pittaway, E. (2007). Beyond 'do no harm': The challenge of constructing ethical relationships in refugee research. *Journal of Refugee Studies*, 20(2), 299-319.
- Mahoney, G., & Perales, F. (2003). Using relationship-focused intervention to enhance the social emotional functioning of young children with autism spectrum disorders. *Topics in Early Childhood Special Education*, 23, 77-89.
- Main, M., & Solomon, J. (1986). *Discovery of a new, insecure-disorganized/disoriented attachment pattern*. In T. B. Brazelton & M. Yogman (Eds), *Affective development in infancy*, pp. 95-124. Norwood, New Jersey: Ablex.
- Main, M., & Cassidy, J. (1988). Categories of response to reunion with the parent at age six: Predictable from infant attachment classifications and stable over a 1- month period. *Developmental Psychology*, 24, 415-426.
- Marcu, I., Oppenheim, D., Koren-Karie, N., Dolev, S., & Yirmiya, N. (2009). Attachment and symbolic play in preschoolers with autism spectrum disorders. *Journal of Autism Developmental Disorder*, 39, 1321-1328. DOI:10.1007/s10803-009-0747-y
- Matsumoto, K. (2013). Children's understand of first-and second order false beliefs in one narrative. *The Asian Conference on Psychology & the Behavioral Sciences*, 319-329.
- Meins, E., Fernyhough, C., Russel, J., & Clark-Carter, D. (1998). Security of attachment as a predictor of symbolic and mentalising abilities: A longitudinal study. *Social Development*, 7, 1-24.
- Mensah, M. K., & Kuranchie, A. (2013). Influence of parenting styles on the social development of children. *Academic Journal of Interdisciplinary Studies*, 2(3), 123-129.

- Milkulincer, M., Florian, V., Tolmacz, R. (1990). Attachment styles and fear of personal death: A case study of affect regulation. *Journal of Personality and Social Psychology*, 58, 273-280.
- Mody, M. (2014). Nonverbal individuals with Autism Spectrum Disorder: Why don't they speak. *North American Journal of Medical Science*, 7(3), 130-134. DOI: 10.7156/najms.2014.0703130]
- Mulenga, K. (2001). Performance of Zambian children on the NEPSY: A pilot study. *Developmental Neuropsychology*, 20(1), 375-383.
- Myer, L., Ehrlich, R. I., & Susser, E. S. (2004). Social epidemiology in South Africa. *Epidemiologic Reviews*, 26, 112-123. DOI: 10.1093/epirev/mxh004
- Naito, M., Komatsu, S., & Fuke, T. (1994). Normal and autistic children's understanding of their own and others' false belief: A study from Japan. *British Journal of Developmental Psychology*, 12, 403-416.
- National Institute on Deafness and Other Communication Disorders. (2010). *NIH Workshop on Nonverbal School-Aged Children with Autism*.  
URL:<http://www.nidcd.nih.gov/funding/programs/10autism/Pages/Default.aspx>
- National Research Council. (2001). *Educating children with autism. Committee on Educational Interventions for Children with Autism*. Division of Behavioral and Social Sciences and Education. Washington, DC: National Academy Press.
- Noens, I., van Berckelaer-Onnes, I., Verpoorten, R., van Duijn, G. (2006). The ComFor: an instrument for the indication of augmentative communication in people with autism and intellectual disability. *Journal of Intellectual Disability Research*, 50(9), 621-32.  
DOI:10.1111/j.1365-2788.2006.00807.x. PMID 16901289.
- Onder, A., & Gulay, H. (2009). Reliability and validity of parenting styles & dimensions questionnaire. *Procedia Social and Behavioral Sciences*, 1, 508-514.  
DOI:10.1016/j.sbspro.2009.01.092

