



**MAINSTREAM AND SPECIALIZED FOUNDATION-PHASE TEACHERS'
UNDERSTANDINGS OF AUTISM SPECTRUM DISORDERS IN SOUTH AFRICA.**

By

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A research report submitted in partial fulfilment of the requirements for the degree of Master of Education (Educational Psychology) to the Faculty of Humanities, University of the Witwatersrand, Johannesburg, 2019.

DECLARATION

I, Dominique Rosa Ribeiro, declare that this research report is my own work and that the assistance obtained has been only in the form of professional guidance and supervision. No other person's work has been used without due acknowledgment in the main text of the report. It is submitted in partial fulfilment of the requirements for the degree of Master of Education in Educational Psychology at the University of the Witwatersrand, Johannesburg and has not been submitted before for any degree or examination at any other university.

Signature of Candidate

A handwritten signature in black ink, appearing to be 'D. Ribeiro', written over a horizontal line.

Dominique Rosa Ribeiro

Date: June 12, 2019.

ACKNOWLEDGMENTS

“I am the sum total of everything that went before me, of all I have been, seen, and done, of everything done-to-me. I am everyone and everything whose being-in-the-world affected and was affected by mine. I am anything that happens after I've gone which would not have happened if I had not come.”

Salman Rushdie

I would like to acknowledge with gratitude my initial supervisor, Professor Joseph Seabi, for his unwavering belief in my abilities and for the patient guidance, enthusiastic encouragement and expert advice he always promptly provided. I would also like to thank Dr Zaytoon Amod and Adri Vorster for stepping in at the eleventh hour in his absence and for their indispensable advice, support and encouragement at this critical time.

I would also like to take this opportunity to acknowledge the staff at The Star Academy for their exceptional, tireless efforts in improving the lives of children on the spectrum and to the extraordinary children and families I met during my time there. You were the inspiration for and the impetus behind this research.

However, this accomplishment would not have been possible without my friends and family. To Gaby and Jaime, thank you for your friendship; without it I would not have completed my Master's degree with my sanity intact! To my sisters, Raquel and Jacqueline, and my boyfriend, Mitch, who have stood steadfastly by my side through the highs and lows of more than just the past two (and a half!) years. You add immeasurable value to my life in every sense of the word and I am abundantly grateful for the patience, pride, interest, insight and ever-willingness with which you contributed to my thesis. Last, but certainly not least, to my parents; thank you for your unconditional love, guidance and understanding throughout my many years of study and for your selfless commitment to providing me with every opportunity and the encouragement to pursue my every dream. Everything I am is because of you all.

ABSTRACT

The implementation of the inclusion policies in Education White Paper 6, the ever-increasing prevalence of Autism Spectrum Disorder (ASD) and the reality that many classrooms accommodate undiagnosed students on the spectrum all stress the necessity of comprehensively skilled teachers. Ascertaining teachers' levels of knowledge regarding ASD in South Africa is thus an integral step towards establishing whether they are adequately equipped to effectively adhere to these policies and is the initial step towards ensuring their competence and ability to assist in improving the outcomes of ASD in South Africa. Using a novel, self-developed measure, the *Autism Spectrum Disorder Knowledge Questionnaire* (ASD-KQ), 209 foundation-phase teachers from across mainstream and specialized sectors and across the region were surveyed in order to establish the current state of knowledge on ASD in the foundation-phase educational sector in South Africa. Overall, the sample of teachers surveyed scored well ($M = 21.7$, 73%) and proved themselves adequately knowledgeable on the topic. However, specialized teachers still obtained higher levels of overall knowledge than mainstream teachers. Upon further investigation, increased scores were attributed to the significant influence of gender, educational attainment and the sector in which teachers worked. These results not only serve to suggest that South-African foundation-phase teachers have been adequately equipped with the disorder-specific knowledge integral to beginning to accommodate students on the spectrum, but also serve to encourage further skill development, advise subsequent policy and related resource allocation and provide opportunities for future research on developmental disorders in Sub-Saharan Africa.

Keywords: Autism, Autism Spectrum Disorder, Levels of Knowledge, Policy, Quantitative, South Africa, Sub-Saharan Africa, Teachers.

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CHAPTER 1: INTRODUCTION

1.1 Background

Autism Spectrum Disorder (ASD) has been alarmingly on the increase, both in incidence and prevalence, since its initial identification in 1943. In the late 1980s, prevalence in America was estimated at 3.6 cases per 10 000 children. By 1996, this figure had risen to 3.4 cases per 1000 children and by 2010 Autism Spectrum disorders were calculated to have affected 14.7 out of 1000 children in the United States (Christensen, 2016). In Israel, prevalence in 1986 was estimated at 1.2 cases per 1 000 children (Gal, Abiri, Reichenberg, Gabis, & Gross, 2012). By 2003, this figure had risen to 3.6 cases per 1 000 children and by 2010 Autism Spectrum disorders were calculated to have affected 4.8 out of 1 000 children in Israel (Davidovitch, Hemo, Manning-Courtney & Fombonne, 2013). Similarly, Taylor, Jick and MacLaughlin (2013) calculated a fivefold increase in the annual incidence rates of autism in the United Kingdom during the 1990s and by 2009 it was estimated that Autism Spectrum disorders effected 3.8 out of 1000 boys and 0.8 out of 1000 girls in the United Kingdom.

Although prevalence is currently estimated at 14.7 cases per 1 000 in the United States (Christensen, 2016), globally these disorders are most recently estimated to affect 1 in every 161 children (Elsabbagh et al., 2012). While this may have to do with disparities in diagnostic services, reporting and documentation across first- and third-world countries (Fombonne, 2009), it represents the best estimate nevertheless and translates to roughly 6230 children being born with ASD each year in South Africa alone. Previously, children presenting with these disorders were typically educated in specialized schools, but since the implementation of *Education White Paper 6* (Department of Education, 2001), mainstream schools are required to adhere to the inclusion policies outlined therein. Along with the reality that many classrooms

accommodate undiagnosed students on the spectrum (Bello-Mojeeed et al., 2014), these policies further stress the necessity of additionally skilled teachers.

1.2 Problem Statement

Irrespective of its pervasiveness, ASD in Sub-Saharan Africa is so problematically under-researched that there exists a complete lack of empirical prevalence data for the disorder. In 2011, Bakare and Munir conducted a review of all available literature on the disorder in the African context and found that not a single study specifically addressed the epidemiology of ASD in Africa (Bakare & Munir, 2011a). This meant that the features of children with ASD in Africa could not be not known (Bakare & Munir, 2011a; Bello-Mojeeed et al., 2014). During a later, worldwide review of literature on the topic, Elsabbagh and colleagues reiterated that this was still the case and that there was a “critical need for further research and capacity building in low- and middle-income countries” (Elsabbagh et al., 2012).

More recently, Abubakar, Ssewanyana and Newton (2016) identified that of the 47 studies on the topic conducted in Sub-Saharan Africa, almost all were from Nigeria and South Africa, all were based on very small samples and only one study attempted to document the prevalence of ASD in the region. Ultimately, these researchers again concluded that the current evidence base could not possibly allow for ASD in Sub-Saharan Africa to be adequately planned for and managed. Addressing this later in the year in a workshop on ASD in Africa held by the *International Child Neurology Association and the African Child Neurology Association*, Ruparelia and colleagues emphasised that not only is the dearth of research on ASD in Sub-Saharan Africa problematic but so too is the lack of disorder-specific awareness and access to disorder-specific resources (Ruparelia et al., 2016).

This means that ASD is diagnosed much later than would be ideal and that intervention is subsequently less effective, if diagnosis and treatment are even received at all (Bello-Mojed et al., 2014). Malcolm Smith and colleagues (2010) discovered that even when children are eventually identified in disadvantaged communities, doctors may not diagnose them or refer them for assessment out of concern that the diagnosis would be nothing more than 'bad news' in light of the scarcity of services available. In addition, in comparable research preceding this, variation in autism-specific knowledge amongst teachers and even amongst disorder-specific professionals was revealed. In Pakistan, levels of knowledge on the topic varied across healthcare professionals (Imran et al., 2011), as was the case amongst health workers and final-year medical students in Nigeria (Bakare et al., 2008; Bakare et al., 2015) and even physicians in the United States (Rhoades, Scarpa, & Salley, 2007).

Levels of knowledge on the topic also then varied unsurprisingly across preschool teachers in Singapore (Lian et al., 2008) and China (Liu et al., 2016), primary school teachers in Pakistan (Arif et al., 2013) and India (Shetty & Rai, 2014), educators in Saudi Arabia (Haimour & Obaidat, 2013), isiZulu educators in Pietermaritzburg, South Africa (Hutton, Mitchell & Riet, 2016), and even across school personnel in America (Williams et al., 2011) and special needs educators in London (York et al., 1999). Higher levels of knowledge appear to have been associated with socio-demographic variables such as geographic region (Liu et al., 2016), educational attainment (Haimour & Obaidat, 2013; Liu et al., 2016), teaching experience (Haimour & Obaidat, 2013; Shetty & Rai, 2014), disorder-specific experience (Barned, Knapp, & Neuharth-Pritchett, 2011; Haimour & Obaidat, 2013; Johnson, Porter, & McPherson, 2012) and, most statistically significantly, disorder-specific training (Barned, Knapp, & Neuharth-Pritchett, 2011; Humphrey & Symes, 2013; Johnson, Porter, & McPherson, 2012; Lian et al., 2008; Liu et al., 2016; Sanz-Cervera, Fernández-Andrés, Pastor-Cerezuela, & Tárraga-Mínguez, 2017; Shetty & Rai, 2014).

Although it is a logical assumption that this would too be the case in South Africa, these preceding studies were conducted in areas vastly different to the country of interest, such as Pakistan (Arif et al., 2013; Imran, Chaudry, Azeem, Bhatti, Choudhary et al., 2011), Nigeria (Bakare et al., 2008), Singapore (Lian et al., 2008), China (Liu et al., 2008), India (Shetty & Rai, 2014), Saudi Arabia (Haimour & Obaidat, 2013), England (York et al., 1999) and the United States (Rhoades, Scarpa, & Salley, 2007; Williams et al., 2011). Even Hutton and colleagues' 2016 exploration of ASD-specific knowledge amongst isiZulu-speaking educators in Pietermaritzburg was language- and culture-bound and is thus likely unable to accurately predict the outcomes of South Africa as a whole. The problem with not having a South African-specific understanding of this phenomenon is that although mainstream school teachers in the country are not considered specialists and do not have the training that specialists do, they are now required to manage both undiagnosed and diagnosed children with ASD in their classrooms nevertheless (Roberts, 2008; Weber, 2015).

1.3 Rationale

Ascertaining foundation-phase teachers' levels of knowledge regarding ASD in South Africa is thus an integral step towards establishing whether teachers are adequately equipped to effectively adhere to the policies outlined in *Education White Paper 6* (Department of Education, 2001) and is the initial intervening step towards ensuring their competence. Teachers who are better able to recognize the symptoms of ASD and refer these children for *Early Intensive Behavioural Intervention* treatment where necessary or accommodate them into their own classrooms, will be in a better position to assist in improving the outcomes of ASD in South Africa. By investigating the strengths and deficits of knowledge on ASD amongst South African foundation-phase teachers this research anticipates indirectly identifying related practices, such

as pre-service training and skills development, that could be improved upon or altered to advance the understanding and management of ASD in South Africa.

1.4 Aims of the Study

This research intended to establish the current state of knowledge on ASD in the foundation-phase educational sector in South Africa by:

1. Evaluating both mainstream and specialized foundation-phase teachers' understandings of these disorders;
2. Establishing whether there is variance between the understandings of mainstream and specialized foundation-phase teachers on this matter; and,
3. Investigating what factors affect the level of ASD-specific knowledge amongst foundation-phase teachers in South Africa.

Considering the low levels of knowledge and awareness in South Africa regarding ASD (Bello-Mojed et al., 2014; Malcolm-Smith, Hoogenhout, Ing & De Fries, 2010; Ruparelia et al., 2016) it was hypothesized that mainstream foundation-phase teachers would have limited understandings thereof. It was correspondingly hypothesized that specialized foundation-phase teachers would be more knowledgeable of the disorders and that higher levels of knowledge would be associated with teacher socio-demographic variables such as teaching experience, disorder-specific experience and disorder-specific training, as was the case in analogous research from the United States (Barned, Knapp, & Neuharth-Pritchett, 2011; Johnson, Porter, & McPherson, 2012), Saudi Arabia (Haimour & Obaidat, 2013), China (Liu et al., 2016) and India (Shetty & Rai, 2014).

1.5 Research Questions

The following questions guided the study:

1. What is the level of ASD-specific knowledge and understanding amongst mainstream and specialized foundation-phase teachers?
2. Is there a difference between mainstream and specialized foundation-phase teachers' understandings of ASD?
3. What factors affect the level of ASD-specific knowledge amongst foundation-phase teachers in South Africa?

1.6 Report Structure

This report consists of five chapters exploring the current state of knowledge on ASD in the foundation-phase educational sector in South Africa. Chapter One introduces the topic of research; outlining the problem at hand, contextualizing the study and explicating upon its aims as well as its significance and contribution to society. Chapter One thus focuses on the limitations of not having a South African-specific conceptualization of foundation-phase teachers' understandings of ASD and how, particularly in light of *Education White Paper 6*, the knowledge gained from this study will improve the understanding of ASD in South Africa and consequently the management and outcomes thereof.

In Chapter Two, a comprehensive review of the present literature regarding ASD is offered. Chapter Two thus focuses on the ever-developing definitions of the disorder, its increasing prevalence, the dearth of research emerging from low-resource regions, disorder-specific management difficulties faced by sub-Saharan Africa and the role that teachers play therein.

Chapter Three then further discusses the distinguishing features of South Africa as a context and explores the unique characteristics of the post-Apartheid South African education system. This chapter correspondingly deliberates the choice of an exploratory, non-experimental survey design - particularly considering that enquiry into ASD in the country is still preliminary - and the choice of foundation-phase teachers as the population of interest, considering their unique position in relation to children on the spectrum. The purposive manner in which these teachers were selected and accessed and the development of the *Autism Spectrum Disorder Knowledge Questionnaire* (ASD-KQ) are also detailed in this chapter, as well as the procedure of the study and the process of analysis of the subsequent data.

In Chapter Four, the results obtained from a comparison of the mean ASD-KQ scores of mainstream and specialized teachers are presented and briefly interpreted, as well as the statistical impact of socio-demographic variables on these scores. Finally, Chapter Five discusses, in detail, the research results, deliberating the differences between teachers' levels of ASD-specific knowledge in light of the literature reviewed in Chapter Two and considering the effect of gender, sector (mainstream/specialized), school type (private/government), qualification, ASD-specific training, ASD-specific experience and overall experience on these differences. This chapter concludes with the limitations of the study, its practical implications and recommendations for future research within the field.