- Pavarini, G., de Hollanda Souza, D., & Hawk, C.K. (2013). Parental practices and theory of mind development. *Journal of Child and Family Studies*, 22(6), 844-853
- Pears, K. C., & Moses, L. J. (2003). Demographics, parenting, and theory of mind in preschool children. *Social Development*, 12, 1–20.
- Pechous, E . A . (2001). Young children with autism and intensive behavioral programs: Effects on the primary attachment relationship’, dissertation abstracts international: section B. *The Sciences and Engineering*, 61, 6145.
- Perner, J., & Wimmer, H. (1985). ‘John thinks that Mary thinks that . . .’: Attribution of second-order beliefs by 5- to 10-year-old children. *Journal of Experimental Child Psychology*, 39, 437–471.
- Pretorius, N. (2000). *Aspects of Parenting Styles and the Expressed Fears of a Selected Group of Pre-school children*. Unpublished master’s thesis, University of Stellenbosch, Stellenbosch, South Africa.
- Robinson, C. C., Mandleco, B., Olsen, S. F., & Hart, C. H. (1995). Authoritative, authoritarian, and permissive parenting practices: Development of a new measure. *Psychological Reports*, 77, 819-830.
- Robinson, C. C., Mandleco, B., Olsen, S. F., & Hart, C. H. (2001). *The Parenting Styles and Dimensions Questionnaire (PSDQ)*. In B. F. Perlmutter, J. Touliatos, & G. W. Holden (Eds.), *Handbook of family measurement techniques: Vol. 3. Instruments & index* (pp. 319 - 321). Thousand Oaks: Sage.
- Rogers, S. J., Estes, A., Lord, C., Vismara, L., Winter, J., Fitzpatrick, A., & Dawson, G. (2012). Effects of a brief early start denver model (ESDM)–based parent intervention on toddlers at risk for autism spectrum disorders: A randomized controlled trial. *Journal of the American Academy of Child and Adolescent Psychiatry*, 51(10), 1052-1065.

- Rogers, S.J., Ozonoff, S., & Maslin-Cole, C. (1991). A comparative study of attachment behavior in young children with autism or other psychiatric disorders. *Journal of the American Academy of Child and Adolescent Psychiatry*, 30, 483-488.
- Rogers, S.J., Ozonoff, S., & Maslin-Cole, C. (1993). Developmental aspects of attachment behaviour in young children with pervasive developmental disorders. *Journal of the American Academy of Child and Adolescent Psychiatry*, 32, 1274-1282.
- Ruffman, T., Perner, J., & Parkin, L. (1999). How parenting style affects false belief understanding. *Social Development*, 8, 395-441.
- Rutgers, A. H., Bakermans-Kranenburg, M. J., Van IJzendoorn, M. H., & Van Berckelaer-Onnes, I. A. (2004). Autism and attachment: A meta-analytic review. *Journal of Child Psychology and Psychiatry*, 45, 1123-1134.
- Rutgers, A. H., Van IJzendoorn, M. H., Bakermans-Kranenburg, M. J., & Swinkels, S. H. N. (2007). Autism and attachment: The attachment Q-sort. *Autism*, 11, 191-204.
- Santrock, J. W. (2007). *A topical approach to life-span development, third Ed.* New York: McGraw-Hill.
- Shapiro, T., Sherman, M., Calamari, G., & Koch, D. (1987). Attachment in autism and other developmental disorders. *Journal of the American Academy of Child and Adolescent Psychiatry*, 26, 480-484.
- Siller, M. & Sigman, M. (2002). The behaviors of parents of children with autism predict the subsequent development of their children's communication. *Journal of Autism and Developmental Disorders*, 32(2), 77-89.
- Slaughter, V., Peterson, C. C., Mackintosh, E. (2007). Mind what mother says: Narrative input and theory of mind in typical children and those on the autism spectrum. *Child Development*, 78(3), 839-858.
- Smith, V., Mirenda, P., & Zaidman-Zait, A. (2007). Predictors of expressive vocabulary growth in children with autism. *Journal of Speech Language Hearing Research*, 50(1), 149-160.

- Solomon, J. & George, C. (1999). *The place of disorganization in attachment theory*. In Solomon, J. & George, C. (Eds., pp. 3-32) Attachment disorganization. New York: Guilford Press.
- Spangler, G., & Grossmann, K. E. (1993). Biobehavioral organization in securely and insecurely attached infants. *Child Development, 64*, 1439-1450.
- Spencer, A. G. (1993). Attachment behaviors in children with autism. *Dissertation Abstracts International, 54*, 1321.
- SPSS Inc. (2013). *SPSS Statistics*. Chicago, IL: IBM.
- Steele, S., Joseph, R. M., & Tager-Flusberg, H. (2003). Brief report: Developmental change in theory of mind abilities in children with autism. *Journal of Autism and Developmental Disorders, 33*(4), 461-467.
- Stevenson-Hinde, J., & Verschueren, K. (2002). *Attachment in childhood*. In P. Smith & C. Hart (Eds.), *Blackwell handbook of childhood social development* (pp. 182–204). Oxford: Blackwell.
- Symons, D. K., & Clark, S. E. (2000). A longitudinal study of mother-child relationships and theory of mind in the preschool period. *Social Development, 9*, 3-23. DOI: 10.1111/1467-9507.00108
- Tager-Flusberg, H., Paul, R., & Lord, C. E. (2005). *Language and communication in autism*. In: Volkmar F, Paul R, Klin A, eds. *Handbook of Autism and Pervasive Developmental Disorders*. Vol 1. 3rd ed. New York: Wiley.
- Tager-Flusberg, H. (2007). Evaluating the theory-of-mind hypothesis of autism. *Current directions in Psychological Science, 16*(6), 311-315.
- Turner, E. A., Chandler, M. & Heffer, R. W. (2009). Influence of parenting styles, achievement motivation, and self-efficacy on academic performance in college students. *Journal of College Student Development, 50*(3), 337-346.
- Van Berckelaer-Onnes, I. A., & Luncangeli, D. (1999). *From early infantile autism to an autistic spectrum: An analysis of theoretical perspectives*. In T.E. Scruggs & M.A. Mastropieri

(Eds.), *Advances in learning and behavioural disabilities* (pp. 217–244). Greenwich, CT: JAI Press.

Van Bergen, P., Salmon, K., Dadds, M. R., & Allen, J. (2009). The effect of mother training in emotion-rich, elaborative reminiscing on children's shared recall and emotion knowledge. *Journal of Cognition and Development, 10*, 162-187.

van IJzendoorn, M. H., Rutgers, A. H., Bakermans-Kranenburg, M. J., Swinkels, S. H. N., van Daalen, E., & Dietz, C., et al. (2007). Parental sensitivity and attachment in children with autism spectrum disorder: Comparison with children with mental retardation, with language delays, and with typical development. *Child Development, 78*, 597-608.

Vinden, P. G. (2001). Parenting attitudes and children's understanding of mind: A comparison of Korean American and Anglo-American families. *Cognitive Development, 16*, 793-809.

Wachtel, K., & Carter, A.S. (2008). Reaction to diagnosis and parenting styles among mothers of young children with ASD. *SAGE Publications and The National Autistic Society, 12*(5), 575-594. DOI: 10.1177/1362361308094505

Waters, E., Hamilton, C. E., & Weinfield, N.S. (2000). The stability of attachment security from infancy to adolescence and early adulthood: General introduction. *Child Development, 71*(3), 678-683.

Wellman, H. M., Cross, D., & Watson, J. (2001). Meta-analysis of theory of mind development: The truth about false belief. *Child Development, 72*, 655-684.

Wellman, H. M., Fang, F., & Peterson, C. C. (2011). Sequential Progressions in a Theory-of-Mind Scale: Longitudinal Perspectives. *Child Development, 82*(3), 780-792.

Whiteley, P., Todd, L., Carr, K., & Shattock, P. (2010). Gender ratios in autism, Asperger syndrome and autism spectrum disorder. *Autism Insights, 2*, 17-24.

Willemsen-Swinkels, S. H. N., Bakermans-Kranenburg, M. J., Buitelaar, J. K., Van IJzendoorn, M. H., & Van Engeland, H. (2000). Insecure and disorganized attachment in children with a

pervasive developmental disorder: Relationship with social interaction and heart rate.

*Journal of Child Psychology and Psychiatry*, 41, 759-767.

Wimmer, H., & Perner, J. (1983). Beliefs about beliefs: Representation and constraining function of wrong beliefs in young children's understanding of deception. *Cognition*, 13(1), 103-128.

DOI:10.1016/0010-0277(83)90004-5

Wodka, E. L., Mathy, P., & Kalb, L. (2013). Predictors of phrase and fluent speech in children with autism and severe language delay. *Pediatrics*, 131(4), 1128-1134.

Woolfson, L. & Grant, E. (2006). Authoritative parenting and parental stress in parents of pre-school and older children with developmental disabilities. *Child: Care, Health and Development*, 32, 177-184. DOI:10.1111/j.1365-2214.2006.00603.x

Wu, P., Robinson, C. C., Yang, C., Hart, C. H., Olsen, S. F., & Porter, C. L. (2002). Similarities and differences in mothers' parenting of preschoolers in China and the United States.