CHAPTER 2: LITERATURE REVIEW

2.1 Overview of Chapter

A review of the present literature regarding ASD in South Africa revealed an abundance of research from Western publishers chronicling the lack of research emerging from the nation and from other low-income and low-resource regions. These studies additionally highlight the difficulties managing ASD within sub-Saharan Africa. What follows is a review of the most recent and relevant global research surrounding the state of ASD-specific knowledge worldwide and the unique and integral position of foundation-phase teachers in ensuring the successful management of the disorder.

2.2 Autism Spectrum Disorders: Definitions and Prevalence

Autism Spectrum Disorder (ASD) currently refers to a group of pervasive neurodevelopmental disorders manifest from early childhood that are characterised by persistent deficits in communication and social interaction as well as restricted, repetitive patterns of behaviour, interests or activities, all of which limit and impair day-to-day functioning (American Psychiatric Association, 2013). Prior to the currently accepted cluster of characteristics popularized in the 1989 revised third edition of the *Diagnostic and Statistical Manual* (DSM), the behaviours identified by Kanner in 1943 as “autistic disturbances of affective contact” (Kanner, 1943) were only included in the DSM for the first time in 1980.

In this third edition of the DSM, the first diagnostic subtype, *Infantile Autism*, sought to describe children under the age of 30 months who presented with a persistent indifference toward others, deficits and abnormalities in language development and unusual environmental responses in the absence of Schizophrenic symptoms, while *Childhood Onset Pervasive*

Developmental Disorder sought to describe children over the age of 30 months who presented with marked social impairments in addition to at least three other characteristic symptoms such as anxiety, inappropriate affect, resistance to environmental change, odd motor movements, speech abnormalities, sensory sensitivity and self-injurious behaviour (American Psychiatric Association, 1980). The final diagnostic subtype in this edition, *Atypical Pervasive Developmental Disorder*, provided for the diagnosis of children with social and developmental delays who did not meet the criteria for *Infantile Autism* or *Childhood Onset Pervasive Developmental Disorder* (American Psychiatric Association, 1980).

In the DSM-III-R, published 7 years later, the three previous diagnostic subtypes were reduced to *Autistic Disorder* and *Pervasive Developmental Disorder Not Otherwise Specified* (PDD NOS) (American Psychiatric Association, 1987). In this edition of the DSM, while the diagnosis of PDD NOS served a similar purpose and consisted of similar diagnostic criteria to *Childhood Onset Pervasive Developmental Disorder*, in order to be diagnosed with *Autistic Disorder* the presence of at least eight characteristic symptoms was required, with at least two from the social interaction domain, one from the communication domain and one from the restricted behaviours domain (American Psychiatric Association, 1987). The DSM-IV (American Psychiatric Association, 1994) and DSM-IV-TR (American Psychiatric Association, 2000) kept but expanded upon this triad of diagnostic symptoms as well as the diagnosis of PDD NOS to describe children who did not meet the full criteria for *Autistic Disorder*. These editions did however also include an additional diagnosis, *Asperger's Disorder*, which sought to describe children with deficits in social interaction and restricted, repetitive patterns of behaviour, interests or activities but who did not have difficulties in communication and language.

However, as a result of diagnostic inconsistencies across clinicians, the DSM-5 did away with the separate subcategories of *Autistic Disorder*, *Asperger's Disorder* and *PDD NOS*

in 2013, replacing these with one umbrella term, *Autism Spectrum Disorder* (American Psychiatric Association, 2013). Furthermore, as opposed to symptoms spanning three domains, the current classification system outlines two domains within which symptoms fall: *Social Communication and Interaction* and *Restricted, Repetitive Behaviors, Interests and Activities* (American Psychiatric Association, 2013). Under the DSM-5, diagnosis requires the presence of all three symptoms from the first domain and at least two symptoms from the second (American Psychiatric Association, 2013).

While these changes represent only some of the many advancements in ASD diagnosis and management that have been achieved over the years, a current concern is that the DSM-5 criteria for diagnosis under-identifies individuals on the spectrum. Systematic reviews comparing DSM-IV TR and DSM-5 rates of diagnosis have revealed a decrease in the number of individuals diagnosed with ASD under the new DSM-5 criteria (Kulage, Smaldone, & Cohn, 2014; Smith, Reichow, & Volkmar, 2015; Sturmey & Dalfern, 2014). Having reviewed 14 articles on the topic in 2014, Kulage and colleagues calculated a 31% pooled decrease in the number of individuals diagnosed with ASD when using DSM-5 diagnostic criteria (Kulage et al., 2014). Sturmey and Dalfern's 2015 review, comprising of the analysis of 12 articles, reported a 37% pooled decrease in ASD diagnosis across studies using DSM-5 diagnostic criteria (Sturmey & Dalfern, 2015). Most recently, Smith and colleagues, having reviewed 25 articles and a total of 36 355 participants, determined that 50 -70% fewer individuals met the criteria for a diagnosis of ASD under the new DSM-5 classification than under the DSM-IV-TR (Smith et al., 2015). Although the 'grandfather clause' in the DSM-5 provides that individuals who have been previously diagnosed are to maintain their diagnoses and continue to receive the interventions they have been receiving, those who now present with similar symptoms and needs may thus find themselves under-serviced.

This is especially concerning considering that the increase in ASD prevalence that has prevailed over the years is so immense and so ubiquitous that it cannot possibly be accounted for by alterations to the diagnostic criteria alone (Rice et al., 2012). In the late 1980s, after autism had been distinguished as a distinct clinical diagnosis, researchers at the University of California Los Angeles and the University of Utah applied the DSM-III diagnostic criteria to 483 participants in the small but representative state of Utah to calculate the first large-scale estimate of ASD prevalence (Ritvo et al., 1989). Of the 483 under 25s sampled for the study, 241 were diagnosed as having autism and prevalence in the United States was thus estimated at 4 cases per 10 000 individuals (Ritvo et al., 1989). However, in a review of the data generated by this study, contemporary researchers applied the DSM-IV-TR criteria to the 242 participants classified as "Diagnosed Not Autistic" in 1989 and discovered that 64 of these would have been diagnosed as having autism had this diagnostic criteria been used at the time, suggesting that prevalence then might already have been higher than it was estimated to be (Miller et al., 2013).

Nevertheless, in 1996, using the same diagnostic criteria as the 1989 study the Centre for Disease Control's *Metropolitan Atlanta Developmental Disabilities Surveillance Program* (MADDSP) and its extended surveillance network, the *Autism and Developmental Disabilities Monitoring* (ADDM) Network, determined that prevalence in the United States had risen to 3.4 cases per 1000 children (Christensen, 2016). This marked increase resulted in significant professional and public concern and thus from 2000 onwards the *Autism and Developmental Disabilities Monitoring* (ADDM) Network began to collect prevalence data every two years (Christensen, 2016). By 2010 Autism Spectrum Disorders were calculated to have affected 14.7 out of 1000 children in the United States (Christensen, 2016) and by 2014, despite the implementation of the more stringent DSM-5 diagnostic criteria, prevalence had increased by 15 percent with Autism Spectrum Disorders affecting 16.8 out of 1000 children in the United States (Baio et. al., 2018).

While this is currently the most commonly accepted and utilized estimate of prevalence, global prevalence data suggests that this may not be an entirely accurate representation. For example, in their review of the Ministry of Social Affairs' ASD registry, which contains the details of individuals diagnosed with autism between 1951 and 2008, researchers in Israel estimated prevalence at 1.2 cases per 1 000 children in 1986 and at 3.6 cases per 1 000 children in 2003 (Gal et al., 2012). This latter estimate of prevalence is just about equivalent to the US estimate from 1996; almost a decade prior (Christensen, 2016). By 2010, using data obtained from a health maintenance organization servicing 1.8 million people, Autism Spectrum disorders were calculated to have affected 67% fewer children in Israel than in the United States, affecting only 4.8 out of 1000 children (Davidovitch, et al., 2013) versus the 14.7 out of 1000 children in the US (Christensen, 2016).

Fombonne (2009) postulates that this may have to do with disparities in diagnostic services, documentation and reporting systems and in disorder-specific knowledge across first- and third-world countries, with many cases in third-world countries conceivably going undiagnosed or undocumented. However, in their review of the UK General Practice Research Database (GPRD) - an electronic database documenting the demographics, diagnoses and treatments of over 1000 GPs in over 300 practices since 1990 - researchers in the United Kingdom estimated that in 2009 Autism Spectrum disorders effected 3.8 out of 1000 boys and 0.8 out of 1000 girls in the United Kingdom (Taylor et al., 2013). Although the possibility of false negatives was disclosed as one of the study's limitations, this is an expected limitation of all estimates of prevalence and does not detract from this estimate being much more in line with the prevalence estimate reported for Israel in 2010 than with the prevalence estimate reported for the United States in 2010, despite both being first-world countries (Taylor et al., 2013).

The *International Society for Autism Research* thus initiated the first worldwide review of Autism prevalence research in order to determine a more accurate estimate of global prevalence (Elsabbagh et al., 2012). The research team, comprising of twelve researchers, first incorporated the key findings from preceding analogous reviews into the current report and then assumed an extensive review of available evidence from areas that had been insufficiently represented in these preceding reviews (Elsabbagh et al., 2012). The research team consequently identified and reviewed 636 studies generally omitted from “global” reviews; including those from areas such as South and Central America, the Caribbean, South East Asia, the Western Pacific, the Eastern Mediterranean and Africa, as well as articles in Arabic, Chinese, Dutch, French, Portuguese, and Spanish (Elsabbagh et al., 2012). Although the evidence reviewed supported the notion that socioeconomic factors such as service availability and disorder-specific awareness do impact upon estimates of prevalence, the impact was deemed to be minimal and, more importantly, suggestive of a crucial need for further research and capacity development in third-world and developing countries (Elsabbagh et al., 2012). Based on the evidence generated by the review, Elsabbagh and colleagues also suggested that a more accurate estimate of global prevalence is 6.2 cases per 1000, which translates to 1 in every 161 children (Elsabbagh et al., 2012).

With the population of South Africa estimated to have reached 55.91 million in 2016 and with a birth rate of 21.6 births per 1000 people in this population (Statistics South Africa, 2016) this estimate suggests that a theoretical 6230 children are born with ASD each year in South Africa. This statistic is, however, very limited in its reliability and unfortunately ASD is so under-researched in South Africa, Africa and other low-income and middle-income regions that at the time of commencement of this research, no studies were found specifically addressing the incidence or prevalence thereof in South Africa. Nevertheless, considering that currently only 3 129 children with ASD are currently enrolled in special needs schools across

the country (Department of Basic Education, 2016), this estimate serves to provide an indication of the sheer number of children with ASD who either attend mainstream schools or no formal schooling whatsoever. South Africa's legislated move towards an entirely inclusive education system (Department of Education, 2001) and the reality that many classrooms in Sub-Saharan Africa unknowingly accommodate undiagnosed students on the spectrum (Bello-Mojeeed et al., 2014) implies that the former is most likely, which subsequently indicates the extent of the additional burden placed on teachers and foregrounds the importance that they are additionally skilled.

2.3 The Role and State of Knowledge Amongst Teachers

Previously in South Africa, children presenting with ASD and other neurodevelopmental disorders were typically educated in specialized schools, but since the implementation of Education White Paper 6 (Department of Education, 2001), mainstream schools have been required to adhere to the inclusion policies outlined therein. Education White Paper 6 is a framework policy document that was developed in response to the state of segregated disrepair in which special needs education in South Africa found itself post-apartheid, with only a trivial percentage of socio-economically disadvantaged learners with disabilities receiving specialised education and support (Department of Education, 2001).

To address this, the document legislated that the system be transformed into an inclusive one, where all learners would be permitted access to equivalent education, irrespective of their needs and socio-economic positions; that ordinary public schools not only admit all learners but attend to their educational needs too (Department of Education, 2001). Thus, the move towards converting 500 public mainstream schools into "full-service" schools began, with the view to eventually convert all public mainstream schools (Department of

Education, 2001). In this document, full service schools were defined as mainstream schools “that will be equipped and supported to provide for the full range of learning needs” (Department of Education, 2001, p22) and hoped to permit all children, including those with disabilities, the opportunity to “develop and extend their potential and participate as equal members of society.” (Department of Education, 2001, p5). Along with the reality that many classrooms accommodate undiagnosed students on the spectrum (Bakare & Munir, 2011b), these policies further stress the necessity of additionally skilled teachers.

Foundation-phase teachers, who experience daily contact with children between the ages of 5 and 9 years old, are uniquely positioned to assist in the management of ASD in South Africa. In particular, they are well positioned for the identification of overlooked individuals on the spectrum due to the onset of symptoms of ASD manifesting in early childhood or when social communication demands exceed the child’s limited capacity (American Psychiatric Association, 2013). The latter often transpires upon commencing formal schooling, when children are required to adapt their existing behaviours to fit this new environment (Pentimonti, Murphy, Justice, Logan, & Kaderavek, 2016; Whitebread, 2018), and corresponds with Daniel and Mandell’s (2014) review of 42 articles on the age at which children first present for diagnosis, where they identified that most caregivers first recognize symptoms of ASD when children are between the ages of 3 and 6 years old.

Considering this detail, the South African Department of Basic Education’s 2014 Policy on Screening, Identification, Assessment and Support (SIAS) went as far as to legislate a shift in the responsibility of screening, identification and assessment processes from external specialists, such as neurodevelopmental paediatricians and educational psychologists, to the individual’s everyday support structures, placing a specific emphasis on teachers. Outlined in the policy is the expectation that teachers not only recognize learners who need additional

support and make referrals for their diagnosis but that they also effectively manage their behaviour and provide for their individualized needs in the classroom (Department of Basic Education, 2014). This is not unlike the expectation held of teachers in London as “active observers of pupils’ mental health” (Rothi et al., 2008) and is appropriate considering the likelihood of teachers encountering children on the spectrum in their mainstream classes (Department of Education, 2001). Obtained through the SNE SNAP Survey, in 2016 the Department of Basic Education published statistics regarding Education in South Africa and established that only 3 129 children with ASD were enrolled in schools catering for special needs education students (Department of Basic Education, 2016).

The involvement of teachers in tier one mental health responsibilities is not an unprecedented proposition however; since Stone and Rosenbaum’s seminal investigation in 1988, the broader field has experienced “a growing appreciation for the contributions that teachers can make to the screening and diagnostic process” (Ozonoff, Goodlin-Jones, & Solomon, 2005). Although not formalized, since then mental health professionals began to collaborate with teachers, who make particularly knowledgeable reporters by virtue of their daily observations of children, in multiple circumstances, and their ability to compare their development to other children (Ozonoff, Goodlin-Jones, & Solomon, 2005). The formalization of teacher involvement, however, necessitates they be trained and that school-based ASD screening tools be developed so that opportunities to identify children on the spectrum who may have been overlooked prior to entering the school system are not missed, and that these children receive the important, early intervention they require (Ozonoff et al., 2005). This is also in line with research entrenched in Bronfenbrenner’s (1994) Ecological Systems Theory and Bowlby’s Attachment Theory (1982) which emphasizes the saliency of the relationship between teachers and children diagnosed with ASD (Eisenhower, Bush, & Blacher, 2015).