*International Journal of Behavioral Development*, 26, 481-491.

Yirmiya, N., Erel, O., Shaked, M., & Solomonica-Levi, D. (1998). Meta-analyses comparing theory of mind abilities of individuals with autism, individuals with mental retardation and normally developing individuals. *Psychological Bulletin*, 124, 283-307.

## APPENDIX A

### Roles and responsibilities of Research Team

#### Susan Malcolm-Smith

*Role:* Supervisor of the research team both larger study and this study.

*Position:* Senior Lecturer, Department of Psychology, University of Cape Town

*Contact details:* 021-650-4605, [susan.malcolm-smith@uct.ac.za](mailto:susan.malcolm-smith@uct.ac.za)

#### Katie Hamilton

*Role:* Research leader for larger study

Conceptualised research study and attained approval from different boards

Leader for recruitment of sample of study.

Administered ADOS-II and ToM battery

*Position:* PhD Psychology Candidate, Department of Psychology, University of Cape Town

*Contact details:* 082 463 8335, [kate@hamilton.co.za](mailto:kate@hamilton.co.za)

#### Nakeeta Bailey

*Role:* Leader for this study

Conceptualised addition of parenting styles for the research study

Administered ASCQ and PSDQ with parents

*Position:* Masters in Clinical Psychology Candidate, Department of Psychology, UCT

*Contact details:* 0844633938, [bailey.nakeeta@gmail.com](mailto:bailey.nakeeta@gmail.com)

## APPENDIX B

## Ethical approval from the Faculty of Science Ethics Board

Faculty of Science  
University of Cape Town  
RONDEBOSCH 7701  
South Africa

E-mail: richard.hill@uct.ac.za  
Telephone: + 27 21 650 2786  
Fax: + 27 21 650 3456



7 October 2014

Dr Colleen O'Ryan  
Department of Molecular and Cell Biology

Dear Dr O'Ryan

GENOTYPE: PHENOTYPE ASSOCIATIONS IN AUTISM SPECTRUM DISORDER

I am pleased to inform you that the Faculty of Science Research Ethics Committee has approved the above-named application for research ethics clearance, subject to the conditions listed below. You are required to:

- implement the measures described in your application to ensure that the process of your research is ethically sound; and
- uphold ethical principles throughout all stages of the research, responding appropriately to unanticipated issues: please contact me if you need advice on ethical issues that arise.

Your approval code is: FSREC 076– 2014

I wish you success in your research.

Yours sincerely

**Signed**

Dr Richard Hill  
Chair: Faculty of Science Research Ethics Committee

## APPENDIX C

## Ethical approval from the Psychology Department Ethics Board at UCT

UNIVERSITY OF CAPE TOWN



Department of Psychology

University of Cape Town Rondebosch 7701 South Africa  
Telephone (021) 650 3414  
Fax No. (021) 650 4104

13 April 2015

Mr K. Hamilton  
Department of Psychology  
University of Cape Town  
Rondebosch

Dear Ms Hamilton,

This is to confirm that ethical clearance has been given by an Ethics Review Committee of the Faculty of Humanities for your study, *The Biological Bases of Social Deficits*. The reference number is PSY2014-024.

I wish you all the best for your study.

Yours sincerely,

A grey rectangular box containing the word "Signed" in a large, stylized, black font.

Johann Louw PhD  
Professor  
Chair: Ethics Review Committee

## APPENDIX D

## Ethical approval from the Western Cape's Education Department



**Western Cape  
Government**

Education

Directorate: Research

[Audrey.wyngaard@westerncape.gov.za](mailto:Audrey.wyngaard@westerncape.gov.za)  
tel: +27 021 467 9272  
Fax: 0865902282  
Private Bag x9114, Cape Town, 8000  
[wced.wcape.gov.za](http://wced.wcape.gov.za)

**REFERENCE:** 20141002-37506  
**ENQUIRIES:** Dr A T Wyngaard

Dr Colleen O'Ryan  
Dept of Molecular & Cell Biology  
University of Cape Town  
Private Bag  
Rondebosch  
7700

Dear Dr Colleen O'Ryan

**RESEARCH PROPOSAL: AN EXPLORATION OF THE RELATIONSHIPS BETWEEN AUTISM SPECTRUM DISORDERS (ASD), BEHAVIOUR TRAITS AND GENERIC POLYMORPHISMS**

Your application to conduct the above-mentioned research in schools in the Western Cape has been approved subject to the following conditions:

1. Principals, educators and learners are under no obligation to assist you in your investigation.
2. Principals, educators, learners and schools should not be identifiable in any way from the results of the investigation.
3. You make all the arrangements concerning your investigation.
4. Educators' programmes are not to be interrupted.
5. The Study is to be conducted from **01 September 2014 till 30 September 2018**
6. No research can be conducted during the fourth term as schools are preparing and finalizing syllabi for examinations (October to December).
7. Should you wish to extend the period of your survey, please contact Dr A.T Wyngaard at the contact numbers above quoting the reference number?
8. A photocopy of this letter is submitted to the principal where the intended research is to be conducted.
9. Your research will be limited to the list of schools as forwarded to the Western Cape Education Department.
10. A brief summary of the content, findings and recommendations is provided to the Director: Research Services.
11. The Department receives a copy of the completed report/dissertation/thesis addressed to:

**The Director: Research Services  
Western Cape Education Department  
Private Bag X9114  
CAPE TOWN  
8000**

We wish you success in your research.

Kind regards.

Signed: Dr Audrey T Wyngaard

**Directorate: Research**

**DATE: 02 October 2014**

Lower Parliament Street, Cape Town, 8001  
tel: +27 21 467 9272 fax: 0865902282  
Safe Schools: 0800 45 46 47

Private Bag X9114, Cape Town, 8000  
Employment and salary enquiries: 0861 92 33 22  
[www.westerncape.gov.za](http://www.westerncape.gov.za)

## APPENDIX E

## Information Sheet



**An Exploration of the Relationships between Attachment Classification, Parenting Styles, Theory of Mind, and Social Deficits in Autism Spectrum Disorder.**

**Principal Investigator:** Dr Susan Malcolm-Smith

**Collaborating Investigators:** Dr Colleen O’Ryan

Dr Sofia Stathopoulous

You and your child are invited to participate in a study investigating the relationships between general social ability, attachment, parenting styles and Theory of Mind. Theory of Mind is a skill that is needed for social interaction, and many children with Autism Spectrum Disorders do not fully develop this ability.

This study will recruit approximately 40- 60 boys between 4 and 14 years old who have current Autism Spectrum Disorder diagnoses. Parents will be asked to provide demographic information. The demographic survey asks question about your son’ medical history and about your household so that we can better understand your son. Parents will then be contacted telephonically, or we can set up a meeting if that is more convenient, where you will be interviewed for approximately 30 minutes about your son’s attachment and how he interacts with you and visa-versa.

I will then meet with your son at his school. You, another caregiver or guardian, or a teacher, may be present when I meet with your son. When I meet your son I will do several tasks with your son to get a better understanding of his Autism profile and his social abilities. I will administer the ADOS2 (Autism Diagnostic Observation Schedule, Second Edition) in our first session together. The ADOS2 is used internationally to assist in diagnosing autism and in identifying autism-like characteristics and behaviors. The information from an ADOS2 assessment is very valuable to your school and any doctors or psychologists involved in your child’s treatment. Unfortunately there are usually long waiting lists to get an ADOS2 assessment and having it done privately can be quite expensive. However, if your child completes this assessment as part of this study we can share this information with the appropriate professionals.

Some children will then be asked to return for further sessions where I will administer Theory of Mind testing. The Theory of Mind tasks are all toy or story based tasks that assess social perception and social cognition. These tasks allow me to better understand how well your child understands

other people and social situations. The ToM tasks have all been adapted for children with autism and are designed to feel more like games than tests. Assessments will take between 15 and 60 minutes depending on which tasks your child is asked to complete. In addition, in order to ensure that your son is comfortable, I will break up the ToM testing over approximately 4 sessions. There is no risk involved in participating in this study. If you or your child feel uncomfortable at any time you may withdraw from the study without any negative consequences. We will take strict precautions to ensure that your personal information is kept safe and confidential. We will not use any personal identifiers on any of the information, but will instead use codes, and all data will be kept in a locked file cabinet or a password-protected, secure computer. If data from this study leads to publication, your child's contributions will be kept anonymous. If you have any questions or queries about the research or your participation, please do not hesitate to contact Dr Susan Malcolm-Smith, myself, or the Psychology Department's Ethics Committee at the University of Cape Town.