According to Eisenhower and colleagues' (2015) review of seven empirical, peer-reviewed studies and two dissertations on the topic, successful teacher-student relationships serve as "a protective factor for children at risk of adverse outcomes" and, particularly for children on the spectrum, as a predictor of academic performance, social competency and overall school adjustment. Therefore, of further interest are the various factors that impact upon these relationships, with disorder-specific training and experience emerging as those microsystem influences best able to predict the quality of teacher-student relationships (Eisenhower et al., 2015). Most teachers in the studies reviewed by Eisenhower and colleagues (2015) were discovered to have only low to moderate levels of ASD-specific knowledge, many reported never having attended disorder-specific training before and many more admitted to feeling unable to cultivate adequate relationships with children on the spectrum and effectively provide for their educational needs.

In Saudi Arabia, while the 391 teachers surveyed by Haimour and Obaidat (2013) achieved an acceptable, average score of 58% on the Autism Knowledge Questionnaire, this score comprised of the scores of specialized teachers, who achieved 85% on average, and the scores of mainstream teachers, who achieved 37% on average. Similarly, in China, a total of 471 preschool teachers were surveyed by Liu and colleagues (2016) on their knowledge of typical and autism-specific child development. While 84% of participants were acceptably knowledgeable about typical child development and correctly answered more than half of the questionnaire items assessing this, 83% were ill-informed about ASD and incorrectly answered more than half of the questionnaire items assessing their knowledge on the topic (Liu et al., 2016). Interestingly, although more than half of the participants described having had experience with children on the spectrum, only 16% reported having received formal training on the disorder (Liu et al., 2016).

In Oman, overall knowledge about children on the spectrum amongst teachers was also poor, with more than 60% of the 167 teachers surveyed under the impression that autism could be caused by neglect and abuse and 11% believing that certain foods could cause autism (Al-Sharbati et al., 2015). According to the study, most teachers obtained information on the disorder from mass media communications such as magazines, social media, films and the internet (Al-Sharbati et al., 2015). Similarly, in Pakistan 55% of the 170 primary school teachers surveyed on their knowledge of the disorder reported that they had acquired this knowledge through the media, with only 10% of teachers having attended formal training and 8.8% having attended workshops on autism, despite many being faced with the education of children on the spectrum (Arif, Niazy, Hassan, & Ahmed, 2013). On average, these teachers scored inadequately ($M = 46\%$) when assessed on their knowledge of ASD (Arif et al., 2013).

However, considering the low levels of autism-specific knowledge amongst even disorder-specific professionals, such scores are unsurprising. A study in Pakistan interrogated the knowledge of medical professionals on the topic of ASD (Imran et al., 2011). This study discovered that participants were in agreement on the very basic diagnostic criteria but were uncertain of the more specific characteristics, such as age of onset, and held speculative beliefs of ASD as transitory and a manifestation of Schizophrenia (Imran et al., 2011). A similar study was conducted in the United States of America, but explored the levels of ASD-specific knowledge amongst medical professionals from the point of view of the parents of diagnosed individuals (Rhoades et al., 2007). This study discovered that although almost 40% of medical professionals provided supplementary information about ASD after diagnosis, the majority of the information provided was perceived as inadequate and parents were left looking to the media, teachers and other parents for adequate information regarding their child's diagnosis (Rhoades et al., 2007).

The results of a survey on American educators' knowledge on ASD reiterated this lack of precise, detailed knowledge on the disorder with educators achieving only a low to average factual knowledge score (Williams et al., 2011). Moreover, on other sides of the globe, educators in Singapore and health care workers in Nigeria demonstrated low to average levels of ASD-specific knowledge too (Bakare et al., 2008; Lian et al., 2008), suggesting a universally mediocre level of knowledge in spite of a universally increasing prevalence. The exception to this suggestion, however, lies closer to home. In a very recent South African study on levels of ASD-specific knowledge, educators in Pietermaritzburg scored an average of 68/100 on a translated version of the Knowledge about Childhood Autism among Health Workers (KCAHW) Questionnaire (Hutton et al., 2016). Of particular importance in this study is that the sampled participants were from schools belonging to a support network where at least one teacher in each school received regular training on education-related matters, such as developmental disorders, and then disseminated this information to their colleagues (Hutton et al., 2016). That this training was not taken into consideration in the correlation analysis is identified by the author as a limitation to the research and a future recommendation for equivalent studies (Hutton et al., 2016), particularly considering the increasing number of studies attesting to and confirming the association between disorder-specific training and levels of knowledge on autism (Humphrey & Symes, 2013; Johnson et al., 2012; Lian et al., 2008; Liu et al., 2016; Shetty & Rai, 2014).

For example, although most pre-service teachers in the United States surveyed by Johnson and colleagues (2012) scored between 70% and 75% when assessed similarly, these very same pre-service teachers were on average only 50% confident in their knowledge of the disorder, which the researchers came to discover had much to do with the lack of autism-specific training within their syllabus and their inattendance of workshops on the topic outside of this (Johnson et al., 2012). This insecurity pervaded Barned and colleagues' (2011) study on

the knowledge and attitudes of pre-service teachers regarding children on the spectrum and their inclusion into mainstream classrooms. These teachers not only lacked a working knowledge of the disorder, with 93% of teachers unaware that ASD is a developmental disorder and 60% incorrectly believing that children could “outgrow” the disorder, but they were also unresolved about the inclusion of children into mainstream classrooms as a result of being doubtful of their ability to manage these inclusive classrooms (Barned, Knapp, & Neuharth-Pritchett, 2011). Although the majority of pre-service teachers surveyed agreed that it would be beneficial for their development to integrate children on the spectrum into mainstream classrooms (93.3%) and that neurotypical children would also gain from interactions with these children (100%), many still indicated that specialized schooling would be the optimal placement for children with special needs (67.7%) and that only specialized teachers should educate children with special needs (46.7%) (Barned et al., 2011).

In Humphrey and Symes' (2013) exploration of the attitudes of teachers in England regarding the mainstream inclusion of children on the spectrum, most mainstream teachers communicated a similar partiality towards inclusion and similar lack of confidence in their ability to effectively implement inclusive classrooms. However, in this study, Special Educational Needs Co-ordinators were significantly more confident in their ability to educate children on the spectrum and cope with the behaviours accompanying the disorder (Humphrey & Symes, 2013). Surprisingly, this difference did not appear to be related to having had previous professional experience with a child on the spectrum, with fifty of the fifty-three respondents having previously taught children with autism (Humphrey & Symes, 2013). Instead, corresponding with the results of both Johnson and colleagues' preceding research (2012) and Liu and colleagues' subsequent research (2016), a significant association was found between disorder-specific training, knowledge and self-efficacy (Humphrey & Symes, 2013).

Further exploring this, Lian and colleagues (2015) set out to empirically evaluate the factors contributing to adequate and above average knowledge of childhood developmental disorders. Assessing 503 pre-school teachers in Singapore on the topic, they discovered that the mean T-scores differed significantly between teachers who had had formal training and those who had not and between teachers who had had experience with children on the spectrum and those who had not, with formal training correlating significantly and positively towards increased knowledge (Lian et al., 2008). Likewise, Shetty and Rai (2014), in their exploration of the autism-specific knowledge of 326 teachers in India, found that only 71 teachers had received prior training on ASD, with these teachers performing significantly better on the knowledge questionnaire administered than those who had not. Of these teachers without prior training, 225 were exposed as having markedly inadequate knowledge on the topic (Shetty & Rai, 2014).

Most recently, Sanz-Cervera and colleagues (2017) compared 866 pre-service teachers on their knowledge of autism using the Autism Knowledge Questionnaire. The results revealed that special education pre-service teachers were more knowledgeable and held fewer misconceptions than general education pre-service teachers and that knowledge was statistically dependent on disorder-specific training (Sanz-Cervera et al., 2017). Studies such as these authenticate the necessity for formal, disorder-specific training in light of the inclusive education expectations held of teachers, who themselves have expressed an interest and desire to be formally trained on the topic (Arif et al., 2013; Humphrey & Symes, 2013; Lian et al., 2008; Liu et al., 2016; Shetty & Rai, 2014).

2.3 Challenges Facing the Management of ASD in Africa

2.3.1 Insufficient Research

Malcolm-Smith and colleagues (2010) first brought to attention just how under-researched ASD is in South Africa, Africa and other low-income and middle-income regions in their exploratory appraisal of the global course of Autism Spectrum Disorders. While they commended efforts to increase local capacity, such as the University of Cape-Town's establishment of a Centre for Autism Research in Africa and this very centre's commitment to translating and standardising early screening tools, their concern was that not only did research on the epidemiology of ASD in sub-Saharan Africa seem to be entirely absent, but that validated, culturally-appropriate diagnostic tools appeared to be unavailable and diagnostic and intervention services few and overburdened (Malcolm-Smith et al., 2010). These deficits are of concern as they encumber accurate resource allocation and render an unknowable number of children and families without support and turning to community members, such as teachers, as paraprofessionals.

Looking to empirically expand upon this, in early 2011 Bakare and Munir problematized that of all the studies published on ASD through PubMed/MEDLINE, Google Scholar, African Journals Online (AJOL), and the Nigerian Journal of Psychiatry between January 2000 and December 2009 only twelve included content related to the epidemiology and aetiology of the disorder (Bakare & Munir, 2011a). Although all twelve focused on ASD in Africa, four were from Nigeria, four from Egypt, two from Tunisia, one from Tanzania and one from Sweden (Bakare & Munir, 2011a). Furthermore, no study specifically undertook to measure the incidence or prevalence of ASD in Africa. Only as a by-product of their descriptive, cross sectional study on the use of the *Modified Checklist for Autism in Toddlers* (M-CHAT) to screen for developmental disorders in countries with limited mental health

resources did Seif-Eldin and colleagues calculate the prevalence of ASD amongst children with developmental delays in Egypt and Tunisia. However, the study's very small sample, comprising of only 82 toddlers in Egypt and 25 in Tunisia, and its focus on children already identified as developmentally delayed renders this prevalence statistic hardly generalizable (Seif-Eldin et al., 2008, as cited in Bakare & Munir, 2011a).

More recently, Abubakar, Ssewanyana and Newton (2016a) directed a systematic review of all research on the topic of autism in Sub-Saharan Africa. Of the 341 potentially eligible studies, only 47 were peer-reviewed, focused on ASD as the main disorder of interest, and were carried out from within Sub-Saharan Africa and on a Sub-Saharan sample. Of these, 25 were conducted in South Africa, 11 in Nigeria, three in Tanzania, three in Kenya, two in Zimbabwe, two in Uganda and only one in Ethiopia, with countries such as Ghana, Angola and Botswana seemingly void of scientifically vigorous research on the topic. Most of the research reviewed instead focused on the psychosocial aspects of the disorder, such as levels of awareness in the region, the quality and accessibility of disorder-specific resources therein and challenges faced by caregivers. Very few studies prioritized the development of screening and diagnostic measures for use in Africa and the identification of risk factors and markers for the disorder. While some attempted to determine estimates of prevalence, most of these studies conveniently sampled children from hospitals and specialized units for children with special needs in order to do so, distorting their outcomes (Abubakar et al., 2016a). Kakooza-Mwesige and colleagues' 2014 study was the only population-level study of prevalence identified, and again, this estimate of prevalence was a by-product of their study into the use of an adaptation of the *Ten Questions Screener* to screen for developmental disorders in Uganda (Abubakar et al., 2016a). Nevertheless, the researchers assessed 1169 randomly-sampled children between the ages of two and nine years in Uganda, and identified eight children with ASD,

approximating an unadjusted prevalence rate of 6.8 cases of Autism per 1000 children in Uganda (Kakooza-Mwesige et al., 2014).

Subsequent to this study, which again foregrounded the scarcity of peer-reviewed, autism-specific research coming from Africa, Abubakar, Ssewanyana and Newton (2016b) undertook to understand the genesis of this dearth. They soon discovered that a paramount barrier to epidemiological research on autism in Africa is the unavailability of validated, culturally-appropriate diagnostic tools (Abubakar et al., 2016b). In high-income, first-world countries standardised tools such as the M-CHAT, The *Autism Diagnostic Observation Schedule* (ADOS) and the *Autism Diagnosis Interview* (ADI) have contributed to the understanding of ASD and consequently the management and outcomes thereof (Abubakar et al., 2016b). However, there are currently no existing validated instruments for use specifically on African populations (Ruparelia et al., 2016; Smith et al., 2016) and the *Autism Diagnostic Observation Schedule* (ADOS), which is the most commonly used diagnostic tool in Sub-Saharan Africa, has repeatedly demonstrated biases against non-Westernized participants when not adapted correctly (Abubakar et al., 2016b; Ruparelia et al., 2016; Smith, Malcolm-Smith, & de Vries, 2016; Wilford, 2013).

For instance, while bathroom sinks are commonplace amongst Western European and North American homes, children from impoverished, rural areas in Africa may be unfamiliar with the item which features in the communication skills evaluation of the ADOS, and their performance on the task will thus be compromised (Ruparelia et al., 2016). Similarly, the poor performance of children from within largely oral cultures and children who have had limited or no access to books may not be reflective of their ability levels but rather their lack of familiarity with the stimulus (Ruparelia et al., 2016). Thus, in order to ethically use these tools in the African context they would need to be adapted and translated so as to ensure their cultural

appropriateness; and while some have taken up the gauntlet, it is a labour- and resource-intensive task (Abubakar et al., 2016b). The researchers suggest that, instead, open-source, quick-to-administer diagnostic tools be developed in order to limit the burden on already minimal resources in the region (Abubakar et al., 2016b).

In their review and exploration of the characteristics of children first presenting for diagnosis and in a later discussion prompted by this on the challenges facing the identification of ASD in Africa, Bakare and Munir (2011b) identified that another barrier preventing accurate epidemiological research is that the diagnosis of children with ASD in Africa occurs at a relatively late age. Most of the participants in the six studies meeting criteria for inclusion and spanning Tunisia, Tanzania, Kenya and Nigeria were well over the age of 8 years when they presented for diagnosis for the first time (Bakare & Munir, 2011b; Bello-Mojeeed et al., 2014). According to the review, this is due to low levels of public knowledge and awareness about the disorders, a complicated help-seeking pathway and limited mental healthcare facilities and personnel (Bakare & Munir, 2011b; Bello-Mojeeed et al., 2014).