Dr Susan Malcolm-Smith  
Senior Lecturer  
Department of Psychology  
University of Cape Town  
021-650-4605  
[susan.malcolm-smith@uct.ac.za](mailto:susan.malcolm-smith@uct.ac.za)

Dr Colleen O'Ryan  
Senior Lecturer  
Department of Molecular and Cell Biology  
University of Cape Town  
021-650-4257  
[colleen.oryan@uct.ac.za](mailto:colleen.oryan@uct.ac.za)

Katie Hamilton  
PhD Psychology Candidate  
Department of Psychology  
University of Cape Town  
082 463 8335  
[kate@hamilton.co.za](mailto:kate@hamilton.co.za)

Rosalind Adams  
Administration Assistant: Ethics Committee  
Department of Psychology  
University of Cape Town  
021-650-4104  
[rosalind.adams@uct.ac.za](mailto:rosalind.adams@uct.ac.za)

## APPENDIX F

### Consent Form

Dear Parent(s),

Thank you for taking part in our study!

If you would like your child to participate in the study, please sign the consent form and complete the demographic questionnaire provided. This information is necessary to identify any possible conditions that would exclude your child from being able to take part in the study and to identify possible factors that could influence their symptoms or their Theory of Mind development in any way. We also require some information about your child's medical history so that we can better understand your child. Therefore please answer all questions as accurately and truthfully as possible. Once we have established which children will be able to participate in the study, we will contact you to set up a 30-minute telephonic interview.

We understand that some of this information may be sensitive, but please be assured that all information will be kept strictly confidential. Neither you nor your child will be discriminated against, or lose any privileges, as a result of information given. Only certain authorized researchers at UCT will be able to view the information. The information will then be saved as part of a dataset, which may only include information that cannot directly identify you or your child. For example, the dataset may not include you or your child's name, address, telephone number, ID number or any other photographs, numbers, codes or so forth that link you or your child to the study. If the results of the research are published neither you nor your child will be identified in any way.

If you have any queries or concerns please feel free to contact us.

Thank you for your participation.

Katie Hamilton

Department of Psychology

University of Cape Town

Cell: 082 463 8335

Email: [kate@hamilton.co.za](mailto:kate@hamilton.co.za)

## Consent Form

The study has been explained to me, and my questions have been answered. I understand that participation in this study is voluntary, and that I may withdraw my child at any point. I understand that my child will not be identified except by an initial, and that this anonymity will be maintained throughout the study and when the research is published.

I consent to allow my child to participate in this study.

**Child's name:**

**Signature of parent /guardian:**

**Date:**

---



---



---

*Please indicate below if you would like to be notified of future research projects conducted by our research group:*

Yes, I \_\_\_\_\_ (initial) would like to be added to your research participation pool and be notified of research projects in which I or my child might participate in the future.

Phone number:

Cell phone number:

E-mail address:

P.O. Boxing address:

---



---



---



---



---

{Parent/guardian} \_\_\_\_\_ has been informed of the purpose, procedures, and any possible risks or this study. He / she has been given time to ask any questions, and these questions have been answered to the best of my ability. He / she understands that participation is voluntary.

Researcher:

Signature & Date:

---



---



---



---



---

11. Has your child ever experienced a head injury? (e.g., being hit on the head with an object and losing consciousness as a result) YES NO

If yes, please give details:

---



---



---

12. Has your child ever experienced any of the following medical conditions:

a. Neurological problems (e.g., epilepsy, meningitis, cerebral palsy, encephalitis, Tourette's syndrome, brain tumour, other) YES NO

If yes, please specify:

---



---



---

b. Depression YES NO

If yes, please specify:

---



---



---

c. Memory problems YES NO

If yes, please specify:

---



---



---

d. Problems with their vision: YES NO

If yes, please specify:

---



---



---

e. Problems with their hearing (e.g. difficulty hearing, needing hearing aids, needing grommets): YES NO

If yes, please specify (please include details on how this affected their language development):

---



---



---

f. Is he/she currently taking any prescription medication? YES NO

If yes, what medication(s)?