Presumably closely reflecting public trends, one of the studies reviewed by Bakare and Munir (2011b) revealed that 26.9% of healthcare workers in south-eastern Nigeria subscribed to supernatural aetiological explanations for autism. Consequently, help was often first sought from spiritualists, traditional healers and other non-orthodox professionals, delaying official diagnosis as well as intervention (Bakare & Munir, 2011b; Bello-Mojeeed et al., 2014). Although all from Nigeria, the majority of the remaining studies reviewed by the researchers revealed low levels of autism-specific knowledge and awareness amongst both the public and these very professionals in the region. Perhaps of even more concern than the unfamiliarity of caregivers with the symptoms of ASD is that low levels of knowledge and awareness were exposed amongst healthcare professionals who did not have previous experience managing

children on the spectrum (Bakare & Munir, 2011b; Bello-Mojeed et al., 2014). Professionals in psychiatric facilities were instead discovered to be better able to identify the symptoms of ASD than those in paediatric units, and final-year medical students were significantly better able to do so than nursing and psychology final-year students, inevitably further hindering the early identification of ASD in primary healthcare settings (Bakare & Munir, 2011b; Bello-Mojeed et al., 2014).

2.3.2 Limited Resources

According to another study in the review, a further difficulty faced by those seeking diagnosis and intervention in sub-Saharan Africa is that these very healthcare resources are scarce and overburdened, particularly those specializing in child and adolescent mental health (Bakare & Munir, 2011b; Bello-Mojeed et al., 2014). Using both the World Health Organization Assessment Instrument for Mental Health Systems (WHO-AIMS) and qualitative methods, Kleintjies and colleagues from the Mental Health and Poverty Research Programme Consortium assessed the availability of mental health resources in Ghana, Uganda, South Africa and Zambia and issues impacting their development (Bakare & Munir, 2011b; Bello-Mojeed et al., 2014). While all four countries were discovered to have a national mental health policy, many had not undergone a thorough needs assessment prior to this nor consulted with experts to specifically address child and adolescent mental health, if this population's needs were even specifically addressed at all (Bakare & Munir, 2011b; Bello-Mojeed et al., 2014). Furthermore, at the time, only Uganda and South Africa had included mental health in their annual strategic plans. As a result, at the time of the study there were only 23 mental hospitals in South Africa, three in Ghana and one each in Uganda and Zambia, as well as no day treatment facilities in Ghana and Zambia nor any residential facilities, such as halfway houses and group homes with dedicated mental health professionals, in Uganda and Zambia (Bakare

& Munir, 2011b; Bello-Mojeed et al., 2014). The availability of child and adolescent mental health services was even more limited. The study found schools in Ghana, Uganda and Zambia to be entirely vacant of mental health professionals, such as educational psychologists and clinical social workers, and schools in South Africa very limited in the number thereof, with the responsibility in these regions again falling to the teachers therein (Bakare & Munir, 2011b; Bello-Mojeed et al., 2014).

Bringing this plight to the attention of policy-makers, in April 2014 forty-seven delegates from 14 African countries met with the International Child Neurology Association and the African Child Neurology Association to discuss the management of ASD in Africa (Ruparelia et al., 2016). The chief objectives of this workshop were to investigate the capacity to detect, diagnose and treat ASD in sub-Saharan Africa and to equip attendees with the knowledge to better do so in their respective regions (Ruparelia et al., 2016). First, representatives presented on the current capacity of their regions. While the number of resources and service providers available varied across countries, disorder-specific professionals were consistently reported to be few in comparison to the populations being served and culturally-appropriate screening measures, diagnostic tools and interventions almost entirely lacking (Ruparelia et al., 2016). The role of traditional healers and teachers was also raised multiple times, and the suggestion was made that they be included in the management of ASD in sub-Saharan Africa considering that they are often the first point of contact and first providers of psychosocial support for the families of children with disabilities in many African settings (Ruparelia et al., 2016). This very sort of support was portrayed as indispensable considering the negative stigma attached to ASD and the presence of support organizations in only seven of the 14 countries represented (Ruparelia et al., 2016).

Thereafter, representatives were divided into focus groups to determine areas in need of further research and development (Ruparelia et al., 2016). On the topic of identifying children with ASD in Africa, it was again recommended that the process of screening and identification be incorporated into existing services in the community, health care sector, and in schools. For example, it was suggested that a simple developmental screening tool be designed for use at immunization consultations at 18-months and that educators be trained not only to manage the challenging behaviours accompanying the disorder but to identify children on the spectrum (Ruparelia et al., 2016). Following on from this subject, obstacles preventing the timely diagnosis of ASD in Africa were determined. In line with related research (Abubakar, et al., 2016; Bakare & Munir, 2011; Bello-Mojeed et al., 2014), these obstacles included low levels of public and professional knowledge of the disorder, low patient literacy levels, overburdened specialists and the non-existence of culturally-appropriate diagnostic tools (Ruparelia et al., 2016).

Similarly to the recommendations made by Bakare and Munir (2011), Bello-Mojeed and colleagues (2014), and Abubakar and colleagues (2016), the focus group participants suggested that advocacy groups be established with the purpose of raising awareness and improving public and professional knowledge; that efficient, cost-effective screening tools be developed for use in demanding, low-resource settings; that specialist training include teachers, nurses, general medical practitioners, speech therapists, social workers and psychologists and that if culturally-appropriate tools cannot be developed, that current diagnostic tools be translated, adapted and standardized for use in the region instead. Without this, what is even more likely than individuals being diagnosed and treated belatedly is that many children with ASD in sub-Saharan Africa will find themselves without an official diagnosis at all and resultantly without appropriate intervention (Ruparelia et al., 2016).

Naturally succeeding the screening and diagnostic discussion then, the process of ensuring knowledgeable, accessible service provision for the treatment of children with ASD in Africa was deliberated. While workshop participants from across the region acknowledged the significant impact on prognosis of early, intensive behavioural interventions, they appeared to be concerned that many of these evidence-based behavioural treatments, such as *Applied Behavioural Analysis*, are not practical in the African context by virtue of their resource intensiveness (Ruparelia et al., 2016). Applied Behavioural Analysis is an individualized therapy that utilizes the behavioural principle of positive and negative consequences to build social, academic and adaptive skills as well as decrease excesses in behaviours that prevent these skills from being acquired (Roane, Fisher, & Carr, 2016). Although there are many other interventions for individuals on the spectrum those comprehensive treatment models grounded in Applied Behavioural Analysis have high-quality evidence across many, if not all, significant research methodologies (Brentani et al., 2013; Dillenburger, 2015; Wong et al., 2015).

Early Intensive Behavioural Interventions such as this are also extensively endorsed throughout the United States of America, Canada, Australia and Europe (Dillenburger, 2015) and are currently considered best practice for individuals on the spectrum (Brentani et al., 2013; Dillenburger, 2015), with some medical-aid schemes even covering these interventions after deeming them “not only educationally, but medically, necessary” (Dillenburger, 2015). However, Applied Behavioural Analysis Interventions can only be administered by specifically trained therapists, on a one-to-one basis, and literature recommends 40 hours per week of therapy be implemented before the age of 5 in order to achieve optimum results (Klintwall & Eikeseth, 2014).

Instead, it was proposed that less intensive, caregiver-based behavioural interventions, such *Stepping-Stone Triple-P*, which equips caregivers with the skills necessary to prevent and

treat social and emotional difficulties in children with developmental difficulties, be included in the coursework of paediatricians, nurses, psychologists, teachers, and other paraprofessionals likely to engage with children and their caregivers so as to make use of all available human resources in the region (Ruparelia et al., 2016). Managing ASD in Africa thus requires the commitment of many sectors, and, in particular, the support of the national government and the provincial departments of health, education and social development so as to receive adequate funding and prioritization in policy (Ruparelia et al., 2016). In South Africa, this is a task that the Department of Basic Education has begun to arduously undertake, with a grant of R477 million being awarded in 2017 for the establishment of autism-specific schools and units in mainstream schools. Three schools and thirteen units have since been established (Parliamentary Monitoring Group, 2017). One such school is the Thulasizwe School for Autism, the first autism-specific school in Soweto - a previously disadvantaged area in Johannesburg (Parliamentary Monitoring Group, 2017).

While it is understandable that resources in sub-Saharan Africa have previously been focused on communicable diseases such as HIV, malaria and tuberculosis, in view of the substantial decrease in childhood mortality rates in the last decade (Abubakar et al., 2016b) it is now both possible and prudent, as the Department of Basic education has demonstrated, to redirect a portion of these resources towards the management of non-communicable diseases. Neurodevelopmental disorders, for example, have as big an impact on the quality of life of children and their families and communities as communicable diseases do (Abubakar et al., 2016b). Moreover, although there is still no conclusive biological assessment or definitive answer for what causes autism, the empirically identified risk factors associated with autism - such as maternal infection, placental insufficiency, premature birth, birth complications, and low birthweight - occur commonly in sub-Saharan Africa, and further necessitate that managing the disorder be prioritized (Abubakar et al., 2016a).

2.5 Conclusion

In summary, the literature reviewed in this chapter provides an indication of the alarming dearth of research on ASD emerging from low-income and -resource regions, such as South Africa, in the face of the disorder's rapidly and continually increasing pervasiveness. At an estimated prevalence rate of 1 in every 161 children, 6230 children are theoretically born with ASD each year into a nation that is not adequately equipped to effectively plan for and manage the disorder, instead relying on mainstream teachers and other paraprofessionals for support. However, the knowledge necessary to do so appears to be lacking even amongst disorder-specific professionals around world. Although it is likely that disorder-specific knowledge levels in South Africa can be estimated through the preceding studies, these have been conducted in areas vastly different to South Africa and are thus likely unable to accurately predict the outcomes of this particular context. As with the identification of gaps in literature on the topic, the evidenced cognizance of teachers' levels of knowledge regarding ASD in South Africa is the initial step towards ensuring their competence and confidence, which have become evident as integral to managing ASD in the region.

CHAPTER 3: METHOD

3.1 Overview of Chapter

The following chapter deliberates the methodical choices made by the researcher. The chapter begins with a synopsis of the distinguishing features of South Africa as a context, goes on to motivate the selection of a non-experimental, exploratory, cross-sectional survey design in view of these and thereafter describes the population of interest, the method with which they were sampled, and the subsequent difficulties encountered in doing so. The development of the *Autism Spectrum Disorder Knowledge Questionnaire* (ASD-KQ) (Appendix B) is also detailed in this chapter, along with the procedure of the study, ethical and reliability considerations and the process of analysis of the data generated by the study.

3.2 Context of the Study

South Africa is distinguished from previously investigated contexts by a number of factors. South Africa has a multicultural, multilingual population of 54 841 552 people (Central Intelligence Agency, 2017) and is home to more than 2 million immigrants from around the world (Statistics South Africa, 2012). Although South Africa is considered a third-world, developing country, economically it possesses a middle-income emerging market and Africa's largest stock exchange - which is ranked amongst the top 20 in the world (Central Intelligence Agency, 2017). Despite this, South Africa also ranks amongst the highest in the world when it comes to unemployment, poverty, and inequality (Central Intelligence Agency, 2017). While infrastructure in the country should allow for the effectual distribution of goods throughout the region, this distribution is disparate and thus access to resources amongst the region is disproportionate and varies from area to area (Central Intelligence Agency, 2017).

For example, while Johannesburg has 4 434 827 inhabitants, 99,8% of which reside in urban areas, Pietermaritzburg (now Msunduzi) has only 618 536 inhabitants, with the majority thereof residing in tribal/traditional settlements (Statistics South Africa, 2017). Of these residents, 25% are unemployed in Johannesburg while 33% are unemployed in Pietermaritzburg (Statistics South Africa, 2017). With regards to education - which is the primary focus of this research- prior to the democratic elections in 1994, South Africa's education system was uniquely and systematically separated by both race and disability (Gwalla-Ogisi, Nkabinde & Rodriguez, 2006). During this time the schooling system for Black learners was referred to as *Bantu Education* and special education resources were expensive and limited to White learners (Gwalla-Ogisi et al., 2006).

Today the nation features 30 500 racially inclusive schools (Department of Basic Education, 2016). Of these, 25 741 are classified as ordinary schools and 4 759 as alternative education institutions (Department of Basic Education, 2016). Within these schools there are 3 068 855 learners, with 117 477 of these attending special needs schools (Department of Basic Education, 2016). Enrolled in special needs schools, however, are only 3 129 children with ASD (Department of Basic Education, 2016). While there exists a small possibility that some of these children may have been falsely diagnosed with ASD (Risi et al., 2006), this figure more likely provides for the probability that the majority of children with ASD in South Africa attend either mainstream schools or no formal schooling whatsoever. Considering that - amongst other things - Education White Paper 6 endeavours to eradicate discriminatory practices from the education system and instead provide for an educational system that allows all learners, including those on the spectrum, to participate and be integrated into all social and educational opportunities (Department of Education, 2001), it is probable that the majority of these children attend mainstream schools.

3.3 Research Design

For this research a non-experimental, exploratory, cross-sectional survey design was utilised. Non-experimental research is primarily concerned with the elucidation of phenomena that cannot be randomly assigned or easily manipulated due to its predetermined nature; such as gender, age, nationality or - in the case of this research - level of knowledge (Belli, 2009). Non-experimental research thus endeavours to instead focus on context and describe tendencies in the data as opposed to empirically explaining cause and effect (Creswell, 2011). This enables the preservation of the natural qualities of the population of interest and allows for the preliminary establishment of whether a relation exists between two variables (Reio, 2016); such as between ASD-specific knowledge amongst foundation-phase teachers in South Africa and ASD-specific training and experience.

Exploratory, nonexperimental research is thus considered particularly valuable during the early stages of enquiry (Belli, 2009; Creswell, 2011), as is currently the position of research on ASD in South Africa (Bello-Mojed et al., 2014; Malcolm-Smith et al., 2010; Ruparelia et al., 2016). The following exploratory, non-experimental design provides insight into the current yet developing status of ASD-specific knowledge in South Africa and serves to direct future experimental studies by developing tentative theories and hypotheses for investigation (Creswell, 2011). When further applied, exploratory studies such as this are able to assist in the establishment of policy and to influence resource allocation (Belli, 2009).

3.4 Sample and Sampling

In 2014, the Department of Basic Education determined that there were 435 454 educators across South Africa (Department of Basic Education, 2016). Although it would be

ideal to research entire populations of interest, it is almost always impractical to do so (Gogtay, 2010). The sample for this research thus consists of 209 foundation-phase teachers; a number allowing for rigorous statistical analysis and permitting the relative generalization of results considering the estimated 108 863 foundation-phase teachers nationwide (Gogtay, 2010).

Foundation-phase teachers were selected in particular as the population of interest owing to their unique position in relation to children with ASD and the management of ASD in South Africa (American Psychiatric Association, 2013). As such, the criterion for inclusion in the study was that participants were, at the time of participation, foundation-phase teachers (i.e. teachers through preschool to Grade 3) at either mainstream or specialized schools in South Africa. In order to reach these particular teachers a purposive random sampling method was utilised (Gall, Borg, & Gall, 1996). Once comprehensive lists of mainstream and specialized primary schools within South Africa were obtained from the Gauteng, Eastern Cape, Free State, Kwa Zulu Natal, Limpopo, Mpumalanga, North West, Northern Cape and Western Cape Departments of Education as well as the Independent Examinations Board, simple random sampling was used to identify the 300 schools from each province that were to be contacted. In line with the decrease in email survey response rates since 1986 (Sheehan, 2001), this study experienced poor response rates with only 9.8% of schools contacted consenting to participate.

As such, the decision was made to increase the sample size by recruiting participants through social media self-selection sampling. Considering its 845 million diverse users, 87% of which are adults between the ages of 18 and 29 and 56% of which are adults over the age of 64 (Wilson, Gosling, & Graham, 2012), Facebook was selected as the online social network of choice. This database facilitated access to a broad range of demographic groups from various educational and socio-economic backgrounds (Wilson et al., 2012). To ensure that the particular population of interest was reached, questionnaires and surveys were distributed via specific

Facebook groups geared towards education in South Africa, and included demographic questions confirming participant eligibility. The resultant sample included 254 of the 108 863 foundation-phase teachers in South Africa, of which only 209 met inclusion criteria.

3.4.1 Sample Characteristics

Of these 209, 151 (72.2%) taught at mainstream schools and 58 (27.8%) at specialized schools. While 207 participants (99.1%) were female and only 2 (0.9%) were male, this 0.9% presented as equally distributed across the mainstream and specialized groups (See Table 1). The sample also consisted of an almost equal distribution of teachers within Private/Independent ($n=102$, 48.8%) and Public/Government schools ($n=107$, 51.2%), with the majority of specialized teachers teaching within Private/Independent schools ($n=40$). Although most participants ($n=176$) had taught a child on the Autism spectrum before, only 38.3% ($n=80$) had attended Autism-specific training before, with most who had done so teaching in the specialized field ($n=44$) (See Table 1). Most participants did, however, have a bachelor's degree ($n=158$, 75.6%) and 35.8% ($n=75$) had more than 15 years' experience teaching (See Tables 2 and 3). The average age of the eligible participants was 38 years, with ages ranging from 20 years of age to 67.

Table 1

Sample Socio-Demographic Characteristics

	Total Sample ($n=209$)		Mainstream ($n=151$)		Specialized ($n=58$)	
	Freq.	%	Freq.	%	Freq.	%
Male Teachers	2	00.9	1	00.1	1	00.1
Female Teachers	207	99.1	150	99.9	57	99.9
Private/Independent	102	48.8	62	59.0	40	69.0
Public/Government	107	51.2	89	41.0	18	31.0
ASD Experience	176	84.2	118	78.2	58	100
No ASD Experience	33	15.8	33	21.8	0	00.0
ASD Training	80	38.3	36	23.8	44	24.1
No ASD Training	129	61.7	115	76.2	14	75.9

Note: n = Sample Size. Freq = Frequency. Valid cases: 209; cases with missing value(s) = 0.

Table 2
Participants' Educational Attainment

	Total Sample (n=209)		Mainstream (n=151)		Specialized (n=58)	
	Freq.	%	Freq.	%	Freq.	%
Matric Certificate	4	01.9	3	02.0	1	01.7
Teaching Diploma	33	15.8	25	16.5	8	13.8
Bachelor's Degree	158	75.6	117	77.5	41	70.7
Master's Degree	12	05.7	5	03.3	7	12.1
PHD	2	01.0	1	00.7	1	01.7

Note: n = Sample Size. Freq = Frequency. Valid cases: 209; cases with missing value(s) = 0.

Table 3
Participants' Teaching Experience

	Total Sample (n=209)		Mainstream (n=151)		Specialized (n=58)	
	Freq.	%	Freq.	%	Freq.	%
< 3 years	31	14.8	24	15.9	7	12.1
3 - 5 years	39	18.7	25	16.5	14	24.1
6 - 10 years	41	19.6	30	19.9	11	19.0
11- 15 years	23	11.0	17	11.3	6	10.3
> 15 years	75	35.9	55	36.4	20	34.5

Note: n = Sample Size. Freq = Frequency. Valid cases: 209; cases with missing value(s) = 0.

3.5 Data Collection

This research utilised a socio-demographic questionnaire (Appendix A) as well as a novel, self-developed measure, the Autism Spectrum Disorder Knowledge Questionnaire (ASD-KQ) (Appendix B), in order to establish the current state of knowledge on Autism Spectrum Disorders in the foundation-phase educational sector in South Africa.

3.5.1 Socio-Demographic Questionnaire

The socio-demographic questionnaire primarily differentiated between mainstream and specialized foundation-phase teachers in order to determine the eligibility of participants. It additionally consisted of questions particularly focused on inquiry into disorder-specific

experience and training, as these are the factors that were anticipated to impact upon levels of disorder-specific knowledge to the greatest extent. Less specific demographic questions, such as age and gender, were included for descriptive purposes.

3.5.2 Autism Spectrum Disorder Knowledge Questionnaire (ASD-KQ)

The design of the ASD-KQ was based on surveys featured in analogous studies that have met the criteria for “well-established assessments” as defined in a recent international analysis of ASD knowledge assessment measures (Harrison et. al., 2016). In particular, the development of the ASD-KQ took inspiration from the Knowledge about Childhood Autism among Health Workers (KCAHW) Questionnaire (Bakare et al., 2008), an African questionnaire which demonstrated good test-retest reliability and internal consistency (Cronbach's alpha = 0.97). In addition, the KCAHW is recognised as a valuable instrument in “improving the early recognition of autism among affected children in Sub-Saharan Africa and other developing countries where knowledge and awareness about childhood autism is low” (Bakare et al., 2008).

It is for this reason that Hutton, Mitchell and Van der Riet (2016), translated the KCAHW into IsiZulu and utilised it on a sample of educators in Pietermaritzburg to establish a baseline of knowledge of ASD therein. Within their discussion of the possibilities for future research, it was suggested that several adaptations to the questionnaire should be investigated (Hutton et al., 2016). In particular, it was suggested that amendments to the structure (such as a collapse of the domains and inclusion of criteria uncharacteristic of ASD) would improve validity and minimize set response styles. It was also recommended that the questionnaire should be updated to reflect the new DSM-5 criteria for ASD and assess for disorder-specific training and experience (Hutton et al., 2016) – recommendations that were observed during the development of the ASD-KQ.

The ASD-KQ is thus a self-administered, dichotomous true/false questionnaire that consists of 30 statement items measuring knowledge of ASD and spanning the following four content clusters: Aetiology; Social Diagnostic Criteria; Repetitive/Restricted Behavioural Diagnostic Criteria and Diagnostic Specifiers/Particulars. These items reflect disorder-characteristic content from the fifth edition of the Diagnostic and Statistical Manual (DSM-5) as well as disorder-atypical features based on an online article chronicling common myths about the disorder (Autism Speaks, 2012). There are two options per item - true or false - of which only one can be selected and of which only one is correct. Resultantly a maximum total score of 30 and a minimum total score of 0 is possible for this questionnaire, with higher scores indicating increased levels of knowledge on ASD. Specific scoring information for the ASD-KQ is available in Appendix C.

Preceding the commencement of data collection, the ASD-KQ was piloted on a sample of 3 mainstream and 3 specialized teachers who did not form part of the final sample. While participants attested to the relevance of the questions proposed and voiced their satisfaction with the questionnaire's length, a predominant concern expressed during this phase of the ASD-KQ development was that the language used throughout would be inaccessible to mainstream teachers. As such, decisions made as a result of this trial run of the ASD-KQ included simplifying the language used and jargon included in questions 3, 6 and 16 and an explanation of the term *savant abilities* in question 22. At the recommendation of pilot test participant and ASD specialist, Jenna White (Board Certified Autism Technician, Board Certified Behaviour Analyst and member of the Behavioral Intervention Certification Council of America), questions number 28, 29 and 30 were incorporated into the final questionnaire in order to ascertain whether educators are aware of the variability within ASD, the learning potential of children on the spectrum and the mental health and safety considerations associated therein.

3.6 Procedure

At the onset of research, ethical clearance from the Human Research Ethics Committee at the University of the Witwatersrand was obtained (Appendix D) in order to protect the rights of the research participants and to ensure research of the highest possible standards. Hereafter, external piloting of the ASD-KQ was undertaken. This entailed that 6 individuals who were alike but not part of the proposed sample completed the ASD-KQ during a respondent-driven think-aloud interview (Collins, 2003) with some researcher-driven probing (Collins, 2003). This enabled the identification of validity issues as well as comprehension and communication difficulties (Collins, 2003). In addition, the content validity of the ASD-KQ was scrutinized through consultation with Jenna White, a Board Certified Autism Technician, Board Certified Behaviour Analyst and member of the Behavioural Intervention Certification Council of America; an expert on the topic of ASD. The ASD-KQ was subsequently adjusted as necessary.

After the necessary modifications to the ASD-KQ were complete, the recruitment of participants began. The initial purposive sampling process included retrieving comprehensive contact lists for educational institutions under the jurisdictions of the Gauteng, Eastern Cape, Free State, KwaZulu-Natal, Limpopo, Mpumalanga, North West, Northern Cape and Western Cape Departments of Education as well as those administered under the Independent Examinations Board. Once these comprehensive lists had been obtained, the researcher utilised simple random sampling to identify the 300 schools from each province that were contacted, endeavouring to achieve representation from both mainstream and specialized schools within each. The principals of these randomly sampled schools were thereafter communicated with and provided with the link to the web-based survey and questionnaire to distribute accordingly. This ensured the anonymity of participants (Creswell, 2011).

Upon discovering that certain schools had no or limited access to the requisite technology, paper-based forms of both were made available in order to prevent socio-economic bias within the sample (Salkind, 2010). The participation of recruited teachers from within these schools was thereafter voluntary. As the potential biasing effects of volunteer participants are recognised (Rosenthal & Rosnow, 2009; Salkind, 2010), efforts were undertaken to mitigate volunteer bias by utilizing methods intended to increase the degree of volunteering, such as having participation endorsed by each school's principal (Salkind, 2010). Nevertheless, response rates were low and participation in the study was thus extended to include participants recruited through social media self-selection sampling wherein the ASD-KQ and accompanying demographic survey were distributed via specific Facebook groups geared towards education in South Africa.

Two hundred and fifty four (254) volunteers then completed the socio-demographic survey and the ASD-KQ in either web-based or paper-based form. The completion of both took no longer than 15 minutes per person and participants were requested not to consult additional sources nor to leave out any questions – the latter of which was guaranteed when web-based.

3.7 Threats to Validity

Considering that the ASD-KQ is an unmonitored computer assisted survey the possibility exists that participants may have researched their answers as a result of social desirability pressures (Burnett, 2016; Clifford & Jerit, 2017). However, that participants were explicitly instructed not to consult additional sources, that participation was not incentivized and that anonymity was guaranteed are all factors likely to have mitigated the likelihood thereof (Burnett, 2016; Clifford & Jerit, 2017). Furthermore, since on average only 189 in 2000 respondents (9.5%) research the answers to fact-based questions in online questionnaires

without these mitigating factors (Clifford & Jerit, 2017), the impact of doing so on this exploratory study is likely to have been minimal.

3.8 Ethical Considerations

Throughout the development and the procedure of this study, various potential ethical issues were carefully considered. While this research has a low potential for harm in addition to a non-vulnerable sample, guidelines for ethical research were consulted and ethical clearance from the Human Research Ethics Committee (Appendix D) was obtained in order to protect the rights of the research participants and to ensure research of the highest possible standards (Health Professions Council of South Africa, 2008).

Those that did volunteer to participate were provided with a Participant Information Sheet, prior to the commencement of data collection. Outlined in this document was that participation was entirely voluntary; that participants would not be advantaged or disadvantaged in any way for choosing to take part in the research; that participants could withdraw from participation at any time during the procedure without any consequence; that there were no risks or benefits associated with participation; the manner in which the data would be stored and protected; the manner in which anonymity and confidentiality would be ensured; to whom and when the research would be available; that only the researcher and her supervisor would have access to the data collected, as well as the researcher and her supervisor's contact details. This document thus empowered the participants with the necessary information to make an informed decision about their consent to participation. Completion and return of the questionnaire was thereafter considered to indicate permission for the participants' responses to be used for the research project.

Each participant's right to confidentiality and anonymity was additionally respected. Participating teachers were not required to identify themselves at all throughout the questionnaire, which additionally solicited no identifying information and could not be traced back to their identity. Furthermore, no information that might identify the schools was included in the final research thesis and will not be in any other publications or presentations that might arise therefrom. While the results have been compiled and submitted to the University of the Witwatersrand in the form of a research report and may also be presented at local and international conferences and published in a peer reviewed journals, the raw data generated has been securely stored and is only accessible to the researcher and her supervisors.

3.9 Data Analysis

Following the collection of 254 voluntary participants' data, the responses of the 209 eligible participants were computed into the IBM Statistical Package for the Social Sciences (SPSS). Herein, both descriptive and inferential statistics were conducted. In particular, descriptive statistics were utilized to explore the differences in ASD-specific knowledge between mainstream and specialized foundation-phase teachers, and an Independent Samples *t*-Test to compare the mean ASD-KQ scores of both groups. A Stepwise Multiple Regression was utilized to determine the impact of socio-demographic variables, such as disorder-specific training and disorder-specific experience, on levels of ASD-specific knowledge.

3.9.1 Descriptive Statistics

In order to comprehensively address Research Question 1, the differences between mainstream and specialized foundation-phase teachers' understandings of ASD were statistically described and explored.

To do so, the data obtained by the ASD-KQ was summarized by computing mainstream and specialized teachers' minimum, maximum and mean scores for each of the content clusters that comprised the questionnaire. Hereafter, the data within each content cluster was more thoroughly explored, comparing sample and group scores so as to ascertain both within-group and between-group disorder-specific strengths and deficits.

3.9.2 Independent Samples *t*-Test

In order to establish whether there is a statistically significant difference between the levels of ASD-specific knowledge and understanding amongst mainstream and specialized foundation-phase teachers (Research Question 2), the following two hypotheses were considered:

1. $H_0: \mu_1 = \mu_2$ (that the ASD-KQ mean scores for both populations are equal)
2. $H_a: \mu_1 \neq \mu_2$ (that the ASD-KQ mean scores for both populations are not equal)

To do so, an independent samples *t*-test was deemed the most suitable statistical test considering that the dependant variable (ASD-specific knowledge) is continuous in nature and the independent variable (specialized and mainstream teachers) dichotomous. Utilizing the One-Sample Kolmogorov-Smirnov test and Levene's Test for the Equality of Variances, the assumptions of normality and homogeneity of variance were additionally assessed. The Independent Samples *t*-Test, the findings of which are reported in Chapter 4, was two-tailed with the probability of rejecting the null hypothesis when it is true set at $p < 0.05$, ensuring 95% certainty that the observed differences did not occur by chance.