---



---

## B. Parent Information:

**1. What is the total monthly income of the household in which you live? (Tick the appropriate block):**

*[NOTE: This should be total household income, not personal income.]*

0 – R2999		R3000 – R6299		R6300 – R 10 499		R10 500 – R 14599	
R14 600 – R18 799		R18 800 – R22 999		R23 000 – R26 999		R27 000 – R31 299	
R31 300 – R35 499		R35 500 - R39 499		R39 500 – R43 750		more than R43 750:	
What is the estimated value of your total monthly household income: R							

**2. Highest level of education completed for mother, father, and/or guardian (please circle appropriate number).**

*Please indicate if child is adopted, and fill in for adoptive parents if the information for biological parents is unknown.*

	Biological mother	Biological father	Guardian
1) 0 years (Never went to school)	1	1	1
2) Grade 1	2	2	2
3) Grade 2	3	3	3
4) Grade 3 / Standard 1	4	4	4
5) Grade 4 / Standard 2	5	5	5
6) Grade 5 / Standard 3	6	6	6
7) Grade 6 / Standard 4	7	7	7

8) Grade 7 / Standard 5 [Completed primary school]	8	8	8
9) Grade 8 / Standard 6	9	9	9
10) Grade 9 / Standard 7	10	10	10
11) Grade 10 / Standard 8	11	11	11
12) Grade 11 / Standard 9	12	12	12
13) Grade 12 / Standard 10 [Matric; Completed high school]	13	13	13
14) Tertiary education: Diploma received	14	14	14
15) Tertiary education: Bachelor's degree received	15	15	15
16) Tertiary education: Post graduate degree received	16	16	16
17) Don't know	17	17	17

### 3. Parental employment: (Please circle appropriate number)

*Please indicate if child is adopted, and fill in for adoptive parents if the information for biological parents is unknown.*

	Biological mother	Biological father	Guardian
1. Higher executives, owners of large businesses, major professionals (e.g. doctors, lawyers)	1	1	1
2. Business managers of medium sized businesses, professions (e.g. nurses, opticians, pharmacists, social workers, teachers, accountants)	2	2	2
3. Administrative personnel, managers, owners / proprietors of small businesses (trade specialists, decorator, actor, reporter, travel agent)	3	3	3
4. Clerical and sales, technicians, small businesses (e.g. bank teller, bookkeeper, clerk, draftsman, timekeeper, secretary)	4	4	4
5. Skilled manual – usually having had training (e.g. baker, barber, chef, electrician, fireman, machinist, mechanic, painter, welder, police, plumber, electrician)	5	5	5

6. Semi-skilled (e.g. hospital aide, painter, bartender, bus driver, cook, garage guard, checker, waiter, machine operator)	6	6	6
7. Unskilled (e.g. attendant, janitor, construction helper, unspecified labour, porter, unemployed)	7	7	7
8. Homemaker	8	8	8
9. Student, disabled, no occupation	9	9	9

#### 4. Material and financial resources (please answer for each item).

Which of the following items, in working order, does your household have?

Items	Yes	No
1. A refrigerator or freezer	Yes	No
2. A vacuum cleaner or polisher	Yes	No
3. A television	Yes	No
4. A hi-fi or music center (radio excluded)	Yes	No
5. A microwave oven	Yes	No
6. A washing machine	Yes	No
7. A video cassette recorder or dvd player	Yes	No

Which of the following do you have in your home?

Items	Yes	No
1. Running water	Yes	No
2. A domestic servant	Yes	No
3. At least one car	Yes	No
4. A flush toilet	Yes	No

5. A built-in kitchen sink	Yes	No
6. An electric stove or hotplate	Yes	No
7. A working telephone	Yes	No

Do you personally do any of the following?

Items	Yes	No
1. Shop at supermarkets	Yes	No
2. Use any financial services such as a bank account, ATM card or credit card	Yes	No
3. Have an account or credit card at a retail store	Yes	No

## APPENDIX H

## Attachment Style Classification Questionnaire (Adapted to parent interview)

	Not true	Unsure	True
1. My child makes friends with other children easily.	0	1	2
2. My child doesn't feel comfortable trying to make friends.	0	1	2
3. It is easy for my child to depend on others, if they're good friends of his/hers.	0	1	2
4. Sometimes others get too friendly and too close to my child.	0	1	2
5. Sometimes my child is afraid that other kids won't want to be with him/her.	0	1	2
7. It's all right with my child if good friends trust and depend on him/her.	0	1	2
8. It's hard for my child to trust others completely.	0	1	2
9. My child sometimes feels that others don't want to be good friends with him/her as much as he/she does with them.	0	1	2
10. My child usually believes that others who are close to him/her will not leave him/her.	0	1	2
11. My child is sometimes afraid that no one really loves him/her.	0	1	2
12. My child finds it uncomfortable and gets annoyed when someone tries to get too close to him/her.	0	1	2
13. It's hard for my child to really trust others, even if they're good friends of his/hers.	0	1	2
14. Children sometimes avoid my child when he/she wants to get too close and be a good friend of theirs.	0	1	2
15. Usually when anyone tries to get too close to my child, it does not bother him/her.	0	1	2

*How true is each of these sentences of your child?*

## APPENDIX I

### Parenting Style and Dimension Questionnaire

Now I would like to ask questions about your son and your family, and specifically about how your son responds to you. Some of the questions focus on discipline and dealing with disruptive behaviours. These questions were designed for typically developing children, so they may not all be appropriate for you son, but please try answer as accurately as you can.

		Never	Some times	About Half of the Time	Often	Always
1.	I am responsive to my child's feelings and needs.	1	2	3	4	5
2.	I use physical consequences as a way of disciplining my child.	1	2	3	4	5
3.	I take my child's desires into account before asking him to do something.	1	2	3	4	5
4.	When my child asks why he has to conform, I state: because I said so, or I am your parent and I want you to.	1	2	3	4	5
5.	I explain to my child how I feel about his good and bad behaviour.	1	2	3	4	5
6.	I spank when my child is disobedient.	1	2	3	4	5
7.	I encourage my child to talk about his troubles.	1	2	3	4	5
8.	I find it difficult to discipline my child.	1	2	3	4	5
9.	I encourage my child to freely express himself even when disagreeing with his parents.	1	2	3	4	5
10.	I punish by taking privileges away from my child with little if any explanations.	1	2	3	4	5
11.	I emphasize the reasons for rules.	1	2	3	4	5
12.	I give comfort and understanding when my child is upset.	1	2	3	4	5
13.	I yell or shout when my child misbehaves.	1	2	3	4	5

14.	I give praise when my child is good.	1	2	3	4	5
15.	I give into my child when he causes a commotion about something.	1	2	3	4	5
16.	I explode in anger towards my child.	1	2	3	4	5
17.	I threaten my child with consequences more often than actually giving it.	1	2	3	4	5
18.	I take into account my child's preferences in making plans for the family.	1	2	3	4	5
19.	I grab my child when being disobedient.	1	2	3	4	5
20.	I state consequences to my child and do not actually do them.	1	2	3	4	5
21.	I show respect for my child's opinions by encouraging him to express them.	1	2	3	4	5
22.	I allow my child to give input into family rules.	1	2	3	4	5
23.	I scold and criticize to make my child improve.	1	2	3	4	5
24.	I spoil my child.	1	2	3	4	5
25.	I give my child reasons why rules should be obeyed.	1	2	3	4	5
26.	I use threats as a consequence with little or no justification.	1	2	3	4	5
27.	I have warm and intimate times together with my child.	1	2	3	4	5
28.	I punish by putting my child off somewhere alone with little if any explanations.	1	2	3	4	5
29.	I help my child to understand the impact of behaviour by encouraging my child to talk about the consequences of his own actions.	1	2	3	4	5
30.	I scold or criticize when my child's behaviour doesn't meet my expectations.	1	2	3	4	5
31.	I explain the consequences of his behaviour.	1	2	3	4	5
32.	I slap my child when he misbehaves.	1	2	3	4	5

**APPENDIX J****Assent for Psychological Assessment**

Hello! I want to tell you about a research study I am doing. A research study is a way to learn more about something, and we want to learn more about autism!

If you join this study, I will ask you to do tasks and play a few games with me. Some of the games will have toys, and some will involve listening to stories and looking at some pictures with me. I may ask to see you again after today so that we can play more games. Every time we meet I will have new games. If you get tired, then we can take a break.

You do not have to join this study. It is up to you. No one will get upset if you don't want to be in the study. You won't get into trouble if you don't join this study. It is also fine if you join the study, but then change your mind and want to stop. You can decide at any time to stop being in this study.

Do you have any questions?

{Participant's name} \_\_\_\_\_ has been informed of the purpose, procedures, and any possible risks of this study. He has been given time to ask any questions, and these questions have been answered to the best of my ability. He understands that participation is voluntary.

Researcher \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_