3.9.3 Stepwise Multiple Regression

In order to determine which variables best account for variations in ASD-specific knowledge and understanding amongst mainstream and specialized teachers (Research

Question 3), the relationships between ASD-KQ scores and the following socio-demographic variables were investigated: School Sector (mainstream/specialized), School Type (private/government), Qualification, Gender, Experience (In Years), ASD-Specific Experience and ASD-Specific Training. The ensuing hypotheses were thus considered:

1. H_0 : School Sector, School Type, Qualification, Gender, Experience (In Years), ASD-Specific Experience and ASD-Specific Training do not predict ASD-KQ scores.
2. H_a : School Sector, School Type, Qualification, Gender, Experience (In Years), ASD-Specific Experience and ASD-Specific Training predict ASD-KQ scores

To do so, a multiple regression was deemed the most suitable statistical test considering the nature of the criterion variable of interest (ASD-KQ scores). The following regression equation was used: $Y = a + b_0 + b_1*x_1 + b_2*x_2 + b_3*x_3 + b_4*x_4 + b_5*x_5 + b_6*x_6 + b_7*x_7 + e$, where Y represents the estimated ASD-KQ score, a represents the constant, b represents the regression coefficient, x represents each predictor variable and e the variance not explained by the predictor variables (error). Utilizing the stepwise method, which combines forward entry and backward removal methods, the variables that explain the distribution best were identified and are reported in Chapter 4. The assumptions of linearity, homoscedasticity and multicollinearity were additionally tested for using scatter plots and Variance Inflation Factors.

3.10 Conclusion

In summary, considering the diversity of South Africa as a context and the preliminary nature of ASD research in the region, a non-experimental, exploratory survey design was considered most suitable and valuable. Foundation-phase teachers were subsequently selected as the particular population of interest owing to their unique position in relation to children with ASD and the management of ASD in South Africa. The study thus commenced with the simple random sampling of schools from each province but, due to a meagre 9.8% response

rate, the decision was made to increase the sample size by recruiting participants through social media self-selection sampling. The resultant 209 participants meeting selection criteria then completed the ASD-KQ and its corresponding socio-demographic survey, the data from which was then statistically analysed to explore the differences in ASD-specific knowledge between mainstream and specialized foundation-phase teachers, compare the mean ASD-KQ scores of both groups and determine the impact of socio-demographic variables on levels of ASD-specific knowledge.

CHAPTER 4: RESULTS

4.1 Overview of Chapter

The aim of this research was to determine whether there is a difference between mainstream and specialized teachers when it comes to ASD-specific knowledge and understanding and, if so, to establish which factors affect ASD-specific knowledge and understanding within this population. Both descriptive and inferential statistics were thus utilised to achieve this end.

Descriptive statistics, further to those in Section 3.3, were utilised to explore the differences in ASD-specific knowledge and understanding between mainstream and specialized participants and are presented in Section 4.2. An Independent Samples t-Test, presented hereafter in Section 4.3.2, then statistically compared mainstream and specialized participants on their levels of ASD-specific knowledge and understanding. Finally, a Stepwise Multiple Regression, presented in Section 4.3.2, was utilized to determine the impact of socio-demographic variables, such as disorder-specific training and disorder-specific experience, on levels of ASD-specific knowledge.

4.2 Descriptive Statistics

4.2.1 Autism Spectrum Disorder Knowledge Questionnaire (ASD-KQ) Scores

Consisting of 30 statement items, the ASD-KQ measured autism-specific knowledge across four content clusters (Aetiology; Social Diagnostic Criteria; Repetitive/Restricted Behavioural Diagnostic Criteria and Diagnostic Specifiers/Particulars) and allowed for the comprehensive investigation of ASD-specific knowledge and understanding amongst 209 foundation-phase teachers in South Africa. In order to explore the differences in knowledge

and understanding on the topic between mainstream and specialized teachers, the ASD-KQ scores of both groups were compared (Tables 4 to 8).

Overall, the sample of foundation-phase teachers investigated scored fairly well ($M = 21.7$) and were, on average, familiar with 72% of disorder-typical and -atypical features, best acquainted with the social diagnostic criteria of ASD ($M = 8.2$, 82%), and least knowledgeable about the aetiology of ASD ($M = 2.6$, 52%). However, specialized teachers did score higher overall ($M = 22.3$) than mainstream teachers ($M = 21.6$), as well as when it came to the social diagnostic criteria ($M = 8.5$), diagnostic particulars ($M = 6.2$) and the repetitive and restrictive behaviours characteristic of the disorder ($M = 5.2$). Although both groups lacked familiarity with recent understandings regarding the aetiology of ASD ($M = 2.6$, 52%), mainstream teachers appeared to know a significant amount more on the topic ($M = 2.7$, 54%) than specialized teachers ($M = 2.4$, 48%).

Table 4

*Teachers' Overall Knowledge of ASD **

Content Clusters	Total Sample ($n = 209$)			Mainstream ($n = 151$)			Specialized ($n = 58$)		
	M	Min	Max	M	Min	Max	M	Min	Max
Overall	21.7	15	30	21.6	15	27	22.3	16	30
Aetiology	2.6	1	5	2.7	1	5	2.4	1	5
Social Diagnostic Criteria	8.2	4	10	8.1	4	10	8.5	5	10
Repetitive/Restricted Behaviors	5.0	2	7	4.9	2	7	5.2	3	7
Diagnostic Specifics/ Particulars	6.0	3	8	5.8	3	8	6.2	3	8

Note: *As measured by the ASD-KQ. n = Sample Size. M = Mean. Min = Minimum score attained. Max = Maximum score attained. Maximum Possible Scores: ASD-KQ = 30, Aetiology = 5, Social Diagnostic Criteria = 10, Repetitive/Restricted Behaviors = 7, Diagnostic Specifics/ Particulars = 8.

Within the aetiology content cluster (Table 5), while many participants were knowledgeable that ASD is four times more likely to develop in males ($n = 173$; 83%) and that emotionally distant parents are not linked to the development of ASD ($n = 186$; 89%), most did not know that Foetal-Alcohol Syndrome, low birth weight and the use of Epilepsy

medication during pregnancy have all been linked to the development of ASD. Of those who did know, most were mainstream teachers, with 6% more of the mainstream sample demonstrating awareness of the link between low birth weight and the development of ASD, 13% more demonstrating awareness of the link between Foetal-Alcohol Syndrome and the development of ASD, and 19% more demonstrating awareness of the link between the use of Epilepsy medication during pregnancy and the development of ASD. Nevertheless, although mainstream teachers appeared to know more about the aetiology of the disorder, knowledge on the topic across both groups was still poor.

Table 5

*Teachers' Knowledge of the Aetiology of ASD**

Causes	Total Sample (n=209)			Mainstream (n=151)			Specialized (n=58)		
	True	False	C	True	False	C	True	False	C
Foetal - Alcohol Syndrome	68	141	33%	55	96	36%	13	45	23%
Emotionally Distant Parents	23	186	89%	21	130	86%	2	56	97%
Very Low Birth Weight	53	156	25%	41	110	27%	12	46	21%
Epilepsy Medication	65	144	31%	55	96	36%	10	48	17%
Increased Male Prevalence	173	36	83%	123	28	82%	50	8	86%

Note: *As measured by the ASD-KQ. n = Sample Size. C = Percentage of n who answered correctly.

However, the sample's poor knowledge regarding the aetiology of ASD is contrary to their knowledge of the social diagnostic criteria of ASD ($M = 8.2$, 82%). Both mainstream and specialized foundation phase teachers in South Africa presented as thoroughly knowledgeable on this topic. For instance, most teachers knew that poor conversational skills are a characteristic feature of autism ($n = 184$, 88%), and almost all knew that children with ASD are likely to experience mild speech impairments ($n = 196$, 94%), generally find it difficult to share their emotions ($n = 201$, 96%), struggle to make and maintain eye contact ($n = 204$, 98%), and often do not understand irony, lies and sarcasm ($n = 199$, 95%). The majority also knew that children on the spectrum usually find it difficult to make friends ($n = 196$, 94%) and to initiate

social interactions ($n = 182$, 87%). It appears that the only social diagnostic criteria that the participants were not well-acquainted with were that children on the spectrum generally do not engage in imaginative play and non-verbal communication. Instead, many appeared to think that children on the spectrum tend to communicate non-verbally through the use of facial expressions, gestures and eye contact ($n = 87$, 41%) and that they often play imaginatively ($n = 120$, 57%). However, these misconceptions were much more prevalent amongst mainstream teachers ($n = 70$, 46%; $n = 97$, 64%) than specialized teachers ($n = 17$, 29%; $n = 23$, 40%).

Table 6

*Teachers' Knowledge of ASD Social Diagnostic Criteria**

Features	Total Sample ($n = 209$)			Mainstream ($n = 151$)			Specialized ($n = 58$)		
	True	False	C	True	False	C	True	False	C
Poor Conversational Skills	184	25	88%	132	19	87%	52	6	90%
Mild Speech Impairments	196	13	94%	140	11	93%	56	2	97%
Trouble Sharing Emotion	201	8	96%	146	5	97%	55	3	95%
Inability to Feel Emotion	71	138	66%	53	98	65%	18	40	70%
Initiate Social Interaction	27	182	87%	20	131	87%	7	51	88%
Trouble with Eye -Contact	204	5	98%	147	4	97%	57	1	98%
Imaginative Play Common	120	89	43%	97	54	36%	23	35	60%
Communicate Non-Verbally	87	122	59%	70	81	54%	17	41	71%
Struggle w. Lies & Sarcasm	199	10	95%	144	7	95%	55	3	95%
Make Friends Easily	13	196	94%	10	141	93%	3	55	95%

Note: *As measured by the ASD-KQ. n = Sample Size. C = Answered Correctly.

The sample of foundation-phase teachers investigated also presented as thoroughly knowledgeable when it came to the repetitive and restricted behaviours characteristic of ASD ($M = 5.0$, 71%). Most teachers were aware that 'scripting' lines from movies, television programs, commercials and books is a common behaviour amongst children on the spectrum ($n = 144$, 68%), and almost all knew that changes in routines and schedules are generally difficult for children with ASD ($n = 203$, 97%), that it is common for children with ASD to

responds unusually to sounds, smells, textures and tastes ($n = 173$, 83%) and that children with ASD often have very specific and intense interests ($n = 206$, 99%) and unusual eating habits ($n = 203$, 97%). However, many also thought that violence and aggression are common characteristics of children on the spectrum ($n = 113$, 54%) and that children on the spectrum usually have 'savant' abilities ($n = 164$, 79%). In this case, these misconceptions were similarly widespread amongst mainstream ($n = 83$, 55%; $n = 123$, 81%) and specialized teachers ($n = 30$, 52%; $n = 41$, 70%).

Table 7

*Teachers' Knowledge of ASD Repetitive/Restricted Behaviours**

Features	Total Sample ($n=209$)			Mainstream ($n=151$)			Specialized ($n=58$)		
	True	False	C	True	False	C	True	False	C
Text Scripting Uncommon	65	144	68%	45	106	70%	20	38	66%
Specific, Intense Interests	206	3	99%	148	3	98%	58	0	100%
Violent and Aggressive	113	96	46%	83	68	45%	30	28	48%
Unusual Eating Habits	203	6	97%	145	6	96%	58	0	100%
Distressed by Changes	203	6	97%	145	6	96%	58	0	100%
Sensory Difficulties	173	36	83%	122	29	81%	51	7	88%
Savant Abilities	164	45	21%	123	28	19%	41	17	30%

Note: *As measured by the ASD-KQ. n = Sample Size. C = Answered Correctly.

Despite an adequate understanding of the diagnostic specifiers and particulars of ASD necessitating a more nuanced knowledge of the disorder, the foundation phase teachers in this sample presented as well acquainted with these features ($M = 6.0$, 75%). Almost all knew that the symptoms of ASD usually differ for each child on the spectrum ($n = 198$, 95%), and most knew that the age at which symptoms become obvious can vary depending on the child ($n = 183$, 88%), and that although intellectual disabilities are not comorbid with a diagnosis of autism ($n = 180$, 86%), anxiety and depression are ($n = 180$, 86%). Most were also aware that

children on the spectrum generally require a high amount of support ($n = 185$, 89%). What most of the foundation phase teachers in this sample ($n = 134$, 64%) did not know however, was that the symptoms of ASD must be present in the first few years of a child's development in order to be diagnosable, and many mainstream teachers ($n = 96$, 63%) were under the misimpression that a diagnosis of ASD can be made from communication difficulties alone.

Table 8

*Teachers' Knowledge of ASD Diagnostic Specifiers/Particulars**

Features	Total Sample ($n=209$)			Mainstream ($n=151$)			Specialized ($n=58$)		
	True	False	C	True	False	C	True	False	C
Communication Difficulties Alone	119	90	43%	96	55	37%	23	35	60%
Noticeable Distress Unnecessary	53	156	75%	40	111	74%	13	45	78%
Universal Symptom Presentation	11	198	95%	8	143	95%	3	55	95%
Symptom Discernibility Varies	183	26	88%	130	21	86%	53	5	91%
Comorbid: Intellectual Disability	29	180	86%	20	131	87%	9	49	84%
Comorbid: Anxiety & Depression	180	29	86%	129	22	85%	51	7	88%
Childhood Onset Necessary	75	134	36%	50	101	33%	25	33	43%
Requiring High Support	185	24	89%	137	14	91%	48	10	83%

Note: *As measured by the ASD-KQ. n = Sample Size. C = Answered Correctly.

4.3 Inferential Statistics

4.3.1 Comparison of Mainstream and Specialized Teachers' ASD-KQ Scores

An independent-samples t -test was conducted in order to compare the ASD-KQ scores of mainstream and specialized teachers (see Table 9). Given no violation of Levene's test for equality of variances; $F(1,207) = 0.25$, $p = .619$, a t -test assuming equal variances was calculated. As predicted, the results of this t -test indicate that there is a statistically significant difference in the ASD-KQ scores of specialized teachers ($M = 22.31$, $SD = 2.51$, $n = 58$) and mainstream teachers ($M = 21.57$, $SD = 2.48$, $n = 151$); $t(207) = 2.13$, $p = .034$, two-tailed (see Table 9). The null hypothesis (that the ASD-KQ mean scores for both populations are equal) was thus formally rejected with 95% confidence since $p < .05$. These results suggest that the level of ASD-specific knowledge and understanding that teachers possess really is affected by

whether they are mainstream or specialized teachers. Specifically, the results suggest that, on average, specialized teachers possess higher levels of ASD-specific knowledge and understanding ($M = 22.31$) than mainstream teachers ($M = 21.57$).

Table 9

T-test Results Comparing Mainstream & Specialized teachers' ASD-KQ Scores

School Type	ASD-KQ Score					t-test Results		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>	<i>t</i>	<i>df</i>	<i>p</i>
Specialized	58	22.31	2.51	16	30	2.13	207	.034*
Mainstream	151	21.57	2.48	15	27			

Note: *Significant at the 0.05 level ($p < 0.05$). *n* = Sample Size. *M* = Mean. *SD* = Standard Deviation. *t* = *t*-Value. *df* = Degrees of Freedom. *p* = probability value. A maximum score of 30 and minimum of 0 was possible for the ASD-KQ, with higher scores indicating increased levels of ASD-specific knowledge.

4.3.2 The Impact of Socio-Demographic Variables on ASD-Specific Knowledge

Using the stepwise method entering variables with a probability of $F \leq .050$ and removing those ≥ 1.00 , a multiple regression was conducted to determine which variables most significantly account for variations in ASD-specific knowledge and understanding amongst mainstream and specialized teachers. Given no first order linear auto-correlation ($d = 2.07$), the results of the regression indicated that the three variable model explained 11.7% of the variance therein ($R^2 = .117$) and was a significant predictor of ASD-specific knowledge and understanding; $F(3,205) = 11.01$, $p < .001$. It was found that gender ($\beta = 2.178$, $p < .001$), qualification ($\beta = 1.012$, $p < .001$) and the sector within which participants worked ($\beta = .963$, $p < .001$) significantly predicted their ASD-KQ scores, with female teachers scoring 2.18 points more than male teachers, those in the specialized sector scoring 0.9 more points than those in the mainstream sector and with each additional qualification earned increasing ASD-KQ scores by 1.01 points. The final predictive model was thus: $\text{ASD-KQ score} = 16.030 + 2.178 (\text{Gender})$

+ 1.012 (Qualification) + .963 (Sector), where Gender is coded as 1 = Male, 2 = Female; Sector is coded as 1 = Mainstream, 2 = Specialized; and Qualification is coded as 1 = Matric Certificate, 2 = Teaching Diploma, 3 = Bachelor's Degree, 4 = Master's Degree and 5 = PhD.

Table 10

Summary: Multiple Regression Analysis for Variables Predicting ASD-KQ Scores (n =209)

	Model 1				Model 2				Model 3			
	<i>B</i>	SE <i>B</i>	β	<i>p</i>	<i>B</i>	SE <i>B</i>	β	<i>p</i>	<i>B</i>	SE <i>B</i>	β	<i>p</i>
Qualification	.935	.257	.223	.000*	1.02	.254	.243	.000*	1.01	.250	.241	.000*
Sector					.987	.304	.197	.001*	.963	.300	.192	.001*
Gender									2.18	.765	.169	.005*

Note: *Significant at the 0.05 level ($p < 0.05$). *B* = Unstandardized Beta. SE *B* = Standard Error for *B*. β = Standardized Beta. *p* = probability value.

4.4 Conclusion

In summary, according to the results of the present study, foundation-phase teachers in South Africa are generally above averagely knowledgeable of ASD-typical and -atypical features. However, as hypothesized, specialized teachers proved to still be significantly more knowledgeable in this regard than mainstream teachers. Upon further analysis, in addition to the sector in which participants worked, gender and educational attainment were further variables found to significantly predict higher levels of autism-specific knowledge, with female teachers scoring higher on the ASD-KQ than male teachers and with each additional qualification earned increasing ASD-KQ scores.

CHAPTER 5: DISCUSSION AND CONCLUSION

5.1 Overview of Chapter

This research aimed to establish the current state of knowledge on ASD in the foundation-phase educational sector in South Africa. In order to do so, both mainstream and specialized foundation-phase teachers' understandings of these disorders were explored and compared, and the factors affecting the level of ASD-specific knowledge amongst them investigated. The results thereof, as outlined in Chapter Four, are interpreted and discussed in Sections 5.2, 5.3 and 5.4 of the following chapter in relation to the literature reviewed in Chapter Two. This chapter then deliberates the practical implications of the results in Section 5.5, the strengths and limitations of the study in Section 5.6, recommendations for future research in Section 5.7 and closes with concluding remarks and key takeaway points in Section 5.8.

5.2 Foundation-Phase Teachers' Understandings of Autism Spectrum Disorders

As indicated prior, the first aim of this study was to investigate both mainstream and specialized South African foundation-phase teachers' understandings of Autism Spectrum Disorders. Considering the low levels of knowledge and awareness in South Africa regarding ASD (Bello-Mojee et al., 2014; Malcolm-Smith et al., 2010; Ruparel et al., 2016) and the low levels of autism-specific knowledge revealed of teachers (Al-Sharbati et al., 2015; Arif et al., 2013; Haimour and Obaidat, 2013; Liu et al., 2016) and even disorder-specific professionals (Bakare et al., 2008; Lian et al., 2008; Rhoades et al., 2007; Williams et al., 2011) it was hypothesized that South African foundation-phase teachers would be limited in their knowledge of the disorder. However, the results of this research proved to be inconsistent with

international research, instead indicating that, overall, South African foundation-phase teachers are adequately knowledgeable on the topic.

While Arif and colleagues' analogous study found that primary school teachers in Pakistan averaged only 46% when assessed on their knowledge of ASD (Arif et al., 2013) and Liu and colleagues' study found that 83% of Chinese primary school teachers averaged below 50% when assessed on their knowledge on the topic (Liu et al., 2016), the results of the current study indicated that foundation-phase teachers in South Africa were, on average, familiar with 72% of disorder-typical and -atypical features. This result even unexpectedly positions foundation-phase teachers in South Africa as more knowledgeable than educators in more developed countries such as the United States of America, with participants here having attained only a low to average factual knowledge score when assessed correspondingly (Barned et al., 2011; Williams et al., 2011).

Furthermore, foundation-phase teachers in South Africa proved to be particularly well-acquainted with the various diagnostic criteria and specifiers of ASD. Again, this contrasts with the results of Williams and colleagues' survey of American educators, which emphasized their lack of precise, detailed diagnostic knowledge (Williams et al., 2011). However, it is consistent with and supports the findings of Hutton and colleagues' recent research on the levels of diagnostic-specific knowledge amongst educators in Pietermaritzburg, South Africa. Here participants scored an average of 68/100 on a translated version of the *Knowledge about Childhood Autism among Health Workers* (KCAHW) Questionnaire (Hutton et al., 2016), reiterating that South African foundation-phase teachers are adequately knowledgeable when it comes to ASD.

Although the possibility exists that participants may have researched their answers as a result of social desirability pressures, a more probable explanation for the above-average ASD-specific knowledge levels of foundation-phase teachers in South Africa might instead be the

fact that inclusive education and diverse learning needs have been included as modules in many undergraduate education programmes across the nation. This is as a result of the inclusion policies outlined in Education White Paper 6 (Department of Education, 2001) which stress the necessity of additionally skilled teachers. Independently, this result suggests that foundation-phase teachers in South Africa are adequately equipped to accommodate students on the spectrum.

5.3 Comparing the Knowledge of Mainstream and Specialized Teachers

This study also aimed to establish whether there is statistically significant variance between the understandings of mainstream and specialized foundation-phase teachers on the topic of ASD. Considering that in Saudi Arabia the mainstream teachers surveyed by Haimour and Obaidat (2013) only achieved an average score of 37% on the Autism Knowledge Questionnaire while specialized teachers achieved an average score of 85%, and that in Spain Sanz-Cervera and colleagues (2017) found that special education pre-service teachers were more knowledgeable and held fewer misconceptions than general education pre-service teachers, it was hypothesized that South African specialized foundation-phase teachers would be more knowledgeable of the disorders than mainstream teachers. The results of the present study confirm this hypothesis, with specialized teachers scoring higher overall than mainstream teachers, as well as when it came to the social diagnostic criteria, diagnostic particulars and the repetitive and restrictive behaviours characteristic of the disorder.

Furthermore, in accordance with Haimour and Obaidat (2013) and Sanz-Cervera and colleagues' (2017) research, the present study determined that this difference was statistically significant. Considering this, while it appears that all foundation-phase teachers in South Africa are adequately knowledgeable when it comes to ASD and equipped to accommodate students

on the spectrum, the reality is that, although very near-matched, mainstream teachers in the country are not as knowledgeable and as equipped to do so to as specialized teachers.

5.4 The Impact of Socio-Demographic Variables on Levels of Knowledge

In light of this statistically significant difference, the present study then sought to establish the factors contributing to the varying levels of ASD-specific knowledge amongst foundation-phase teachers in South Africa. Considering the results of analogous research from the United States (Barned et al., 2011; Eisenhower et al., 2015; Johnson et al., 2012), Saudi Arabia (Haimour & Obaidat, 2013), China (Liu et al., 2016) and India (Shetty & Rai, 2014) it was hypothesized that teacher socio-demographic variables such as teaching experience, disorder-specific experience and disorder-specific training would be associated with higher levels of knowledge. Moreover, considering the increasing number of studies attesting to and confirming the association between disorder-specific training and levels of knowledge on autism (Humphrey & Symes, 2013; Johnson et al., 2012; Lian et al., 2008; Liu et al., 2016; Shetty & Rai, 2014), it was hypothesized that disorder-specific training would be the variable that most significantly accounts for, and thus predicts, variations in ASD-specific knowledge and understanding amongst mainstream and specialized teachers.

The results of the present study instead found that gender, educational attainment and the sector within which teachers worked (mainstream/specialized) were most significantly associated with higher levels of ASD-specific knowledge. The results found that being female, within the specialized sector and having earned additional qualifications contributed significantly to higher levels of knowledge, with the latter contributing most significantly. While these results appear inconsistent with preceding research, which found teaching experience, disorder-specific experience and disorder-specific training to be most significantly associated with higher levels of ASD-specific knowledge (Barned et al., 2011; Eisenhower et al., 2015; Haimour & Obaidat, 2013; Humphrey & Symes, 2013; Johnson et al., 2012; Lian et

al., 2008; Liu et al., 2016; Shetty & Rai, 2014), this could perhaps be due to the present study's limited operationalization of disorder-specific training and its small sample of male participants ($n=2$). Such a small sample of male participants might have overexaggerated the predictive power of being female, whereas neglecting to explicitly include into the study's measurement of autism-specific training any in-qualification or supplementary training within which the topic of ASD was incorporated is likely to have resulted in the underestimation of training as a predictor.

5.5 Strengths and Limitations of the Study

While the findings of the present study provide valuable insights into the strengths and deficits of knowledge on ASD amongst South African foundation-phase teachers, as with all studies these findings should be considered in the context of the study's limitations.

The present study provided the first nation-wide exploration of South African foundation-phase teachers' levels of knowledge regarding ASD. Consisting of 209 foundation-phase teachers, the reasonably large sample size allowed for rigorous statistical analysis and permitted the relative generalization of results considering the estimated 108 863 foundation-phase teachers nationwide (Gogtay, 2010). The study also established a statistically and practically significant variance between the levels of ASD-specific knowledge amongst mainstream and specialized foundation-phase teachers in South Africa and provided valuable insight into why this was the case. These results are integral to adequately equipping teachers to effectively adhere to the policies outlined in Education White Paper 6 (Department of Education, 2001) and reveal and highlight a number of practices, such as pre-service and in-service training, that can be improved upon or altered to improve the understanding and management of ASD in South Africa.

However, although the sample was adequately large, it consisted of a very small number of male participants ($n=2$). While this imbalance approximates and is thus representative of the male-to-female ratio of foundation-phase teachers in South Africa, it might have skewed the predictive power of gender in determining which variables best account for variations in ASD-specific knowledge. Furthermore, after the simple random sampling of 300 schools across South Africa yielded only a 9.8% response rate, the decision was made to increase the sample size by recruiting participants through social media self-selection sampling. While this non-probability sampling technique ensured a large enough sample for rigorous statistical analysis and the generalization of results, participants sampled thereby are susceptible to volunteer bias. This suggests that their participation in the study may have been motivated by a vested interest in or familiarity with ASD, which may have subsequently exaggerated the findings of the study.

Furthermore, as discussed in Section 3.6, considering that the ASD-KQ is an unmonitored computer-assisted survey, the possibility exists that participants may have researched their answers as a result of social desirability pressures (Burnett, 2016; Clifford & Jerit, 2017). However, precautions mitigating the likelihood thereof and the small percentage of participants that have done so in empirical research on cheating in online-surveys suggest that the impact of doing so on this exploratory study is expected to have been minimal. Instead, the operationalization of training in the ASD-KQ is likely to have most limited the present study.

In the socio-demographic section of the ASD-KQ, participants were only asked whether they had previously attended autism-specific training (Item H, Appendix A). The operationalization of this question may thus have resulted in participants omitting any in-qualification or supplementary training they might have attended within which the topic of ASD was incorporated. Furthermore, the limited scope of the question did not take into account the fact that, in South Africa, only teachers who have a three- or four-year teaching

qualification and at least two years of teaching experience may enrol for the postgraduate qualifications that will allow them eligibility as special needs educators. This entails that all specialized foundation-phase teachers in South Africa have additional qualifications and have thus also received additional pre-service training on children with special education needs, such as those on the spectrum. Consequently, it is possible that the predictive power of further educational attainment and working within the specialized sector may be instead be better attributed to the training inherent to each.

5.6 Implications of The Results

The primary aim of this research was to ascertain foundation-phase teachers' levels of knowledge regarding ASD in South Africa and thus establish the current state of knowledge on ASD in the foundation-phase educational sector in South Africa.

Accordingly, the first practical implication of the results is that they contribute to the limited pool of research regarding ASD in Sub-Saharan Africa. ASD is so under-researched in South Africa, Africa and other low-income and middle-income regions that at the time of the commencement of this research, no studies were found specifically addressing the incidence or prevalence of ASD in the region (Abubakar, Ssewanyana & Newton, 2016a; Malcolm-Smith et al., 2010). The results of the present study are thus intrinsically important as they provide critical empirical data regarding the current state of knowledge on ASD in in South Africa and answer the prudent call for the advancement of knowledge on the topic in countries rife with the identified risk factors associated with autism, such as South Africa. Furthermore, the results are important given that the only other comparable study, although consistent with the present study's results, consisted solely of Zulu-speaking educators from Pietermaritzburg (Hutton et al., 2016).

In addition to advancing knowledge in the field, another implication of the present study's results is their positive reflection of the foundation-phase teaching curriculum provided by universities across the nation. Having established, by virtue of achieving an average of 72% on the ASD-KQ, that South African foundation-phase teachers possess above-average levels of knowledge regarding ASD, it would appear that - contrary to expectations - these teachers are indeed adequately equipped with the knowledge to effectively include children on the spectrum into their classrooms and to adhere to the policies outlined in Education White Paper 6 (Department of Education, 2001). Judging by how many of the study's participants attest to having taught children on the spectrum ($n=176$, 84.2% - of which only 58 were specialized teachers), it also appears that foundation-phase teachers in South Africa are doing precisely this. Considering that most of the study's participants ($n=129$, 61.7%) had received no prior ASD-specific training, this result serves to applaud the current prioritization of inclusive education in the foundation-phase teaching curriculum provided by universities across the nation and to encourage curriculum planners therein to advocate the continuation thereof.

Perhaps most importantly, a further implication that derives from the results of the present study is the potential for positive social change. Considering their above-average overall scores on the ASD-KQ (72%) and their particularly strong performance on the diagnostic criteria section of the questionnaire (82%), the present study empirically supports the South African Department of Basic Education's expectation that teachers be actively involved in the screening, identification and assessment of learners with special education needs, such as those on the spectrum (Department of Basic Education, 2014). Formalizing this shift in responsibility would be a prudent and efficient use of the available human resources in the region. Not only will this go a long way to improving the rate of diagnosis and intervention in South Africa (Abubakar, Ssewanyana & Newton, 2016b; Bakare & Munir, 2011b), which will have a consequent impact on the establishment of incidence and prevalence rates therein

(Fombonne, 2009), but it will also spare scarce resources so as to allow for their allocation where greater need has been identified.

For example, in light of the wealth of under-utilized, disorder-specific knowledge possessed by foundation phase teachers in South Africa, the allocation of resources towards the development of school-based ASD screening and diagnostic tools would thus be advisable. So too would be the allocation of resources towards building a similar capacity amongst professionals in paediatric units and mental health facilities in Sub-Saharan Africa, who are also expected to be actively involved in the screening, identification and assessment of learners with special education needs (Department of Basic Education, 2014) but appear to lack the knowledge to effectively do so (Bakare & Munir, 2011b; Bello-Mojed et al., 2014).

Considering that the present study identified that additional and specialized educational attainment was most significantly associated with higher levels of ASD-specific knowledge, and that both inherently involve disorder-specific training, the results of the present study further attest to the importance of training in building this very capacity (Humphrey & Symes, 2013; Johnson et al., 2012; Lian et al., 2008; Liu et al., 2016; Shetty & Rai, 2014). Considering too that the present study's mostly-knowledgeable participants lacked familiarity with the aetiology of ASD, and the importance of prevention in countries rife with the identified risk factors associated with autism, this study also serves to advocate that this be an area of specific focus in training on the topic.

5.7 Recommendations for Future Research

Further studies are, however, still a necessity in the under-researched field of ASD in Sub-Saharan Africa. The present study, being exploratory in nature and faced with a number of limitations, provides for a number of opportunities for this.

Firstly, replication of the present study, bearing in mind the following considerations, is recommended so as to increase the reliability and validity of its results. Whilst it is unnecessary to always have equally balanced samples, the markedly small number of male participants in the present study's sample ($n=2$) might have skewed the predictive power of gender in determining which variables best account for variations in ASD-specific knowledge. What the present study could have done to address this, and what future studies looking to replicate these results should do, is conduct a power analysis for male participants in the early stages of research. This would determine the minimum number of male participants necessary for accurate representation and adequate power, and inform the subsequent recruitment thereof. However, was the present study to have strictly randomly sampled participants, the sample would have been intrinsically representative. Thus, it is recommended that future studies looking to replicate these results randomly sample participants. This will not only ensure a representative sample but one significantly less affected by volunteer bias.

Further to this, considering the possibility that participants may have researched their answers as a result of social desirability pressures (Burnett, 2016; Clifford & Jerit, 2017), it is recommended that future studies include a measure of social desirability - such as the Strahan–Gerbas version of the *Marlowe–Crowne Social Desirability Scale* - as well as open-ended, subjective questions requiring more than just one-word answers. The former provides insight into the tendency of participants to engage in socially desirable responding (SDR) and the latter may assist in determining whether answers are being copied from other sources. Armed with this knowledge, researchers can then make an informed decision as to whether to discard the responses of high-scoring participants and those appearing to have researched their answers or to statistically control for them.

Prior to the replication of the present study it is also recommended that the operationalization of training in the socio-demographic section of the ASD-KQ be revised. The

original operationalization thereof only measures autism-specific training, to the omission of any in-qualification or supplementary training that participants might have attended within which the topic of ASD was incorporated. Broadening the measurement to include this, especially considering the likelihood of specialized teachers to have covered children with special education needs in their pre-service training, would increase the accuracy of the measure and its resultant predictive power.

Should future analogous studies still find that training is not a significant predictor of ASD-specific knowledge, it might be worthwhile to investigate where foundation-phase teachers in South Africa have instead acquired this capacity and include these variables in future regression analyses. Such an investigation would be intrinsically worthwhile too, considering that, irregardless of their above-average knowledge of ASD, both groups held a number of misconceptions regarding children on the spectrum, presumably attained elsewhere to formal training. Without knowing from where these misconceptions stem, remedying them will prove a more difficult task.

Finally, it might also be valuable for future studies to compare the knowledge of South African teachers across disorders common to school-going children, such as ADHD, dyslexia and anxiety. The results of these studies could further assist in ensuring that teachers in South Africa are adequately equipped to effectively adhere to the inclusion policies outlined in Education White Paper 6 (Department of Education, 2001) by directing the allocation of resources to where there is the greatest need for capacity building.

5.8 Overall Conclusion

The broader aim of the present study was to establish the current state of knowledge on ASD in the foundation-phase educational sector in South Africa, a country prevalent with the

empirically identified risk factors associated with autism and forming part of the under-researched Sub-Sharan region. To achieve this end, a self-developed measure, the *Autism Spectrum Disorder Knowledge Questionnaire* (ASD-KQ), was utilized to measure participants' levels of knowledge on the topic as well as to determine the amount of variance between mainstream and specialized teachers in this regard and the factors affecting ASD-specific knowledge within this population.

Overall, the 209 foundation-phase teachers investigated scored well and were above-averagely knowledgeable of ASD-typical and -atypical features; an unexpected outcome inconsistent with the results of analogous international research. However, as hypothesized, and in accordance with previous studies having compared the two groups, specialized teachers were discovered to be significantly more knowledgeable than mainstream teachers. Being female, working within the specialized sector and having attained additional qualifications were the variables found to most significantly predict higher levels of autism-specific knowledge. However, the predictive power of the latter two variables was most likely a result of the training inherent to both. It is thus strongly recommended that future studies looking to replicate these results revise the limited operationalization of training in the ASD-KQ.

Nevertheless, these results suggest that foundation-phase teachers in South Africa are adequately equipped to accommodate students on the spectrum as per Education White Paper 6 (Department of Education, 2001). They also serve to applaud the foundation-phase teaching curriculum provided by South African universities and encourage comparable capacity development amongst other professionals who would ideally be actively involved in the screening, identification and assessment of learners with special education needs. In increasing the number of professionals equipped to do so, the burden on an already scarce supply of resources would be lessened and would allow for the prioritization of screening and diagnostic

tool development, preventative education and training, and further research on ASD and other developmental disorders in Sub-Saharan Africa.

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Appendix A

Demographic Questionnaire

a) At which type of school do you teach?

☐ Private/Independent School

☐ Public/Government School

b) In which sector do you teach?

☐ Mainstream Sector

☐ Specialized Sector

c) What is your age? _____

d) What is your gender?

☐ Male

☐ Female

e) What academic qualification do you hold?

☐ Matric Certificate

☐ Diploma

☐ Bachelor's Degree

☐ Master's Degree

☐ PHD

f) How many years teaching experience do you have?

☐ less than 3 years

☐ 3 – 5 years

☐ 6– 10 years

☐ 11 – 15 years

☐ more than 15 years

g) Have you interacted with a child on the Autism Spectrum?

☐ Yes

☐ No

h) Have you attended Autism-specific training before?

☐ Yes

☐ No

Thank you for your participation! Please proceed to the Autism Spectrum Disorders Knowledge Questionnaire.

Appendix B

AUTISM SPECTRUM DISORDERS KNOWLEDGE QUESTIONNAIRE

Instructions:

This questionnaire contains 30 statements about Autism Spectrum Disorders as classified by the Diagnostics and Statistics Manual 5 (DSM-5). Please read each item carefully and mark either the true OR false box with an X. Please do not consult additional sources when completing this questionnaire. Please do answer every item.

1. Foetal-Alcohol Syndrome is linked to the development of Autism Spectrum Disorders
☐ True ☐ False

2. Very low weight at birth is linked to the development of Autism Spectrum Disorders
☐ True ☐ False

3. Emotionally distant or cold parents are linked to the development of Autism Spectrum Disorders
☐ True ☐ False

4. The use of medication for Epilepsy during pregnancy is linked to the development of Autism Spectrum Disorders
☐ True ☐ False

5. Autism Spectrum Disorders are four times more likely to develop in males than females
☐ True ☐ False

6. The inability to continue normal back-and-forth conversation is a common sign of a child with an Autism Spectrum Disorder
☐ True ☐ False

7. Many children with Autism Spectrum Disorders have speech impairments, ranging from a complete lack of speech to overly literal language
☐ True ☐ False

8. Children with Autism Spectrum Disorders generally find it difficult to share their emotions
☐ True ☐ False

9. Children with Autism Spectrum Disorders are often unable to feel emotion at all
☐ True ☐ False

10. Children with Autism Spectrum Disorders frequently initiate social interactions
☐ True ☐ False

11. Children with Autism Spectrum Disorders often struggle to make and maintain eye contact
☐ True ☐ False

12. Imaginative play is common in children with Autism Spectrum Disorders
☐ True ☐ False

13. Children with Autism Spectrum Disorders generally understand and use facial expressions and non-verbal communication well
☐ True ☐ False

14. Children with Autism Spectrum Disorders often do not understand irony, lies and sarcasm
☐ True ☐ False

15. Children with Autism Spectrum Disorders usually find it easy to make friends
☐ True ☐ False

16. Repeating lines from movies, television programs, advertisements and books is an unusual behavior amongst children with Autism Spectrum Disorders
☐ True ☐ False
-
17. Changes in routines and schedules are generally difficult for children with Autism Spectrum Disorders
☐ True ☐ False
-
18. Violence and aggression are common characteristics of children with Autism Spectrum Disorders
☐ True ☐ False
-
19. Children with Autism Spectrum Disorders often have very specific and intense interests
☐ True ☐ False
-
20. It is common for children with Autism Spectrum Disorders to responds unusually to sounds, smells, textures and tastes
☐ True ☐ False
-
21. Abnormal eating habits are common amongst children with Autism Spectrum Disorders
☐ True ☐ False
-
22. Children with Autism Spectrum Disorders usually have 'savant' abilities (i.e. they are outstandingly talented in certain areas such as mathematics, art or music)
☐ True ☐ False
-
23. It is possible for children with Autism Spectrum Disorders to only have difficulties in communication
☐ True ☐ False
-
24. The symptoms of Autism Spectrum Disorders do not have to cause notable negative impacts on the child's day-to-day functioning in order to be diagnosable
☐ True ☐ False
-
25. The symptoms of Autism Spectrum Disorder will usually be the same for each child with the disorder
☐ True ☐ False
-
26. The symptoms of Autism Spectrum Disorders must be present in the first few years of a child's development in order to be diagnosable
☐ True ☐ False
-
27. The age at which the symptoms of Autism Spectrum Disorders become obvious can vary depending on the child and his or her environment
☐ True ☐ False
-
28. Autism Spectrum Disorders and intellectual disabilities always occur together
☐ True ☐ False
-
29. Children with Autism Spectrum Disorders generally require a high amount of support
☐ True ☐ False
-
30. Children and adolescents with Autism Spectrum Disorders are prone to anxiety and depression
☐ True ☐ False
-

Thank you for your participation.

Appendix C

AUTISM SPECTRUM DISORDERS
KNOWLEDGE
QUESTIONNAIRE

Scoring and Content Clusters

Question #:	Cluster:	Score:	
		True	False
1	Aetiology	1	0
2	Aetiology	1	0
3	Aetiology	0	1
4	Aetiology	1	0
5	Aetiology	1	0
6	Social Diagnostic Criteria	1	0
7	Social Diagnostic Criteria	1	0
8	Social Diagnostic Criteria	1	0
9	Social Diagnostic Criteria	0	1
10	Social Diagnostic Criteria	0	1
11	Social Diagnostic Criteria	1	0
12	Social Diagnostic Criteria	0	1
13	Social Diagnostic Criteria	0	1
14	Social Diagnostic Criteria	1	0
15	Social Diagnostic Criteria	0	1
16	Repetitive/Restricted Behavioural Diagnostic Criteria	0	1
17	Repetitive/Restricted Behavioural Diagnostic Criteria	1	0
18	Repetitive/Restricted Behavioural Diagnostic Criteria	0	1
19	Repetitive/Restricted Behavioural Diagnostic Criteria	1	0
20	Repetitive/Restricted Behavioural Diagnostic Criteria	1	0
21	Repetitive/Restricted Behavioural Diagnostic Criteria	1	0
22	Repetitive/Restricted Behavioural Diagnostic Criteria	0	1
23	Diagnostic Specifiers/Particulars	0	1
24	Diagnostic Specifiers/Particulars	0	1
25	Diagnostic Specifiers/Particulars	0	1
26	Diagnostic Specifiers/Particulars	1	0
27	Diagnostic Specifiers/Particulars	1	0
28	Diagnostic Specifiers/Particulars	0	1
29	Diagnostic Specifiers/Particulars	1	0
30	Diagnostic Specifiers/Particulars	1	0

A total score of 30 is achievable. Items left unanswered are scored as zero.

Appendix D

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

HUMAN RESEARCH ETHICS COMMITTEE (SCHOOL OF HUMAN & COMMUNITY DEVELOPMENT)

CLEARANCE CERTIFICATE

PROTOCOL NUMBER: MEDP/17/008 IH

PROJECT TITLE:

Mainstream and Specialized Foundation-Phase Teachers' Understandings of Autism Spectrum Disorders in Johannesburg

**INVESTIGATORS
DEPARTMENT**

Ribeiro Dominique Rosa
Psychology

DATE CONSIDERED

05/06/17

DECISION OF COMMITTEE*

Approved

This ethical clearance is valid for 2 years and may be renewed upon application

DATE: 10 May 2017

CHAIRPERSON
(Prof. Joseph Seabi)



cc Supervisor:

Prof. Joseph Seabi
Psychology

DECLARATION OF INVESTIGATOR (S)

To be completed in duplicate and **one copy** returned to the Secretary, Room 100015, 10th floor, Senate House, University.

I/we fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure be contemplated from the research procedure, as approved, I/we undertake to submit a revised protocol to the Committee.

This ethical clearance will expire on 31 December 2019

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES