An exploration of the relationship between unintegrated primitive reflexes and symptoms of anxiety in children between 10-13 years in the Western Cape province of South Africa

by

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Declaration

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I declare that the above dissertation is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.
I further declare that I submitted the dissertation to originality checking software and that it falls within the accepted requirements for originality.

I further declare that I have not previously submitted this work, or part of it, for examination at Unisa for another qualification or at any other higher education institution.

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Abstract

Anxiety Disorder is one of the most common disorders experienced by children and, if not managed, can extend into adulthood. Research has established a link between unintegrated primitive reflexes (UPR) and Learning Disorders. Learning Disorders are often co-morbid with symptoms of anxiety, however, the relationship between symptoms of anxiety and UPR have not been studied. This study aims to explore the relationship between the UPR and symptoms of anxiety in children between 10 – 13 years of age. No correlation was found between the total primitive reflex score and total symptoms of anxiety score; however, a significant relationship was found between symptoms of anxiety and the Moro, Plantar and Spinal Galant reflex. These UPR play an important role in balance. Research on balance dysfunction indicates a relationship with symptoms of anxiety. Prenatal maternal stress, common childhood illness and comorbidity with ADHD were also found to be factors in symptoms of anxiety in children.

Keywords: anxiety, balance; childhood illness, INPP, maternal stress, Moro reflex, Plantar reflex, primitive reflexes; SCARED; Spinal Galant

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List of Figures and Tables

Abbreviations and acronyms

ADHD	Attention Deficit Hyperactivity Disorder
ANS	Autonomic Nervous System
ASD	Autism Spectrum Disorder
ATNR	Asymmetrical Tonic Neck Reflex
CBT	Cognitive Behavioural Therapy
CNS	Central Nervous System
DSM-5	Diagnostic and Statistical Manual of Mental Disorders (5th Edition)
ELSEN	Learner with Special Educational Needs
GAD	Generalised Anxiety Disorder
HPAC	Hypothalamo-pituitary-adrenocortical
INPP	Institute for Neuro-Physiological Psychology Screening Test for Clinicians and Health Practitioners
ODD	Oppositional Defiant Disorder
SACE	South African Council of Educators
SADAG	South African Depression and Anxiety Group
SCARED	Screen for Child Anxiety Related Disorders (SCARED) - Child version
STNR	Symmetrical Tonic Neck Reflex
TLR	Tonic Labyrinthine Reflex
UPR	Unintegrated Primitive Reflexes

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Chapter 1: Introduction

The components of anxiety, stress, fear and anger do not exist independently of you in the world. They simply do not exist in the physical world, even though we talk about them as if they do.

– Wayne Dyer

Background

Anxiety Disorders are difficult to define because there are a number of disorders associated with anxiety such as Generalised Anxiety Disorder, Social Phobia, Simple Phobia, Panic Disorder, Post-Traumatic Stress Disorder and Obsessive-Compulsive Disorder (Leonardo & Hen, 2008). In addition, anxiety is often a co-morbid disorder to other psychological disorders such as Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorder (ASD), Major Depressive Disorder and Oppositional Defiant Disorder (ODD) (Pliszka, 2000; Dickerson Mayes, et al. 2009).

The researcher noticed many adolescents in an education setting who displayed symptoms of anxiety in environments or contexts, such as school and social interactions. The researcher (within the context of being a primitive reflex assessor) also noticed a trend in learners displaying symptoms of anxiety when they were assessed for the presence of unintegrated primitive reflexes (UPR). It was noted that, when a child was assessed for primitive reflexes and was found to have a number of UPR, there were often reports from the parents about their child displaying symptoms of anxiety. This trend piqued the researcher's interest but upon further investigation it was found that the available literature details the effects that Anxiety Disorders have on adults, but the literature details this to a much lesser extent on children with the same diagnosis. Whilst the symptoms of anxiety on adults and children have been researched, those suffering from the symptoms of anxiety have not been

as thoroughly studied when their symptoms do not warrant a diagnosis of an Anxiety Disorder according to the Diagnostic and Statistical Manual of Mental Disorders (5th Edition) (DSM-5). Given the research on Anxiety Disorders occurring in childhood there is limited research on whether UPR could be related to the symptoms of anxiety and, if such a relationship exists, if there is a primitive reflex profile associated with symptoms of anxiety common in the research age group of 10-13 year-old children. These observations have led the researcher towards the current research which is aimed at investigating the relationship, if any, that exists between the presence of UPR and symptoms of anxiety in children.

Fear, Worry and Anxiety in Children

Childhood and adolescence can be a very challenging time as body and mind go through a number of changes during these developmental phases. When the uneasy feelings associated with these changes are small, and do not impact on a child's normal functioning, an experience of anxiety is not likely. However, some children experience excessive anxiety, worry and fear that impact on normal functioning. Anxiety, worry and fear are normal to a certain degree in all developing children (Mash & Wolfe, 2005). However, when these feelings begin to impact on a child's normal functioning the feelings may be considered as abnormal or clinically significant for a diagnosis of anxiety (Hill, Waite & Creswell, 2016). Anxiety can become maladaptive when the symptoms begin to impact on the normal functioning of an individual (Cooray, 2005). According to DSM-5 (American Psychiatric Association, 2013), the key symptom of any Anxiety Disorder is when an individual presents with, amongst others, an "excessive anxiety and worry about a number of events or activities" and that the worry and anxiety occurs more often than not during the past 6 months (Sadock, Sadock & Ruiz, 2015, p. 407). The feelings associated with the Anxiety Disorder, in terms of intensity, duration and frequency, are disproportionate to the actual likelihood of the

anticipated event occurring. Beesdo, Knappe and Pine (2009) state that differentiating between normal and pathological anxiety in children is extremely difficult as fears and anxieties are part of typical development and that often children of a younger age do not have the language skills to communicate their feelings. Symptoms of Anxiety Disorders in children, according to the DSM-5 classification system (American Psychiatric Association, 2013), include excessive worrying and an inability to control the feeling associated with the worrying, being easily fatigued, irritability and muscle tension. Other symptoms include heart palpitations, sweating, nausea, stomach aches and headaches (2013). In the United Kingdom, it was found that Anxiety Disorders are the most common mental health disorders in adolescents and that the average age of onset is 11 years of age, and that between 9% and 32% of children and teenagers are diagnosed with an Anxiety Disorder during adolescence (Hill et al., 2016). According to the South African Depression and Anxiety Group (SADAG), 8-11% of all children and adolescents (SADAG, n.d) suffer from some form of anxiety and that anxiety is wide-spread in children under the age of 12 (Clark, 2017).

Anxiety

Anxiety is a common human experience which can "manifest itself in physiological, emotional, cognitive and behavioural reactions" (Simon, 2016, p. 200) and is necessary for human functioning. Anxiety may serve a protective function which enhances perception and focus (2016). Physiological anxiety symptoms include nausea, increased breathing and heart rate; emotional reactions including increased fear and worry whilst cognitive manifestations, according to Simon (2016), show self-doubt, an unfounded expectation of failure and behavioural reactions including avoidance, withdrawal and excessive procrastination. Robinson, Vytal, Cornwell and Grillon (2013) reported that when in an anxious state, a person gives a disproportionate amount of attention to the so-called threat they, thus,

negatively affect their ability to concentrate on any information which is irrelevant to the threat. According to Robinson et al. (2013) this protective ability to focus on the threat is likely to have a negative effect on cognitive functions such as memory, information processing and executive functioning skills which include decision making, planning and spatial navigation.

The diagnostic criteria for Anxiety Disorders in children are slightly different to the criteria needed for a diagnosis in adults (American Psychiatric Association, 2013). For an Anxiety Disorder diagnosis in childhood to be made the diagnostic criteria required are often less in duration and intensity. According to DSM-5, Generalised Anxiety Disorder includes excessive anxiety and worry in adults and children and must occur more days than not for a period of 6 months, however, adults must display three of the six listed symptoms such as restlessness, being easily fatigued, difficulty concentrating, irritability, muscle tension and sleep disturbance (2013) whereas children will only need to display one item in order to have a diagnosis considered (2013). The age of the child will also need to be taken into account. Rabner, Mian, Langer, Comer & Pincus (2017) report that at different ages, symptoms of anxiety are seen to be normal for the developmental phase that a child is in. Separation Anxiety symptoms at 1 year of age is deemed as part of normal child development, however, that same response at the age of 7 years is found to be inappropriate and, thus, a possible diagnosis can be made (Rabner et al., 2017).

Worry

Worry is different from anxiety. Worry is where there is no fearful stimulus present, merely thoughts of potential dangers (Muris, Merckelbach, Gadet & Moulaert, 2000). Worry according to Muris (2007) is suggested to be a "cognitive avoidance strategy which inhibits emotional processing" and can be noted as a classic example of anxiety (p. 44). Worry is

reported to be a cognitive process where there is an inability to perceive the event correctly, which exacerbates the feelings of unease in a child in an otherwise non-threatening environment. Worry also tends to be more verbal in nature as it encompasses negative self-talk about a situation and concentrates on the possible negative outcomes of a situation (Eagleson, Hayes, Mathews & Perman, 2016; Mathews, 1990).

Fear

Fear generally occurs when a child is in a situation they consider as dangerous and has a very clearly defined function which is to set the body into an alert state in order to remove the body from harm (Muris et al., 2000; Muris, 2007). This reaction, originally coined as the fight or flight response by Cannon (cited in Bracha, Ralston, Matsukawa, Williams & Bracha, 2004) precisely captures the two behaviours that are evoked during a situation that a person perceives as stressful or fearful. Gray (cited in Bracha et al., 2004) added a third step as the initial reaction – freeze. A further response was later added which was originally known as evoking "tonic immobility" which is today known as fright (Bracha et al., 2004, p. 448). In another article in the same year by Bracha (2004), a fifth response, of fainting, was added to the list of stress responses and are theorised to occur in the following order: Freeze, fight, flight, fright, and faint response. These reactions are governed by the primitive subcortical brain systems which form neural circuits responsible for coordinating movement, learning, memory and motivation and may lead to abnormal responses if the circuits are altered (Hibar, Stein, Renteria, Arias-Vasquez & Desrivières, 2015). The five reactions mentioned by Bracha are governed by the same part of the brain from where primitive reflexes originate, namely the brain stem and limbic system (Bracha, 2004; Muris, 2007). When these neural circuits are immature or incomplete, a child may incorrectly perceive situations which may in turn reinforce the fears leading to anxiety later on in life (Grupe & Nitschke, 2013). Fear is a

normal process and fears change as a child ages, from simple fears such as loud noises and strangers in the first year of life to fears of the dark, bodily injuries and school tests by the time the child reaches the age of twelve years (Mash & Wolfe, 2005). Fears that are developmentally normal are usually outgrown as the child ages and their intellectual ability, maturity and awareness of their environment and psychosocial context changes (McNaughton & Corr, 2004), but when the fears do not diminish with age the resulting anxiety symptoms may be "associated with poor ability to discriminate threat and safety cues/contexts" (Lau & Waters, 2017, p. 394).

Neuroscience and Primitive Reflexes

Neuroscience is a branch of biology in which the structures and functions of the central nervous system (CNS) are studied. Neuroscience, in addition, focuses on the impact that the brain has on behaviour and cognitive functioning as well as the implications of a brain that is not functioning optimally (Tham, Walker, Tan, Low & Chen, 2019). The field of neuroscience includes primitive reflexes in its area of study. Primitive reflexes are unconscious behaviours that occur very briefly, within the first 12 months of life, and which are triggered by an external stimulus (Futagi, Toribe & Suzuki, 2012). These brief and stereotypical movements originate from the spine and brainstem (Ditmar, 2011). Fiorentino (1981) believes that primitive reflexes are necessary for normal development in children as it assists with the sequential development of milestones that need to be reached in all typically developing children. In children where development has been normal, primitive reflexes steadily integrate so that higher levels of functioning can replace the lower order and reflexive movements. The theory on which these levels of functioning is based is Paul MacLean's triune brain theory (1972), and Luria's theory of brain functioning (1966). Primitive reflexes have a limited life span, so that the neurological pathways can be initiated,

developed, completed, and thereafter a more complex neurological pathway can be built on the previous pathway, much like scaffolding. If a reflex is still aberrant the next, more complex neurological pathway cannot be completed, resulting in neuromotor immaturity (Goddard Blythe, 2014).

Neuromotor Immaturity

Research by Sally Goddard Blythe (2012; 2014) has suggested that UPR result in neuromotor immaturity (NI). NI is the term used to describe the signs children or adolescents exhibit when cognitive skills such as comprehension, executive functioning, analytical thinking and cognitive perception are not evoked in a stressful situation and when the reactions are primitive in nature, rather than a controlled and planned movement (Palicka, Klecka & Przybylo, 2016). These primitive reflexes, when not integrated, cause the complex brain functions to be superseded by simpler and primitive functions where thoughts and actions are centred on survival (Goddard Blythe, 2014).

Neuromotor Immaturity and Learning Disorders

When a child is conceived, the embryo goes through a number of stages of development. While still in the embryo phase, the central nervous system (CNS) and the autonomic nervous system (ANS), which consist of the sympathetic and parasympathetic nervous system, begin developing (Slater & Bremner, 2011). During this time primitive reflexes also begin to form neural pathways in the brain. If the forming of neurological pathways does not begin, does not complete development or is completed in the incorrect order, the child will continue to move and respond in a reflexive manner since the child's responses are still under the control of the subcortical brain stem (Hoag, 2015). These reflexive movements are caused by primitive reflexes and are the first step in which neurological pathways in the brain may

begin to develop. In order for the neurological pathways to integrate and be completed, repetition of the primitive reflexes must occur until integration, then only can controlled movement and higher order thinking take over (Zafeiriou, 2004). Primitive reflexes emerge in a specific order, which will be discussed in greater detail in Chapter 2, and are instrumental in assisting infants to reach developmental milestones such as neck control, sitting, standing etc. When these primitive reflexes remain unintegrated, milestones are delayed, achieved in the incorrect order or not achieved and, thus, the child may present as having a barrier to learning (Gieysztor, Choińska & Paprocka-Borowicz, 2018). Research has shown that a strong relationship exists between UPR and Learning Disorders such as ADHD (Bilbilaj, Gjipali & Shkurti, 2017; Taylor, Houghton & Chapman, 2004) and ASD (Chinello, 2016). The CNS is responsible for processing and interpreting information from the brain and the spinal cord whilst the ANS is responsible for two opposing functions, namely the sympathetic system and the parasympathetic system (Autonomic nervous system, 2018). When a child feels anxious and displays symptoms of anxiety such as heart palpitations, shortness of breath, dizziness and becoming emotional, these symptoms stem from the sympathetic nervous system which is related to the fight or flight system, or more recently noted as the fight, flight, fright, freeze or faint reaction and are often associated with anxiety and its symptoms (Bracha, 2004; Fitzgordon, 2018). When symptoms of anxiety are left untreated, children may be unable to concentrate, memorise or learn at school, thus, resulting in an avoidance of social settings like school and sporting events and may in turn have a negative effect on their academic performance, ability to make friends and overall functioning and thus lead to other Psychiatric Disorders later in life (Groenewald, 2013). Research indicates that the earlier in a child's life anxiety is experienced and diagnosed the more likely a child will be to have recurring episodes of anxiety, or co-morbid disorders will appear later in life (Costello, Mustillo, Erkanli, Keeler & Angold, 2003). The following disorders: ADHD, ASD

and Dyslexia, with which anxiety is often found to be co-morbid have also been found to be strongly related to UPR (Berne, 2006; Chinello, 2016; Taylor et al., 2004).

Berne (2006) reported that UPR "can lead to poor eye movements and poor fixation from far to near" (p. 139) which may impact on visual coordination, hand-eye coordination and visual memory. When NI is prominent, a child may display behaviours that present as barriers to learning in a classroom or learning environment (Konicarova & Bob, 2013; Taylor et al., 2004; Zafeiriou, 2004). Learning and developmental disorders such as ADHD, ASD and Dyslexia are disorders where utilising executive functioning, comprehension and perception are found to be difficult (Taylor et al., 2004).

Neuromotor Immaturity and Symptoms of Anxiety

A study by Leonardo and Hen (2008) reports the cause of anxiety as being a developmental disorder since "both trait anxiety and Anxiety Disorders are likely to be determined by early developmental processes or events that affect the way an individual brain is 'wired'" (p. 134) (Kagan & Snidman, 1999; Van Ameringen et al., 1998, as cited in Leonardo & Hen, 2008). A number of brain structures have been implicated in anxiety circuits. The limbic system which includes the amygdala, temporal and prefrontal cortices amongst others, are involved in the stress-hormone response system where the hypothalamo-pituitary-adrenocortical (HPAC) mediates the stress response of anxiety and Mood-Related Disorders (Leonardo & Hen, 2008). The amygdala has been scientifically determined to be the control centre of emotional output of all types and is in part responsible for controlling the ANS output such as heart rate, digestion, pupillary movement and respiration (Hu, Lamers, de Geus & Penninx, 2016; Gray & McNaughton, 2007; Kreibig, 2010). The brainstructures and mechanisms involved in anxiety and fear will be discussed in more detail in Chapter 2.

Studies have revealed that anxiety is often a co-morbid disorder with ADHD, ASD, Major Depressive Disorder and Oppositional Defiant Disorder (ODD) (Pliszka, 2000; Dickerson Mayes et al., 2009). When a child displays trait anxiety and an Anxiety Disorder it is likely to be due to the way in which the brain was developed or 'wired' in the first few years of life (Kagan & Snidman, 1999). Symptoms of anxiety such as an inability to concentrate, muscle tension and an exaggerated startle response are similar to the symptoms a child with NI displays, and vice versa (Goddard Blythe, 2014). This indicates some overlap in the symptoms of anxiety and NI as a result of UPR (Ivanović, Stošović, Medenica & Nikolić, 2018). The symptoms that children display when they show signs of NI are similar in nature to the symptoms of anxiety that children exhibit, namely issues with balance, coordination, visual perception and emotional sensitivity (Goddard Blythe, 2014). There have been few studies where NI has been researched (2014) and a number of research studies on anxiety in children, (Ballas, 2017; Clark, 2017; Hill et al., 2016) however, there is little, if any research on whether a relationship exists between UPR, as presentation of NI, and symptoms of anxiety in children (Goddard Blythe, 2009).

Statement of the Problem

The purpose of the study was to determine whether a relationship exists between UPR and the presence of symptoms of anxiety in children between the ages of 10 and 13 years in the Western Cape Province of South Africa, and if such a relationship does exist, whether these participants share a common primitive reflex profile.

Rationale of the Study

In a study of the available literature it was noted that the relationship between UPR and Learning Disorders, such as ADHD, ASD, sensory processing or integration (which are implicated in hand-eye coordination problems in learners), have been well explored and

accepted (Berne, 2006; Chinello, 2016; Taylor et al., 2004). A literature search on studies on Anxiety Disorder in children are abundant (Ballas, 2017; Clark, 2017; Green & Ben-Sasson, 2010; Hill et al., 2016; Hudson et al., 2015), however, the symptoms of anxiety are seemingly not as well researched. The symptoms of anxiety in this research will be those symptoms that do not fulfil the diagnostic criteria of a full-blown Anxiety Disorder since the researcher is not trained to make a diagnosis, nor was Anxiety Disorder part of the inclusion requirements for the current study. Research on the impact of UPR on the symptoms of Anxiety Disorders in children seem to be a generally understudied concept with Lawrence Beuret merely commenting on the potential relationship between these two factors in a chapter of a book by Goddard Blythe (2009). It is therefore important to close the literature gap on UPR and symptoms on anxiety.

Primitive reflexes, when unintegrated, provide a practitioner with a significant amount of information regarding the maturity of the CNS. According to Goddard Blythe (2009; 2014) when NI is noted the following symptoms are displayed; inability to concentrate, inability to enlist executive functioning skills, inability to sit still, increased heart rate and breathing etc. (Gray & McNaughton, 2007). Whilst these symptoms of NI have been studied to determine their contribution to Learning Disorders, their contribution to Emotional Disorders such as symptoms of anxiety have not been studied.

The current research has led to a starting point concerning how symptoms of Anxiety Disorder in children can be addressed using primitive reflex integration therapy. This is helpful in the South African context as educators can be taught simple techniques in order to assess primitive reflexes and provide a reflex integration plan for the parents or guardians to complete at home. The educator will not need to be HPCSA registered in order to assist learners with integrating the UPR and consequently managing their symptoms of anxiety.

Childhood Anxiety in South Africa

In South Africa, learner support is a big part of schooling in both primary and high school, however, more emphasis is placed on the learner support in primary schools as primary schools have a teacher who is in a dedicated learning support position at each school. The person in this position is known as an ELSEN (Learner with Special Educational Needs) teacher or educator, (Western Cape Government, 2017) and is primarily involved in supporting learners with their academic needs, but is not qualified or registered with the Health Professional Council of South Africa (HPCSA) to assist with Emotional Disorders such as anxiety. In an article, in which learners' experiences of learning support in the Western Cape Province of South Africa (Bojuwoye, Moletsane, Stofile, Moolla & Sylvester, 2014) was explored, it was found that primary school learners reported "major sources of support as teachers and peers" (p.10). Therefore it can be concluded that during these years of schooling, children turn to teachers for support for their well-being, but if a teacher is not trained to assist children with anxiety, the child may not seek assistance elsewhere.

Mental health care on the other hand, is less readily available to both primary and high school learners. Flisher et al. (2012) reported that in the Western Cape of South Africa, the ratio of mental health practitioners to children is 1:34 702. More recent statistics from the World Health Organisation (2004) (as cited in De Kock & Pillay, 2017, p. 3) reported that the ratio of "South African psychiatrists to 100 000 population … is less than 0.5:100 000 and local and international studies suggest that this ratio is closer to 0,28:100 000". It was also noted that the majority of these mental health specialists work in urban areas and that the ratio of those in rural areas is significantly more concerning. The problems associated with symptoms of anxiety and Anxiety Disorder are more far reaching than just the symptoms mentioned above. Children who have had Anxiety Disorders that remain untreated often become adults with a diagnosis of an Anxiety Disorder (Ramsawh, Chavira & Stein, 2010).

According to an article by the South African Depression and Anxiety Group (SADAG), adults with Anxiety Disorders take 28 days off work per year due to the inability to deal with their disorder (Bateman, 2015) and as many as one in six South Africans suffer from anxiety, depression or substance abuse problems (SACAP, 2018). If the absentee rate of adults is applicable to children and adolescents, then Anxiety Disorders can have a great impact on a child's academic achievement due to their absence from the classroom. When these children are unable to attend school due to the intensity of the anxiety symptoms some of which may manifest as somatic symptoms (Hill et al., 2016), these symptoms may be magnified even more upon their return to school later. The workload with which they must catch up may seem overwhelming. Essau, Lewinsohn, Olaya and Seeley (2014) and Jaycox et al., (2009) both cited in Lau and Waters (2017) reports that not only will the anxiety symptoms negatively impact on the scholastic achievement of the child but may also have a undesirable effect on the child's socialisation and quality of life.

Purpose of the Study

Children who experience symptoms of anxiety often do not seek treatment for their symptoms, firstly, because of their age and inability to recognise and verbalise what they are feeling (De Kock & Pillay, 2017). A second reason is that treatment for mental health is often inaccessible and when accessible, is usually financially inaccessible to a large percentage of South Africans, as the cost of mental health care is expensive in private practice and difficult to obtain from provincial hospitals (De Kock & Pillay, 2017; Flisher et al. 2012). Treatment for anxiety usually involves Cognitive Behavioural Therapy (CBT), anxiolytic (anti-anxiety) medication or a combination of both which are often difficult to access with 60% of South Africa's mental health practitioners working in private practice (De Kock & Pillay, 2017). Another reason, is that people are often uneducated on mental health

issues and have a “low perceived need” for mental healthcare “and are those participants who did not think they needed help or thought they needed help for less than 4 weeks” (Andrade, Alonso, Mneimneh & Wells, 2014, p. 6). According to Andrade et al. (2014) a low perceived need was reported as a common reason for not accessing mental health care in the population who displayed moderate to mild symptoms of Mental Disorders and are also not likely to access inpatient or outpatient treatment (Andrade et al., 2014, p. 6).

Research shows that CBT is effective in assisting adults and children to deal with their anxieties (Warwick, et al., 2017), however the process is costly and time-consuming (Hudson et al., 2015). Medication, although effective, is costly and adherence to medication is often not followed through, rendering this method ineffective in some cases (Taljaard, 2016). When CBT and medication, if strictly adhered to, do not prove to be successful as a treatment plan then an alternative approach needs to be considered (Goddard Blythe, 2014). If the cause of the symptoms of anxiety are misdiagnosed, the treatment will be incorrect and potentially ineffective and so other treatment or management programmes must be considered. The purpose then of this research is to determine if a relationship exists between UPR and symptoms of anxiety so that an alternative to the common treatment methods can be investigated, such as primitive reflex integration.

Research objectives

The objectives of the current study have been identified:

- Conduct an intake interview of the parent participant in order to gain a general understanding of the child and parent participant.
- Assess the extent of each of the 20 child participants’ primitive reflexes using *The Institute for Neuro-Physiological Psychology Screening Test for Clinicians and Health Practitioners* (INPP) (Goddard Blythe, 2012).
- Screen each of the child participants for symptoms of anxiety using the *Screen*

for Child Anxiety Related Disorders (SCARED) Child version questionnaire (Birmaher, 2012).

- Use the intake interview to inform the qualitative semi-structured interview of the parent participants to determine the child and parent participants' history.
- Determine if a causal relationship exists between the INPP and SCARED scores.
- Identify and discuss the variables that may contribute to the presence of symptoms of anxiety in the child participants.
- Evaluate the INPP scores to determine whether a primitive reflex profile exists in children with symptoms of anxiety.

Description of the Study

The current research aims to explore the relationship between UPR and symptoms of Anxiety Disorder in children between 10 and 13 years of age. The research design employed for this study was a convergent parallel, mixed methods design (Creswell & Plano Clark, 2017). A convergent parallel design concurrently conducts both quantitative and qualitative data collection and places equal emphasis on both data strands. Both the quantitative and qualitative data are analysed independently and merged at the end to interpret the results (Creswell & Plano Clark, 2017; Creswell, 2014). In this research the first part involved collecting data by means of an intake interview, followed by a primitive reflex assessment by *The Institute for Neuro-Physiological Psychology Screening Test for Clinicians and Health Practitioners* (INPP) (Goddard Blythe, 2012) and the anxiety scores using the *Screen for Child Anxiety Related Disorders (SCARED) Child version* questionnaire (Birmaher, 2012). Following that, the qualitative parent interview was conducted and analysed. The research involved learners between the ages of 10 and 13 years as this age group is mostly presented in the researcher's practice of primitive reflex assessment of children. Coupled with it being

convenient to obtain a sample, during these ages the children are able to understand the language used in the SCARED questionnaire (Birmaher, et al., 2018).

The researcher in her capacity as both researcher and primitive reflex assessor conducted the data collection for the current study. This was what the researcher was qualified to perform in her scope as a primitive reflex assessor in practice. In training to become a primitive reflex assessor, the researcher had to attend a number of training sessions, conduct practical training as a student primitive reflex assessor and compile a portfolio of evidence for review before qualifying as a primitive reflex assessor. The researcher worked according to policies and procedures as set out in the contract with the training institute with which she worked. All protocols of the training institute were followed for every session to ensure consistency and high standards of service.

The current research sample was collected using two types of sampling, namely convenience and purposive sampling. Firstly, parents would contact the researcher to enquire about a primitive reflex assessment. If the child was between 10 and 13 years of age, the researcher enquired about whether they would like to be a part of the current research. The second way in which the sample was obtained was by advertising on the researcher's practice Facebook page (Addendum F). When the participants arrived at the venue at which the data would be collected, the researcher would conduct an explanation of the study to the parent and child participant and request they sign the informed consent form (ICF) if they were willing to participate in the study. Next, the intake interview was conducted, and the child participants' primitive reflexes were then assessed using the INPP assessment programme (Goddard Blythe, 2012). Each learner was assessed using the INPP programme where eight primitive reflexes were assessed, namely: Moro Reflex, Asymmetrical Tonic Neck Reflex (ATNR), Symmetrical Tonic Neck Reflex and Tonic Labyrinthine Reflex (TLR), Rooting and Sucking Reflex, Palmar and Plantar and Spinal Galant Reflexes. These reflexes and their

reasons for inclusion in the research will be elaborated on in Chapter 2. Thereafter the child participant was asked to answer all 41 questions from the SCARED questionnaire (Addendum B) (Birmaher et al., 2018). Additionally, a semi-structured interview was conducted with each child participant's parent or guardian after the child participant's INPP assessment and SCARED questionnaire were completed. The qualitative interview (Addendum C) focussed on pre-natal factors, post-natal factors, personality, health and development of the child participant. These specific themes were based on previous research searches on the causes of anxiety in children (Miserandino & Porter, 2015; Pearson, 2009; Wong & Fong, 2015). The interviews were then transcribed and coded. After coding, the codes were placed under suitable headings to determine which themes emerged from the interviews (Tesch, 1990). This was done to investigate the relationship between the child participant's UPR score and anxiety score and other contextual factors that may have played a role in the anxiety scores and the primitive reflex profile of the child participant.

This research aimed to investigate whether a relationship exists between UPR and symptoms of anxiety, and if so to describe the nature of the relationship by determining whether a distinctive primitive reflex profile (PRP) exists for children with symptoms of anxiety.

Research Questions

In order for the relationship between UPR and symptoms of anxiety to be studied a number of quantitative and qualitative research questions were used to guide the study. They are listed below:

Quantitative Questions

- Is there a correlation between the UPR scores, as measured by the *INPP Screening Test for Clinicians and Health Practitioners* (INPP) (Goddard Blythe, 2012) and

anxiety questionnaire scores, as measured by the *Screen for Child Anxiety Related Disorders (SCARED) Child version* questionnaire (Birmaher, 2012)?

- Is there a correlation between the UPR scores and the presence of symptoms which may indicate symptoms of Panic Disorder?
- Is there a correlation between the UPR scores and the presence of symptoms which may indicate symptoms of Generalised Anxiety Disorder?
- Is there a correlation between the UPR scores and the presence of symptoms which may indicate symptoms of Separation Anxiety Disorder?
- Is there a correlation between the UPR scores and the presence of symptoms which may indicate symptoms of Social Anxiety Disorder?
- Is there a correlation between the UPR scores and the presence of symptoms which may indicate symptoms of significant school avoidance?

- Is there a specific primitive reflex profile in children who score high (greater than 25) on the SCARED scale?

Qualitative Questions

- What pre-natal factors are associated with symptoms of anxiety in children between the ages of 10-13 years who demonstrate the presence of UPR?
- What post-natal factors are associated with symptoms of anxiety in children between the ages of 10-13 years who demonstrate the presence of UPR?

The quantitative data were analysed by populating a Microsoft Excel (2013) spreadsheet from the collected raw data. The mean, median and standard deviation of the data were calculated using the functions available on Microsoft Excel. The relationship between the two quantitative scores were investigated using the Pearson's correlation function and linear regression on Excel. Microsoft Word was used with the Tesch principle (1990) to code the

qualitative data. Codes formed themes which were later triangulated with the quantitative data to draw conclusions about the current study's findings.

Ethical Considerations

Ethical clearance was gained by the Ethics Committee of The University of South Africa (UNISA) on 9 February 2018, with the ethical clearance reference PERC-17084. The Ethical Clearance Form is found in Addendum D. This research followed the principles of ethic research by adhering to the University of South Africa's policy on research ethics (University of South Africa, 2007). The following principles guide the ethical considerations of this study. Autonomy, beneficence, non-maleficence, justice, informed consent and confidentiality. These principles will be discussed in greater detail in Chapter 3.

Conclusion

Chapter 1 introduced and outlined the current research in terms of the distinguishing characteristics between anxiety, worry and fear whilst also defining the primitive reflexes and neuromotor immaturity. In Chapter 1, the purpose of the study and its research questions were also outlined. The primitive reflexes relevant to this study were briefly introduced by discussing how these UPR contribute to NI. This chapter also noted the difference between worry, fear and anxiety and how NI often shares the same symptoms as anxiety. Thereafter the background, purpose and description of the study was discussed and the research questions for both quantitative and qualitative data were set, followed finally by a brief summary of the ethical considerations for the study.

Chapter 2 begins with a literature review of the primitive reflexes applicable to the current study, expands on the impact of UPR in children and explores other possible factors which may contribute to symptoms of anxiety in children. Thereafter, causes and theories of

anxiety are discussed and, lastly, symptoms and the management of anxiety are also discussed. Chapter 3 elaborates on the research process used for the current study and discusses the research instruments, assessment procedures, data analysis and finally ethical considerations of this research. Chapter 4 presents the results of the qualitative and quantitative data and triangulates this, whilst Chapter 5 discusses the results of Chapter 4 in order to draw conclusions about the outcome of the investigation and presents the limitations and recommendations for further study.

Chapter 2: Literature Review

This chapter consists of three broad sections. The first section provides an overview of primitive reflexes with a discussion on each primitive reflex included in this study. Thereafter the implications of unintegrated primitive reflexes on a child's behaviour and brain development will be discussed. The next section discusses Anxiety Disorders including the causes, incidence, symptoms, diagnosis and current theories on managing anxiety. Finally, the implications of unintegrated primitive reflexes (UPR) in terms of Learning Disorders and Emotional Disorders will be discussed with a focus on anxiety symptoms.

Primitive Reflexes

In 1855, Herbert Spencer developed a theory about the human Central Nervous System (CNS) which he believed followed the principle of evolution, namely the development from simple structures with homogenous movements to more complex and stratified heterogeneous movements and thoughts (Wiest, 2012). Wiest goes on to state the "pure instinctual behaviour" in humans can only be witnessed in early infancy when a child's primitive reflexes are all still unintegrated (Wiest, 2012). Fiorentino (1981) states that primitive reflexes are necessary for normal development in children as it assists with sequential developmental milestones that need to be reached such as rolling, sitting, crawling and walking. In children where development has been normal, the primitive reflexes steadily integrate so that higher levels of functioning can replace the lower order and reflexive movements (Fiorentino, 1981; Wiest, 2012). Primitive reflexes have been described as automatic and uncontrolled movement with which all healthy infants are born and their purpose is to assist in the birthing process and survival, in addition to intiating neural circuits for specific functions (Berne, 2006; Gieysztor et al., 2018; Goddard Blythe, 2012; 2014).

Primitive reflexes have a limited life span. Once the neurological wiring for a specific function has been completed and integrated a more complex neurological pathway can be built upon the established neural circuit (Grigg, Fox-Turnbull & Culpan, 2018). If the primitive reflex integration process has been interrupted, the brain's maturation processes may be disturbed making the brain less likely to properly process all sensory information from the environment (Chinello, 2016). If a reflex is not integrated the next, more complex neurological wiring cannot be completed resulting in neuromotor immaturity (NI) (Chinello, Di Gangi & Valenza, 2018; Goddard Blythe, 2012). Goddard Blythe (2009, p.139) states that "practice and repetition of movement patterns result in them being absorbed into the individual's repertoire of skills" thus suggesting that skilled and controlled movement can only take place once there has been enough repetition through reflexive movement by primitive reflexes. This process is known as primitive reflex integration and occurs only once sufficient repetitions have taken place. The functions of the primitive reflexes are to facilitate movement in an infant in order for milestones to be met, which conclude with a child having the ability to be stable and to balance well on two feet, have visual coordination and visual memory to name a few such milestones (Berne, 2006; Goddard Blythe, 2005).

Bender (1976) mentions that reflexive bodily movements supply the brain with valuable information about the environment and once these primitive patterns of movement become integrated the child can move away from a reflexive stage of learning where the child has little to no control over their limbs and actions. When a child uses reflexive movement, which is governed by the brain stem, it is believed to be due to UPR (Bender, 1976; Fiorentino, 1981; Gieysztor et al., 2018). Goddard Blythe (2012) describes this condition as NI which is defined as the maintenance of immature reflexive movements. NI is noted when primitive reflexes are observed after specific ages in the developmental stages, which makes it difficult for the CNS to mature and function optimally (Chinello et al., 2018). UPR are also

a strong predictor of emotional and cognitive issues later in a child's life (Story, 2018). Each of the primitive reflexes included in this study were included as the assessment tools are readily available in books written by Mary Fiorentino and Sally Goddard Blythe (Fiorentino, 1981; Goddard Blythe, 2015). These primitive reflexes will be discussed in detail below.

Moro Reflex

The Moro Reflex is an involuntary response that originates during the gestation period in utero and should be present at birth (Jaiswal & Morankar, 2017). The reflexive response is characterised by an infant flinging out their arms away from their body while taking a big gasp of air. The baby will freeze momentarily before bringing the arms and legs back towards the body, this action is commonly seen in combination with a cry from the baby (Berne, 2006; Goddard Blythe, 2005). The reflex is a reaction to a threat and thus elicits the stress response originally known as the fight or flight response (Goddard Blythe, 2005), but, as noted in chapter one, is more recently referred to as the fright, fight, flight, freeze and faint response (Bracha, 2004). The Moro Reflex is the main assessor of a potentially threatening situation and, should the Moro Reflex remain unintegrated, the body may be overly sensitive to stress and symptoms thereof (Erez, Gordon, Sever, Sadeh & Mintz, 2004). The Moro Reflex also assists in the development of the vestibular system, which is a key component in balance (Erez et al., 2004). If the Moro Reflex remains unintegrated, the vestibular system, which is found in the inner ear, remains under stimulated. This may also impact on, amongst other functions, the child's ability to balance (Berne, 2006). Balance is the ability to maintain postural control during a range of activities, postural control is the "act of maintaining, achieving or restoring the line of gravity within the base of support" (Pollock, Durward, Rowe & Paul, 2000, p. 404). Additionally, Berne (2006) suggests that when a child has an unintegrated Moro Reflex, the child remains in stress mode which depletes the body of

energy, can cause fatigue and may impact on the immune system of the child. Research has also noted that symptoms of an unintegrated Moro Reflex involve generalized anxiety, "vestibular related problems such as motion sickness, poor balance and coordination" (Goddard Blythe, 2005, p. 32). The Moro Reflex is the first of the primitive reflexes to initiate and is known as the gateway for other reflexes such as the Tonic Labyrinthine Reflex, Asymmetrical Tonic Neck Reflex and Symmetrical Tonic Neck Reflex to initiate (Taylor et al., 2004).

Tonic Labyrinthine Reflex (TLR)

This reflex is usually fully integrated by four months of life and is essential for vestibular stimulation (Adams & Craft, 2014). When this is stimulated in an infant the baby will straighten its arms and legs if the head is lowered below the level of the spine, conversely when the head is moved above the level of the spine the arms and legs curl in towards the body (Berne, 2006, Goddard Blythe, 2005; 2009; 2012). This movement is essential so that the child can react to the pull of gravity and can gain control of its head and posture and essentially gain muscle tone (Goddard Blythe 2014). If this reflex remains unintegrated it may result in poor balance, low muscle tone and poor control of eye movements (Berne, 2006). This poor control over eye movements may lead to problems with information processing later in the child's life (Adams & Craft, 2014). The symptoms of a child with an unintegrated TLR are similar to those in children who present with Attention Deficit Hyperactivity Disorder (ADHD), of which anxiety is often a co-morbid disorder (Taylor et al., 2004).

Asymmetrical Tonic Neck Reflex (ATNR)

The ATNR affects the limbs on either side of the body differently. This emerges at about 18 weeks in utero and assists with the natural birthing process by allowing the baby to twist its way down the birth canal (Gieysztor et al., 2018). This happens as the infant turns its head to one side, while the arm and leg on the same side extend, and the opposite limbs bend towards the body (Adams & Craft, 2014; Berne, 2006; Goddard Blythe, 2014). When an ATNR does not integrate it may impact on the development of balance and muscle control (Goddard, 2014). Berne (2006) reports that an unintegrated ATNR from insufficient stereotypical movements in utero can have an impact on the development of the vestibular system and ultimately balance. Bruijn et al. (2013) report that the ATNR is commonly present in healthy adults, but when unintegrated in combination with other primitive reflexes can have a great impact on the individual's functioning. Goddard Blythe (2012) echoed Bruijn's conclusion, however, adding that the unintegrated ATNR together with other UPR may lead to poor eye control and may hinder reading progress in children. Collections of primitive reflexes that remain unintegrated may have an impact on a range of daily functions including the "development of oculo-motor skills, which in turn can impact on visual processing" (Payard, 2013, p. 4). Visual processing is the ability to make sense of information input through the eyes, and when incorrectly processed may increase anxiety in children and adults (Weierich, Treat & Hollingworth, 2008).

Symmetrical Tonic Neck Reflex (STNR)

The STNR is a different kind of reflex in that it emerges immediately after birth, disappears and re-emerges at approximately 6 to 9 months and integrates on average between 9-11 months of age (Gieysztor et al., 2018; Goddard Blythe, 2005). This reflex causes the body to move in two separate halves, the upper and lower body, where these two halves work in

opposing directions (Berne, 2006; Goddard Blythe, 2005; 2012). If this reflex remains unintegrated the movement of the body in opposite directions can hinder balance, posture and concentration (Berne, 2006). The STNR according to Berne (2006) is also essential for the development of the vestibular system, proprioception and integration of the visual system.

Spinal Galant Reflex

This primitive reflex emerges at approximately 20 weeks during gestation and facilitates the movement down the birth canal as the contractions push against the lumbar region of the spine, the reflexive movement causes the hip to pull away from the stimulation (Goddard Blythe, 2005). The Spinal Galant when not integrated, has a detrimental effect on posture and may impede upright movement, and when active long past the expected time of nine months may contribute to an inability to sit still as well as prolonged bed wetting (over 5 years old). Berne (2006) states that the presence of an unintegrated Spinal Galant Reflex uses an excessive amount of energy in an attempt to control the reflexive movement and thus less energy is available for the higher parts of the brain to complete high order functions.

Rooting and Sucking Reflex

This reflex emerges during gestation at about 24 to 28 weeks and should begin to fade at around 3 months in life once a child learns to use visual cues of food and not tactile cues, such as the reflex to begin drinking (Goddard Blythe, 2005). The Rooting and Sucking Reflex assists in the development of the tongue and lips for speech and if retained may result in a constant need for oral stimulation, such as the eating of food or sucking and chewing on objects (Berne, 2006). Once the Rooting and Sucking Reflex integrates, cortical control over the brainstem emerges which indicates that controlled movement has been mastered (Willing & Wagner, 2013). If the Rooting and Sucking Reflex does not integrate, the child may have

poor articulation from a lack of control of the mouth, prolonged thumb sucking and hypersensitivity of the mouth region (Barrett et al., 2016). Research suggests that children who frequently suck their thumbs or fingers do so when they are stressed, anxious or nervous (Hatala, 2017). Ferante's research (2015) confirmed that anxious individuals who suck their thumbs do so to release tension, both psychological and physical. This is often referred to as self-soothing (Jaiswal & Morankar, 2017).

Palmar Reflex and Plantar Reflex

The Palmar and Plantar Reflexes are grouped together because they are similar in function, however, the Palmar Reflex is concerned with the development of the hands while the Plantar Reflex is responsible for the development of the feet (Futagi & Suzuki, 2010). Both are grasping reflexes since they attempt to grasp when stimulated. The hands, when stimulated, will curl the fingers inwards in an attempt to hold that which stimulates it. The palmar grasp maintains that all five fingers move together leaving little room for more advanced grips (Goddard Blythe, 2005). The Plantar Reflex of the feet emerge almost at the same time as the Palmar Reflex but remains unintegrated for a much longer time, up to nine months after birth. This reflex needs to integrate in order for the baby to be able to crawl and eventually stand. With an unstable base, of feet with curled toes, balance will decline (Goddard Blythe, 2005).

Implications of Unintegrated Primitive Reflexes on Children

Every normally developing foetus born to term has a full set of primitive reflexes available to him/her. These primitive reflexes are survival mechanisms in that they allow the baby reflexive bodily movements to assist in survival until controlled movements can supersede the reflexive movements at a later age (Goddard Blythe, 2009). Primitive reflexes are

typical, automated and involuntary movements that are controlled by the lower brain levels, namely the Reptilian brain, within the first years of life, and are responsible for sensorimotor "wiring" which are neural pathways in the brain (Holscher, 2014; Masgutova, 2018). The neural pathways have the function of connecting the senses, brain and muscles in order to enable optimal functioning of the brain (Berne, 2006). A literature search on UPR shows that numerous studies have been conducted on UPR and learning difficulties or disorders and that this relationship has been accepted into research (Goddard Blythe, 2002; Masgutova, 2018, Taylor et al., 2004). The next section briefly reports on the studies that linked UPR and Learning Disorders, and notes which of these learning difficulites or disorders share some common symptoms with anxiety or are co-morbid with Anxiety Disorder.

In a study by Taylor et al. (2004), 109 boys between 7 – 10 years of age, were included in a study to determine the relationship between UPR of the Moro, TLR, ATNR and STNR and ADHD. Of the 109 boys, 54 were diagnosed with ADHD, 34 boys showed some symptoms of ADHD and 21 boys showed no symptoms of ADHD. All boys were drawn from the same district and grade in Perth, Australia. The study was conducted by asking parents of both groups to complete the *Conners' Parent Rating Scale – Revised* in order to confirm the ADHD diagnostic groups. The boys were all requested to complete the *Wide Range Achievement Test – Third Edition* to measure academic achievement. Thereafter the *INPP Reflex Assessment* was completed. The results of this study showed that there was a significant positive relationship between the degree of ADHD classification and UPR at the ATNR, STNR and TLR level with the Moro Reflex being reported as not having any significant relationship with either ADHD classification. The results did however indicate that the Moro Reflex acts as a "gateway for the integration of other reflexes" (Taylor et al., 2004, p. 35) as the Moro Reflex emerges and should integrate before the other reflexes begin to emerge (Masgutova, 2018). This may be due to the fact that the Moro Reflex needs to

inhibit for the successive reflexes to inhibit completely. Limitations of this study were that only boys were included in the study. The sample, although fairly large is from only one school in one district in Australia, therefore the ability to generalise to the population is not possible.

In a Czech study by Konicarova and Bob (2012) of UPR, specifically of the Moro and Spinal Galant Reflexes, the relationship with ADHD was investigated. The sample consisted of 20 children (10 boys and 10 girls) between 8-11 years of age with an ADHD diagnosis and was matched by a sample of 20 children (10 boys and 10 girls), without a diagnosis of ADHD. The Moro and Spinal Galant Reflexes were assessed using the INPP test (Goddard Blythe, 2015). The resuls showed that there is a close relationship between the UPR of the Moro and Spinal Galant Reflex and ADHD scores (Konicarova & Bob, 2012). The sample size of 20 control and 20 experimental participants is not a large study. There is litte detail regarding the demographics of the learners aside from their diagnosis.

In 2013, the same authors Konicarova and Bob conducted another research study. This study, however, focused on the ATNR specifically and its relationship with ADHD in children. The sample consisted of 60 children with a DSM-5 diagnosis of ADHD (27 girls and 33 boys) between 8-11 years of age. The study also included a smaller control group of 30 children in the same age range, 8-11 years old, who did not have a diagnosis of ADHD or any other neuropsychiatric diagnosis. The assessment of reflexes involved assessing the ATNR according to the Schilder test and then the *Children's Parent Questionnaire (CPQ) by Conners* to rate the behaviour of the children (Konicarova & Bob, 2013). The Schilder test is a specific reflex test used to determine whether the ATNR has integrated or not. The results showed that the ATNR scores and ADHD symptoms were significantly correlated and indicated that the majority of ADHD symptoms were associated with persistent ATNR. The shortcoming of the research study is that only one primitive reflex was studied and that due to

this one cannot assume that the ATNR is solely responsible for the ADHD symptoms. The research by Taylor et al., (2004) points to the Moro Reflex as being the gateway to all neurological development and found that the Moro Reflex is connected to the ATNR and then to ADHD symptoms, therefore, one cannot assume one reflex to be the cause of symptoms, but rather the cause is a combination of reflexes or a primitive reflex profile.

In a study done by Reynolds and Lane (2009), the relationship between sensory over responsivity (SOR) and anxiety in children with ADHD was conducted. Sensory over responsivity (SOR) or sensory hypersensitivity suggests that certain people may experience certain stimuli (sound, movement, touch) as more extreme than those whose sensory input is functioning adequately. Anxiety, ADHD and SOR have several similarities in their symptoms, with the inability of the child or adult to regulate the incoming sensory information (Reynolds & Lane, 2009). In 2012, Reynolds, Lane and Dumenci conducted another study of SOR, anxiety and ADHD and reported that an estimated 25% of children with ADHD were also diagnosed with Anxiety Disorder. These authors believe that the link between SOR and anxiety may be related to poor information processing (Reynolds et al., 2012). In the 2009 study, a convenience sample of 48 children between 6–10 years of age were enrolled (Reynolds & Lane, 2009). The 48 children were split into two groups, one group contained 24 children with ADHD only (TYP group) and another group of 24 children, the control group, presented without either ADHD or SOR. All children were screened for an IQ greater than 70. The *SensOR Inventory* and the *Revised Children's Manifest Anxiety Scale (RCMAS*) were used to collect data. The experimental group was then further divided into two groups using the data collection methods mentioned above. Of those in the ADHD group 13 out of the 24 participants met the criteria for SOR and were placed in the ADHDs (ADHD + SOR) group while the remaining 11 participants were positioned in the ADHDt (ADHD without SOR) group. It was reported that 62% of the ADHDs group presented with tactile

over responsivity and 54% showed symptoms of auditory over responsivity. Children in the ADHDs group showed significantly higher levels of anxiety than children in the ADHDt and TYP group. The authors noted that the positive link between ADHD and anxiety was not a surprising one as they had built the study upon the previous research of Schatz and Rostain (2006), however the link between ADHD, anxiety and SOR adds depth to future research in this field as SOR may explain many of the behaviours associated with anxiety. The limitations of the study makes mention of the small sample size and the difficulty in recruiting children who present with ADHD but with no other comorbid diagnoses.

Primitive Reflexes and Balance

Of the primitive reflexes assessed for the current research the Moro, TLR, STNR, ATNR and Spinal Galant Reflexes are all implicated in the development of the vestibular system and ultimately balance (Holscher, 2014; Jaiswal & Morankar, 2017; Masgutova, 2018). Goddard Blythe (2005) states that the functioning of the vestibular system can have an intense effect on one's emotions. The vestibular system and limbic system are connected via the Papez circuit, with the vestibular stimulation activating the limbic system and neocortex (Rajagopalan et al., 2017). The limbic system, specifically the amygdala, has long been implicated in emotional reactions (Erez et al., 2004). Incoming sensory information is received by the senses and processed by the limbic system and then the neocortex, when the processing ability is faulty the information is processed incorrectly and therefore children are more prone to perceiving situations as threatening when they are not (Goddard Blythe, 2005; Erez et al., 2004).

In a study conducted by Erez et al., (2004) 20 children with Anxiety Disorders and 20 children who were deemed free of Anxiety Disorders participated in the study. A neurological examination was performed by professionals in the field where various

assessments such as balance tests, a dizziness questionnaire and a motion sickness questionnaire was administered to all participants in both the control and experimental group. Results of the study showed that none of the free of anxiety group revealed any significant vestibular dysfunction, however roughly 50% of the anxiety group exhibited soft signs of neurological dysfunction with some restlessness, involuntary movements and increased sensitivity during motion and balance evoking situations. The authors go on to report that 80% of the children in the anxiety group, compared to 40% of the free of anxiety group, reported increased sensitivity to a change in position and increased reports of dizzy spells. Balaban and Jacob (as cited in Erez et al., 2004) noted that there exists a comorbidity of balance dysfunction and anxiety in adults, however, research into this relationship is not as frequently studied in children (Bart et al., 2009; Kaga, 2014; Shefer, Gordon, Avraham & Mintz, 2015). The findings of this study were supported by the findings in a study of vestibular mutant mice (Shefer et al., 2015). The study set out to confirm a hypothesis that anxiety may be the result of a normal functioning limbic system, however, the response may seem excessive due to a weak sensorimotor system (Shefer et al., 2015). Sixty vestibular headbanger mutant mice were bred and moved into two cages. One cage was named the training cage which was designed to promote balance training by including running wheels, narrow beams, vertical and horizontal ropes and canals. The control cages of the same sizes had none of the equipment found in the training cages and were specifically designed to prevent balance training. A number of balance tests and anxiety tests were presented to both the control and experimental groups at regular intervals of 1 month, 2 months and 3 months. The tests included a tail hang test, elevated platform test a rotarod test to determine balance skills. The anxiety tests included an open field test and an elevate-plus-maze test. The findings show that there is a strong causal relationship between the balance training and amelioration of anxiety systems in mice (Shefer et al., 2015). In humans, the impact is that in

some patients diagnosed with Anxiety Disorder, the cause may be due to a balance disorder and as such treatment should include improving vestibular function and not only therapy and medication (Orez et al., 2004).

Primitive Reflexes and Emotional Disorders

Goddard Blythe (2014) mentions the term NI to describe children with UPR beyond the age of 6 months. Children with NI may present with problems such as poor motor planning, inability to concentrate and poor hand-eye coordination which are likely to go unnoticed but may negatively impact on the child's ability to function confidently in the classroom (Gieysztor et al., 2018). It is also noted that adult disorders such as panic attacks, Agoraphobia and Anxiety Disorders have their roots in childhood (Goddard Blythe, 2014; Rockhill, Kodish, DiBattisto, Macias, Varley & Ryan, 2010). Anxiety has, on average, an earlier onset age, at approximately 11 years of age, than other Psychiatric Disorders like Major Depressive Disorder, which has a higher onset age of 29 years (Ballas, 2017). This onset age alludes to anxiety and the symptoms thereof might initially be more related to a developmental disorder than a psychiatric disorder (Leonardo & Hen, 2008). Research has shown that Autism Spectrum Disorder, Attention Deficit Hyperactivity Disorder and Anxiety Disorder are often comorbid disorders (Green & Ben-Sasson, 2010) and when primitive reflexes have been assessed in children a large percentage of the children in these studies have been noted to have UPR (Leonardo & Hen, 2008; Chinello, 2016). These findings are supported by a study in which a relationship between social emotional problems such as anxiety and motor skills were studied (Piek, Barrett, Smith, Rigoli & Gasson, 2010). Fifty child participants were assessed 11 times at set intervals from the age of 4 months to 4 years using the *Ages and Stages Questionnaire (AQS)*, and once again between the ages of 6 and 12 years using the *Child Behaviour Checklist (CBCL)* (Piek et al., 2010). The authors report that

a relationship between poor gross motor skills early in life and later symptoms of anxiety existed, however the relationship was not causal in nature. Poor gross motor skills include beginning to walk late (after 18 months), poor hand control and poor coordination or being clumsy (Piek et al., 2010). The work by Piek et al. (2010) supports another author's work (Compos, as cited in Piek et al., 2010) who found that a relationship between gross motor skills and symptoms of anxiety exists, and that poor motor skills could be used as a predictor of anxiety later in life (Compos, as cited in Piek et al., 2010).

Balance Dysfunction and Anxiety

UPR and its contribution to symptoms of anxiety have yet to be explored, however as noted in previous sections of this thesis, primitive reflexes assist in the development of the mechanisms responsible for balance (Hyland, 2015). The Moro Reflex contributes to the development of the vestibular system and is instrumental in the child's ability to maintain both static and dynamic balance (Kaga, 2014). According to Bart et al. (2009), the relationship between anxiety and balance dysfunction has been well researched in adults but is sparse in the studies of the same relationship in children. In their study, Bart et al. (2009) note that the primary treatment for anxiety is CBT, and at times, with a pharmacological treatment added. However, little attention is given to a possible underlying cause for the anxiety, such as balance dysfunction.

According to Bart et al., (2009) the comorbidity between balance dysfunction and anxiety has been well researched in adults and understudied in children. In their study Bart et al. (2009) studied two groups of children. The two groups, the balance dysfunction group and the free of balance dysfunction group consisted of 35 children each with a mean age of 5.8 years. The balance dysfunction group was comprised of children who were referred to the public health clinic for sensory health issues. The free of balance dysfunction group were

assessed using the *Bruininks–Oseretsky test of motor proficiency* (Bart et al., 2009) and found to be without a balance dysfunction. The experiment was two-fold, with the first part of the experiment finding that children in the balance dysfunction group had higher levels of anxiety than those children in the free from balance dysfunction group. In the second part of the study, the experiment group was further divided into two groups, the intervention group and waiting list group. The intervention group underwent balance training and upon completion of the programme were found to have an increased self-esteem and decreased anxiety which were not found to be true of the control – waiting list group (Bart et al., 2009).

Brain Theories

Several theories of brain development refer to the brain developing in a hierarchical process that is from basic to more complex brain structures (MacLean, 1970; Luria, 1966, Wiest, 2012). A theory of emotion which explains stress and anxiety, refers to the bottom-up theory where the physiological experiences of the body are appraised first, followed by the emotional experience of the stressor (Freberg, 2019). This theory supports the hierarchical process as theorised by two major theorists in brain development, Paul MacLean (1970; 1973) and Alexander Luria (1973).

Maclean's Triune Brain

The Triune brain theory, as postulated by Paul MacLean (1970), suggests that the human brain evolved from simple to more complex in structure and function (Kostyanaya & Rossouw, 2013). MacLean (1970) theorised that the brain can be studied as three parts of a whole where there is a specific order of development and each layer of the brain has its own function (Lambert, 2003). MacLean (1970; 1990) stressed that the three brain parts are not

merely superimposed on one another, but integrated with each of the layers to form one functioning unit (Wiest, 2012).

The oldest part of the brain is the *reptilian brain*, also referred to as the R-Complex (MacLean, 1970). The reptilian brain consists of a specific cluster of ganglionic structures. These ganglionic structures are located at the base of the forebrain in reptiles, birds, and mammals and include the medulla spinalis, parts of the midbrain, diencephalon, and basal ganglia as part of the reptilian brain (MacLean, 1973). The medulla spinalis sends sensory and motor impulses to and from the brain (Ploog, 2003). The functions of the reptilian brain include digestion, reproduction, breathing as well as the initiation of the fight or flight response (Caine & Caine, 1994). These functions are automatic and ritualistic in nature and are controlled largely by the brain stem (McComb, 1993). Through uncontrolled movement in infants, primitive reflexes in this part of the brain create and organise neural connections in the brain (Goddard Blythe, 2005; Lambert, 2003; McComb, 1993; MacLean, 1990).

The second part of the brain is the limbic system found to be present in all mammals, but not reptiles (MacLean, 1973). The limbic system consists of the following parts namely the cingulate gyrus, orbital, insular, and temporal lobe and includes the amygdala, septal nuclei, preoptic area, hypothalamus, anterior thalamic nuclei, and parts of the basal ganglia (MacLean, 1973; Ploog, 2003) and is responsible for emotional processing (Lambert, 2003). The amygdala and hippocampus have often been implicated in anxiety (Erez et al., 2004; Wiest, 2015).

The final third of the triune brain is the neocortex which contains structures of the thalamus. The neocortex is the largest and outermost structure of the brain and is responsible for language, speech, writing and is responsible for processing sensory information, assistance in planning and is able to provide logic and perception (Caine & Caine, 1994; Wiest, 2012). The neocortex, however, also plays a role in emotional processing. The

information from the limbic structures are received by the neocortex and interpreted by the frontal lobes of the neocortex where learned control of emotions is found (Languis & Miller, 1992).

MacLean (1973) believed that as the infant grew and developed, the brain processes would develop as the child aged from the reptilian brain in infancy, to the limbic system taking over a while later, to finally being able to process information using the neo cortex (MacLean, 1990). Primitive reflexes are controlled by the subcortical brain which includes the brain stem (Çavdar, Özgür, Kuvvet, Bay & Aydogmus, 2018). The characteristics of the reptilian brain and primitive reflexes are similar in that the movements are uncontrolled, without thought and have the function of creating neural brain connections (Goddard Blythe, 2009; MacLean, 1990; Wiest, 2015). Without these neural connects integrating into the repertoire of neural structures in the brain, incomplete information is transmitted via the sensory pathways to the different brain sections for processing (Goddard Blythe, 2009).

Luria's Functional Units

Luria (1966) also proposed a three functional unit theory where each unit, although functional is dependant on the other units for the body to function.

The first unit – the arousal and attention unit is responsible for the tone of the cortex or arousal and above all, is the basis for all human mental processes. It is reported that without the optimal functioning of this unit, cognitive functioning of the other two units would be disrupted (Languis & Miller, 1992; Luria, 1973). The first functional unit comprises the Reticular Activation System (RAS), thalamus and monoaminergic cell groups in the brain stem (Téllez-López & Sánchez-Jáuregui, 2016). The function of the first unit, also known as the arousal and attention unit, is to activate and sustain general tone in order to activate the cerebral cortex and to ultimately keep the body in a state of alert (2016). The level of arousal

must be kept constant as over arousal may result in anxiety symptoms, whilst under arousal will result in understimulation of the other two units and the cognitive functions they perform (Haywood & Tzuriel, 2013).

The parietal, occipital and temporal lobe make up the second functional unit and is responsible for receiving, processing, integrating and storing the sensory information (Téllez-López & Sánchez-Jáuregui, 2016). This functional unit is also called the unit of sensory input and integration where tasks such as working memory, strategic and semantic coding and spatial visualisation take place (Languis & Miller, 1992).

The information, once coded, is received by the third functional unit, also known as the executive planning and organising unit (Languis & Miller, 1992). This unit has the responsibilty of programming, regulating and verifying the activities processed in the second functional level. Another task is to sustain attention, awareness and insight to the task (Haywood & Tzuriel, 2013) whilst also regulating behaviour (Kostyanaya & Rossouw, 2013). The frontal lobe comprises most of the third functional unit (Haywood & Tzuriel, 2013). Téllez-López and Sánchez-Jáuregui (2016) add to Luria's theory of the three function units by adding a fourth unit, the L unit. The L unit or Limbic unit comprises of the hippocampus, amygdala, fornix and cingulate gyrus as well as the para-hippocampal and orbitofrontal regions (Téllez-López & Sánchez-Jáuregui, 2016). This unit is primarily responsible for the receiving, appraising and responses of emotion and memories (Téllez-López & Sánchez-Jáuregui, 2016).

Comparing MacLean and Luria's theories

Both hierarchical theories of the brain, although dated, have been the basis for research over the past few decades and are still referred to in current literature (Blanchard & Blanchard, 2003; Harris, 2003 & Ploog, 2003; Wiest, 2015). The parallels drawn between the two

theories would suggest that Luria (1966) or MacLean (1973) built upon the other's theories, however, this was not the case as each theory was built independently of the other (Kostyanaya & Rossouw, 2013; Wiest, 2012). Both theories propose that the brain, although completely formed at birth in healthy infants, develops sequentially from primitive to more complex in their functions (Kostyanaya & Rossouw, 2013). Both theorists propose that if these lower areas of the brain do not develop optimally the subsequent brain areas' development will be negatively impacted upon as the incoming sensory information will be distorted (Luria, 1973 & MacLean, 1970). Since primitive reflexes are controlled by the primitive area of the brain and are responsible for the development of neural pathways, if the primitive reflexes remain unintegrated they may impact negatively on the person's ability to regulate the symptoms of anxiety (Wager, Krishnan & Hitchcock, 2019). If the lowest brain level, the reptilian brain and first functional unit, do not develop optimally the sensory information that is passed along to the next brain level, namely the limbic system and second functional unit, cannot be adequately processed or they will process incorrect information (MacLean, 1970; Ploog, 2003; Wager, Krishnan & Hitchcock, 2019). This information may be incorrectly processed as a stressor which results in a chemical and behavioural response from the limbic components. The resulting behaviour may be symptomatic of anxiety. According to the hierarchical theory of the development of the brain, Anxiety Disorders can be described as a malfunction within the levels of the Triune brain (Ploog, 2003).

Anxiety Disorder

Anxiety Disorder is a normal and common feeling that all humas experience in their lifetime (Sadock et al., 2015). Anxiety encourages the secretion of adrenaline (Breggin, 2015) and is characterised by "autonomic symptoms such as headaches, perspiration, heart palpitations, stomach discomfort and an inability to sit still" or to concentrate (Sadock et al., 2015, p. 387).

Anxiety is often useful when it is sensed as a warning sign for imminent danger and allows the body to react accordingly (Wiest, 2015). This is different from fear. Fear is when the imminent danger is known while in the case of anxiety, the imminent danger is unknown (Sadock et al., 2015).

Anxiety is often comorbid to a number of other diagnoses such as ADHD, Autistic Spectrum Disorder (ASD), Learning Disorders and Mood Disorders (Mazzone, Ruta & Reale, 2012). ASD has been found to be comorbid with anxiety, particularly social anxiety, in children (2012). Anxiety and ADHD have been found to be comorbid in children and Wilens and Spencer (2010) report that anxiety and ADHD often share symptoms which may manifest as social, generalised and panic-like symptoms. In this next section theories of anxiety, Anxiety Disorders and the symptoms thereof will be discussed.

Causes of Anxiety

In a study by Beesdo et al., (2009) it was determined that a specific cause of anxiety in children was difficult to establish. It was noted that certain risk factors need to be explored in order to understand the potential cause of the anxiety. The following risk factors or combination of risk factors may predict childhood anxiety: Demographic, biological, neurobiological, personality and environmental factors (Essau, Lewinsohn, Lim, Moon-Ho & Rhode, 2018). Those variables, however, exclude the pregnancy and birth of the child which could also contribute to the child's anxiety (Beesdo et al., 2009). The causes of anxiety can be applied to the popular debate of nature vs nurture (Ulrich, 2010). The nature vs nurture of anxiety would question whether the individual's anxiety is based on genetics, where the biological mother and father may have experienced anxiety or even been diagnosed with anxiety and have 'passed it down' to their offspring, or the nurture question; has the interaction between the parents and child been an anxious filled one where the anxiety has

been noted and internalised by the child (Belsky & Pluess, 2009)? No definitive answer has been noted in literature and this is still under debate. Several other factors may contribute to symptoms of anxiety, either directly or indirectly and will be discussed as prenatal and post-natal factors below.

Prenatal factors are those factors before conception, throughout the pregnancy and include the birth process which affects the infant. These include maternal and paternal history, conception, pregnancy in terms of health, diet, stress etc. (Wait, Meyer & Loxton, 2005). Post-natal factors are those which influence the infant after the birth of the child such as illness, trauma, developmental milestones and school history (Wait et al., 2005). In this research, the factors explored were up to the age at which the child arrived for the assessments, which is between 10 and 13 years of age. The themes explored in the semi-structured interview were informed by the information received from the intake interview (Addendum I) (De Jager, 2017).

Maternal Stress. Monk and Hane (2016) reported that when mothers of infants met the diagnostic criteria for Anxiety or Depressive Disorders prenatally, the infants showed a higher basal cortisol than mothers who did not meet the diagnostic criteria. This is a direct physiological relationship. The stress response initiates a reaction in which the body goes into a freeze, fight, flight, fright, and faint response (Bracha, 2004). The body prepares itself to perform either one of a range of these reactions in response to the stressor and subsequently increases the production of cortisol, the stress hormone (Monk & Hane, 2016).

When a mother suffers from anxiety or depression postnatally, the child's home environment may be negatively impacted. The mother may be less inclined to seek out the infant and provide the stimulation that is needed for the infant to be developmentally stimulated and this, in turn, may impact on the infant's ability to develop optimally (Tronick

& Reck, 2009) resulting in possible delayed gross motor skills. This is an indirect psychological relationship between maternal stress and anxiety in children.

Childhood Illness. A foetus begins developing its immunity during the first trimester, however, the immune system remains dormant so that the immunity of the mother and the foetus do not begin attacking or rejecting each other (Ledford, 2017). After an infant is born the immune system begins to activate and is fully functional by two to three months post-partum (2017). This means that for two to three months the infant is prone to a range of common illnesses (Merbl, Zucker-Toledano, Quintana & Cohen, 2007). During gestation, the foetus relies on the mother's immunity for protection against common illness (Ledford, 2017). Common illnesses experienced during infancy and well into the toddler years are upper respiratory and lower respiratory infections as well as acute otitis media (AOM) which is a middle ear infection (Chonmaitree et al., 2016; Lau, Mick & Nunez, 2018). Early development of AOM increases the risk of chronic ear infections later in life (Chonmaitree et al., 2016). Young children have short and underdeveloped Eustachian tubes which can secrete mucous from a respiratory infection into the middle ear, which is why respiratory and ear infections are commonly treated together (Pandey, 2016). A common way in which ear infections are treated is with an antibiotic (Flasche & Atkins, 2018) but if the ear infection is recurrent the doctor may recommend the insertion of grommets or ventilation tubes into the ear (Lau, Mick & Nunez, 2018). Grommets are tiny plastic tubes that are inserted into the middle ear to assist in draining pus from the ear, thus reducing the pain associated with a middle ear infection (Lau, Mick & Nunez, 2018). Middle ear infection is not only painful, but can have a negative effect on hearing and can potentially alter the intellectual and behavioural development of children (Pandey, 2016). Padley (2016) states that chronic ear infections may result in balance problems, delayed motor milestones, problems with speech

and language development, as well as problems in school. In a review of literature, Monsanto, Kasemodel, Tomaz, Paparella and Penido (2018) found that patients presenting with otitis media or middle ear infections have a greater chance of vestibular problems and delays in the meeting of milestones. Literature has noted a distinct relationship between vestibular issues such as balance and symptoms of anxiety (Shefer et al., 2015; Erez et al., 2004; Bart et al., 2009), however, based on the fact that illnesses such as AOM can negatively impact on balance, it is possible that health problems such as AOM could be indirectly linked to symptoms of anxiety.

Birth Order. Birth order is defined as the position into which a child is born into a family, first born refers to the eldest while later borns are any subsequent births (Rohrer, Egloff & Schmukle, 2015). In their study Rohrer et al. (2015) reviewed past literature on birth order from Francis Galton (1874), Alfred Adler (1928) and Frank Sulloway (2001) and found that these theorists found notable differences in temperament in children depending on their birth order. Sulloway (2001) predicted that birth order affected intellect and imagination, but no significant findings for emotional stability were noted, however, he was able to predict that first borns were more susceptible to anxiety and anger outbursts while later borns were predicted to be more depressed and impulsive. Sulloway (2001) based this on evolutionary theory where, according to the birth order in the family, children adapted to ensure survival (Rohrer, et al., 2015). Rohrer et al. (2015) concluded his study of birth order and found that there were no notable temperament differences associated with birth order when he conducted his research.

Personality Characteristics of the Child. Personality traits are broken down into the big five of personality traits which are: Neuroticism, extraversion, openness, agreeableness

and conscientiousness (Miserandino & Porter, 2015). Of significance to the current study is the personality trait of neuroticism as people who display personalities of neuroticism are more likely to be predisposed to Emotional Disorders (Widiger & Oltmanns, 2017). Under the umbrella of neuroticism are a number of facets which include adjectives such as anxious, angry, hostile, depressed, self-conscious, impulsive, low self-esteem, perfectionism and vulnerable to stress (Miserandino & Porter, 2015). These same individuals are prone to having poor coping skills as well as poor health due to the impact of stress on the individual (Miserandino & Porter, 2015; Widiger & Oltmanns, 2017). Perfectionism is noted as a neurotic personality style and is believed to result in psychopathology if not managed (Hewitt & Flett, 2007). Perfectionists often have a great need for perfection in order to validate themselves and thus their self-esteem is likely linked to completing tasks and the praise they receive from the completed task, thus, a need arises to do so perfectly (Hewitt & Flett, 2007). Children who have personality types of extraversion, openness, agreeableness and conscientiousness are generally less likely to experience Anxiety Disorder (Widiger & Oltmanns, 2017).

Theories of Anxiety

Theorists have yet to come up with one single reason for the onset of Anxiety Disorder and anxiety symptoms (Chow & Tsang, 2007). Theorists, however, tend to emphasize either nature or nurture when it comes to the study of Anxiety Disorders (Ulrich, 2010). The following section will detail the theories that guide research and treatment of Anxiety Disorders.

Biological Theory

In infants, a loud and unexpected noise causes a reaction known as the Moro Reflex. The Moro Reflex causes the infant to fling out their arms away from their body while taking a big gasp of air. The infant will freeze momentarily before bringing the arms and legs back towards the body, this action is commonly seen in combination with a cry from the baby (Berne, 2006; Goddard Blythe, 2005). Later in life, a sudden loud noise will elicit the startle reflex. The Moro Reflex and Startle Reflex are closely related. People with an enhanced Startle Reflex report higher levels of anxiety. The amygdala is a very important part of the brain in terms of fear and anxiety (Kalat, 2015). The amygdala has three subsections namely the lateral and basolateral areas as well as the central amygdala. The lateral and basolateral areas receive sensory input from the sensory systems, vision and hearing (Kalat, 2015). Once received, these parts send the information to the central amygdala. This information is combined with information about pain and stress from the thalamus. Once the amygdala has received the information from the lateral and basolateral amygdala and the thalamus, the amygdala quickly assesses the information as either potentially dangerous or not (Freberg, 2019). How the information is determined as a threat or not is defined by memories and experiences that the individual has retained (Calhoon & Tye, 2015; Gray & McNaughton, 2003). If perceived as dangerous, the amygdala sends information to the hypothalamus which activates two systems of emergence, the sympathetic adrenal-medullary (SAM) system and the hypothalamic-pituitary-adrenal (HPA) axis (Freberg, 2019; Kalat, 2015).

When the SAM is activated, the sympathetic strand of the Autonomic Nervous System (the other is the parasympathetic strand) is activated and releases adrenaline (epinephrine) and norepinephrine into the blood. The neurochemicals, epinephrine and norepinephrine circulate in the blood to the organs and prompt the fight or flight response to stress, coupled with rapid breathing and heart palpitations (Freberg, 2019).

The HPA axis activates when the information from the amygdala is received by the paraventricular nucleus (PVN). The PVN sends signals to the locus coeruleus, the spinal cord and the pituitary gland so that the PVN can release the corticotrophin-releasing hormone (CRH) and vasopressin (Freberg, 2019). The CRH and vasopressin are the link between the hypothalamus and anterior pituitary gland (Freberg, 2019). The pituitary gland, in response to the CRH and vasopressin, releases the adrenocorticotropic hormone (ACTH) into the bloodstream and stimulates the adrenal glands to release glucocorticoid cortisol (Freberg, 2019). The hippocampus, with its glucocorticoid and cortisol receptors, is involved in the regulation of the HPA axis and inhibits the release of CRH by assessing the amount in the blood stream and preventing the release of ATCH and cortisol (Freberg, 2019). The cortisol travels in the blood stream to the brain, if too much cortisol reaches the brain it can be toxic to neurons (Nguyen et al., 2014).

A neuron, the smallest unit of the nervous system, is responsible for conducting sensory, motor and regulatory signals within the human body (Everly & Lating, 2013). In order for signals to move from one neuron to another neurotransmitters are needed. Neurotransmitters are chemical substances such as Serotonin, Gamma Amino Butyric Acid (GABA) and Dopamine that are able to pass signals along specific pathways of the nervous system (Everly & Lating, 2013; Marques et al., 2015). The nervous system, which contains hundreds of millions of neurons, is divided into two systems, the Central Nervous System (CNS) and the Peripheral Nervous System (PNS) (Slater & Bremmer, 2011). The CNS, contains the brain and spinal cord. The spinal cord is where the neurons conduct signals to and from the brain (Everly & Lating, 2013). The sensory signals are sent along the spinal cord to the reticular formation and brain stem and through the thalamus to the higher levels of the brain (Everly & Lating, 2013).

It is, thus, important to understand that sustained periods of stress, will lead to increased cortisol in the blood stream and ultimately the brain. Cortisol, in large concentrations or chronic exposure can lead to reduced neural activity of the brain (Nguyen et al., 2014).

Psychological Theory

This theory is fundamentally based on cognitive and behavioural processes of Anxiety Disorders. Behavioural theories of Anxiety Disorders involve both classical and operant conditioning in the appraisal of anxiety evoking situations (Antony, Federici & Stein, 2009; Pavlov, 1927). Classical conditioning, by Pavlov, is the ability to learn about your environment through association, both negative and positive (Rehman, Mahabadi & Rehman, 2019). This is important in the study of Anxiety Disorders as the symptoms of anxiety experienced by an individual can be due to a learned response (Pavlov, 1927). Pavlov noticed that when a neutral stimulus is paired with an unconditioned stimulus, that later the neutral stimulus becomes the conditioned stimulus and eventually the unconditioned stimulus is no longer needed for a reaction to occur (Antony et al., 2009). The person just needs to be presented with the conditioned stimulus in order to experience the same feelings of stress associated previously with only the initial stressor. This may be the reason why some people find situations anxiety provoking while others, who were not exposed to the neutral stimulus, do not experience anxiety in the same situation.

Operant conditioning, theorised by the seminal work of B.F. Skinner, focuses on the modification of behaviour by reinforcement or punishment (Skinner, 1938). When a person perceives a situation as anxiety evoking, the appraisal of the situation as fearful was likely due to classical conditioning. Anxious children note the anxiety with which their parent's approach situations and begin modelling their parent's behaviour (Mineka & Oehlberg, 2008). When a stressful situation is avoided, the avoidance behaviour is perceived as a

reward as the anxiety symptoms are rapidly reduced. If the person stays in the stressful situation, the resulting feeling is that of punishment which means that the behaviour is less likely to be repeated in the future. This ultimately rewards the avoidant behaviour and when the person is next confronted with a similar situation, is likely to avoid the behaviour again (Skinner, 1938).

There are a number of theories of emotion, both classical and contemporary, however, they have differing views on the processing of emotion (Kalat, 2015). The two generally accepted views are the bottom-up and top-down processing views. Top-down processing, relies solely on the cognitive appraisal of the situation in order to understand the physical sensations experienced by the body in the situation (Kalat, 2015). Bottom-up processing appraises the sensations of the body first, then the emotional experiences are experienced (Kalat, 2015).

Developmental Theory

Childhood anxiety, according to the developmental theory, emerges from a number of underlying factors that integrate with a child's characteristics and environment. Anxiety is often described as being passed down from parents to their offspring, however the mechanisms of this relationship have not been as thoroughly researched (Ahmadzadeh et al., 2019). One possibility is that the child may have inherited the genes associated with anxiety from their parents. Anxious parents can promote anxious behaviours in their children or the family could be exposed to negative environments which may promote anxiety in both parents and children (Ahmadzadeh et al., 2019). Childhood temperament, parenting styles, family relationships, and negative experiences in early childhood may also account for anxiety in children (Antoni, Frederici & Stein, 2008). Parenting styles, where parents are over protective, encourage avoidant behaviour and are controlling, tend to increase the child's

vulnerability to an Anxiety Disorder (Antony et al., 2009). The care and nurture that a parent affords a child may also have long term effects on the child's ability to handle stress (Freberg, 2019). Children with behaviour inhibition or inhibited temperament, are children who are described as quiet, shy and fearful (Kalat, 2015). These children have also been shown to have heightened amygdala responses to unknown situations and people and, in effect, are at great risk of experiencing anxiety symptoms (Kalat, 2015).

Symptoms of Anxiety and Diagnosis

Anxiety Disorder is a complex term to define. Anxiety Disorder contains a number of related disorders with distinct diagnostic criteria (Sadock et al., 2015). As mentioned in Chapter 1, The Diagnostic and Statistical Manual of Mental Disorders (fifth edition) (APA, 2013) (DSM-5) includes a number of disorders under the umbrella of anxiety, these include Panic Disorder, Agoraphobia, Specific Phobia, Social Anxiety and Generalised Anxiety Disorder in adults (APA, 2013; Sadock et al., 2015). In children, the diagnostic criteria are similar to those of adults, however, the number of symptoms needed for a diagnosis may be different or other behaviour may be specified for children (APA, 2013). Along with the sub-categories of Anxiety Disorders, there are also some differences in the symptoms of anxiety associated with each of those subcategories. One of the quantitative data collection tools used in the current research is the *Screen for Child Anxiety Related Disorders (SCARED) - Child version* questionnaire (Birmaher, 2012). This questionnaire screens for symptoms of Anxiety Disorders in children and uses five subcategories to explain and screen for the specific kind of anxiety that may be present. The SCARED questionnaire's categories are aligned with DSM-5 categories of anxiety, namely: Social Anxiety Disorder, Separation Anxiety Disorder, Panic Disorder and Generalised Anxiety Disorder. The SCARED questionnaire also assesses for significant school avoidance. Significant school avoidance, also referred to as school

refusal, is however, not a DSM-5 disorder but is generally associated with anxiety disorders such as those for which the SCARED questionnaire screens (Fremont, 2003).

In the next section, the anxiety disorders and the symptoms thereof, which are specific to this research, will be discussed in order to show the vast similarities and differences in the symptoms of the Anxiety Disorders that are mentioned.

Anxiety in Children

In her thesis Groenewald (2013) reviewed the subjective experiences of children with Anxiety Disorder in an academic hospital in South Africa. The study involved 50 children with the majority presenting with complaints such as poor school performance (N = 34) and fewer of them with poor concentration (N = 28). It was also noted that comorbid disorders such as ADHD (N = 24) and other learning disorders (N = 18) were presented, however, Groenewald did not emphasise which learning disorders were noted. In her review of the literature Groenewald (2013) reported on the possible treatments available for children with anxiety. It was determined that psychotherapy and medication are efficacious in treating anxiety and that psychoeducation and educational support have also been shown to be effective. These methods of assistance although effective, may not be effective if the child is incorrectly diagnosed. The DSM-5 (APA, 2013) is used to describe the symptoms associated with 12 subtypes of anxiety in adults. In all of these descriptors and also in the International Classification for Diseases and Related Health Problems (ICD-10) (Word Health Organisation, 2004) in order to make a diagnosis of an Anxiety Disorder children must give a subjective experience of anxiety or distress. This is often difficult as children may not have the vocabulary to verbalise what they are feeling. This makes the correct diagnosis difficult. Groenewald (2013) reveals that research is being conducted to focus on ways to identify anxiety in children in a community setting. It has been noted that limited research has been

conducted on the subjective experiences of children with Anxiety Disorder globally and in South Africa. Research shows that anxiety is comorbid with a number of other disorders including depression, ADHD, Bipolar Disorder, Pervasive Developmental Disorder and Substance Use Disorder in children and adolescents (APA, 2013; Sadock et al., 2015). In South Africa it has been found that in terms of race, white children were found to have lower levels of anxiety than their coloured and black counterparts which may stem from black and coloured South Africans being exposed to traumatic events related to the country's history (Groenewald, 2013; Muris et al., 2006). Girls and women are reported to experience higher levels of anxiety than their male counterparts (Groenewald, 2013), however, Hartley, Sikora and McCoy (2008) found no significant differences in their sample.

The method used in Groenewald's (2013) review of children's subjective experiences of anxiety is as follows: A referral was accepted by the Child and Adolescent Family Unit (CAFU) and a psychosocial history was completed by the child and parent or guardian and thereafter an interview was held with the child alone by means of a child psychiatry interview (2013). Then an intellectual assessment and an emotional assessment (a Draw-a-person test with a clinical interview and a sentence completion test) were completed. Only children with a diagnosis of Anxiety Disorder, and where a full psychological assessment was completed, were included in the study. Children with impairments in cognitive functioning, where the child had cognitive functioning in the moderate mentally handicapped range or lower, were excluded from the research.

The review concluded that only 13 of the 50 children diagnosed with an Anxiety Disorder actually had anxiety as a symptom of a principal diagnosis of the consulting disorder. Other participants in the study that presented with an Anxiety Disorder were in fact referred for a number of other issues such as ADHD, a Learning Disorder, Depression, Conduct or Elimination Disorder (Groenewald, 2013). The limitations of the study were that

the sample size was small and thus not generalizable to the population. There have been very few studies of childhood anxiety in South Africa, however, this research showed that the symptoms, with which learners present, may be falsely interpreted as anxiety, as opposed to a host of other possible underlying causes. This thesis is a good starting point for research in the field of childhood Anxiety Disorder.

Generalised Anxiety Disorder

DSM-5 notes Generalised Anxiety Disorder as excessive anxiety and worry about events such as school performance, and where more than three of the following symptoms occur for adults, and one symptom for children, it is considered to have been present more often than not in the past 6 months:

1. Restlessness or feeling on edge
2. Being easily fatigued
3. Difficulty concentrating or the mind going blank
4. Irritability
5. Muscle tension
6. Sleep disturbance (difficulty in falling or staying asleep, or restless or unsatisfying sleep) (APA, 2013)

The worry, referred to here, needs to cause significant distress and should not be attributable to a substance of any kind or another medical condition or explained by another medical condition (APA, 2013). DSM-5 reports that Generalised Anxiety Disorder is twice as likely to be diagnosed in girls as boys (APA, 2013). The median age is 30 years old with a very wide age range (APA, 2013).

Separation Anxiety Disorder

The main diagnostic feature of this disorder is the excessive fear of being separated from an attachment figure. The anxiety is developmentally not aligned with normal separation anxiety at developmentally appropriate ages. The symptoms of separation anxiety must last at least 6 months in adults and at least four weeks in children and adolescents (APA, 2013). The symptoms of criteria A include excessive worrying about harm coming to an attachment figure; reluctance to leave an area of safety (school, home, work) due to fear; fear of being alone or sleeping without the major attachment figure, as well as nightmares involving separation from the attachment figure. Several physical symptoms occur, such as headaches, stomach aches, nausea and vomiting when separated from attachment figure (APA, 2013).

Apart from separation anxiety being normal at certain developmental phases, the onset of separation anxiety may be as early as one year of age and may continue through adolescence and is noted as the most prevalent of Anxiety Disorders in children under 12 years of age (APA, 2013).

Social Anxiety Disorder

Social Anxiety Disorder or Social Phobia is characterised by intense fear or anxiety of situations where the individual is expected to perform (APA, 2013). According to criterion A in DSM-5, in children the feelings or fear must be present when interacting with peers and not only with adults in order for a diagnosis to be considered. The individual is fearful of being humiliated and the fear is disproportionate to the actual threat and must last for more than 6 months (APA, 2013). In children, the fear or anxiety may be portrayed as behavioural with crying, tantrums, freezing and clingy behaviour (APA, 2013). In children, the median age of onset is 13 years of age, however, 75% of children begin showing symptoms between 8 and 15 years of age. When considering Social Anxiety Disorder as a diagnosis, the

symptoms should not be due to any other medical condition, other mental disorder and must have a significant impact on the individual's functioning (APA, 2013).

Panic Disorder

Panic Disorder is rare in children; however, the first age of onset is observable well before the age of 14 years. In order for a diagnosis to be made an individual needs to display at least four of the following symptoms from criterion A:

1. Palpitations, pounding heart or accelerated heart rate
2. Sweating
3. Trembling or shaking
4. Sensations of shortness of breath or smothering
5. Feelings of choking
6. Chest pain or discomfort
7. Nausea or abdominal distress
8. Feeling dizzy, unsteady, light-headed or faint
9. Chills or heat sensations
10. Paraesthesia (numbness or tingling sensations)
11. Derealisation (symptoms of unreality) or depersonalization (being detached from oneself)
12. Fear of losing control or "going crazy"
13. Fear of dying (APA, 2013)

The symptoms noted above must be followed by worry for more than one month about the panic attack occurring again, a dramatic change in behaviour to prevent an attack from taking place, and the symptoms must not be due to a substance or another mental health disorder (APA, 2013).

School Avoidance

As previously mentioned, School Avoidance is not a DSM-5 disorder (APA, 2013) this, however, may be evaluated as a result of the other anxiety categories as noted on the SCARED questionnaire. School Avoidance is a term used to describe intentional avoidance from school due to feelings of unease which may be accounted for by mental health problems (Knollman, Knoll, Reissner, Metzelaars & Hebebrand, 2010) and is said to affect 2-5% of school going children (Kawsar & Marwaha, 2019). When children attempt to avoid going to school, several physical symptoms are voiced, these include muscular and joint pains, dizziness, abdominal pain, back pain, headaches, shakiness/trembling, palpitations and chest pains (Kawsar & Marwaha, 2019). Treatment of School Avoidance includes behaviour therapy and medication (Kawsar & Marwaha, 2019).

Management of Anxiety

Anxiety in children and adolescents such as separation anxiety, generalised anxiety and social anxiety are often considered together since the symptoms may overlap at some point. This adds a layer of complexity when considering the overlap of other anxieties and the co-morbidity of other disorders. This complexity infers that there is no single approach to treating anxiety and, thus, a multimodal approach to anxiety is often adopted (Rockhill et al. 2010). This multimodal approach generally includes psychotherapy, commonly cognitive behavioural therapy (CBT), family education, family psychosocial intervention and pharmacological interventions (Simon, 2016). According to Calhoon and Tye, (2015) CBT is the process by which maladaptive thought processes, and how a situation is interpreted, are replaced with more functional and helpful thoughts, thereby reducing the symptoms of anxiety about a situation (Calhoon & Tye, 2015; Sadock, et al., 2015).

Conclusion

Primitive reflexes are essential for the development of neural pathways in the brain. Primitive reflex movements begin as uncontrolled movements and upon repetition transform into controlled and skilled movement. Without adequate free movement from the time that a person is a baby, primitive reflexes do not integrate, resulting in UPR. UPR results in NI. The symptoms of NI are similar in nature to the symptoms of anxiety and anxiety is often comorbid to disorders such as ADHD and other learning disorders. MacLean (1970) and Luria (1966) both theorised that the hierarchical brain, although a whole brain, consists of three parts which are dependent on the lower level in order for more complex tasks to be mastered. If the lower brain levels are not sufficiently developed and integrated it will have a negative effect on the functioning of the higher brain functions. The next chapter discusses the methodology of the study.

Chapter 3: Methodology

Introduction

Anxiety, and the symptoms thereof, is a complex phenomenon to study. This is not only due to the fact that the Diagnostic and Statistical Manual of Mental Disorders – 5 (DSM-5) lists a number of disorders under the umbrella of anxiety but that the disorders and diagnostic criteria for adults and children are often different (American Psychiatric Association, 2013). Another dimension that contributes to the complexity of the study of anxiety in children and adolescents, is that there is no one cause for anxiety (Leonardo & Hen, 2008; Rockhill et al. 2010). Similarly, the study of anxiety comes with its own complexities when it comes to the methodology used in the study thereof. The methodology chapter will thus examine the research paradigm, method, design, sample and data analysis of the current study. The chapter will conclude with the limitations of the study and ethical considerations.

Research Questions

The aim of the current study was to determine if a relationship exists between UPR and symptoms of anxiety in children between 10 and 13 years of age, and was the basis on which the research questions were identified. Since the current research was a mixed-method study both quantitative and qualitative questions were formulated.

Quantitative Research Questions

Two main research questions were identified and several sub-questions stem from the two central questions. The primary research questions and sub-questions are noted below:

- Is there a correlation between the UPR scores, as measured by the *INPP Screening Test for Clinicians and Health Practitioners* (INPP) (Goddard Blythe, 2012) and

anxiety questionnaire scores, as measured by the *Screen for Child Anxiety Related Disorders (SCARED) Child version* questionnaire (Birmaher, 2012)?

- Is there a correlation between the UPR scores and the presence of symptoms which may indicate symptoms of Panic Disorder?
- Is there a correlation between the UPR scores and the presence of symptoms which may indicate symptoms of Generalised Anxiety Disorder?
- Is there a correlation between the UPR scores and the presence of symptoms which may indicate symptoms of Separation Anxiety Disorder?
- Is there a correlation between the UPR scores and the presence of symptoms which may indicate symptoms of Social Anxiety Disorder?
- Is there a correlation between the UPR scores and the presence of symptoms which may indicate symptoms of significant school avoidance?

- Is there a specific primitive reflex profile in children who score high (greater than 25) on the SCARED scale?

Hypotheses. The hypothesis of a study is vital as it provides both clarity and direction for one's research and is a "hunch, assumption, suspicion, assertion or an idea about a phenomenon, relationship or situation, the reality or truth of which you do not know" (Kumar, 2014, p. 65). In order to begin investigating a hypothesis, a null hypothesis must be formulated (H_0) which is essentially when the research question is written as a statement and indicates that no relationship between the two variables exist (Kumar, 2014 & Rockinson-Szapkiw, 2012). In the section below the research questions are presented as null hypotheses for the current study.

H_0 There is no correlation between the UPR scores, as measured by the INPP Screening Test for Clinicians and Health Practitioners (INPP) and anxiety questionnaire scores,

as measured by the Screen for Child Anxiety Related Disorders (SCARED) Child version questionnaire.

H_1 There is no correlation between the UPR scores and the presence of symptoms which may indicate symptoms of Panic Disorder.

H_2 There is no correlation between the UPR scores and the presence of symptoms which may indicate symptoms of Generalised Anxiety Disorder.

H_3 There is no correlation between the UPR scores and the presence of symptoms which may indicate symptoms of Separation Anxiety Disorder.

H_4 There is no correlation between the UPR scores and the presence of symptoms which may indicate symptoms of Social Anxiety Disorder.

H_5 There is no correlation between the UPR scores and the presence of symptoms which may indicate symptoms of significant School Avoidance.

H_6 There is no specific primitive reflex profile in children who score high (greater than 25) on the SCARED scale?

Qualitative Research Questions

- What pre-natal factors are associated with symptoms of anxiety in children between the ages of 10-13 years who demonstrate the presence of UPR?
- What post-natal factors are associated with symptoms of anxiety in children between the ages of 10-13 years who demonstrate the presence of UPR?

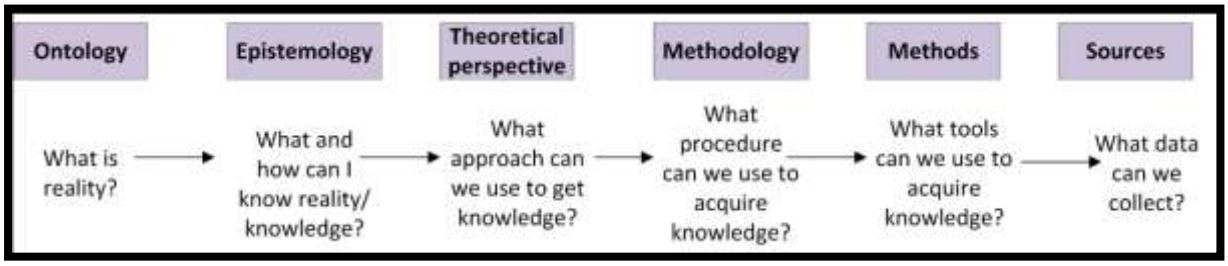
Research Paradigm

After deciding upon a research question, one of the first steps in designing a research study is to decide how the researcher will approach the technical aspects of the study, thus, the

following questions must be considered as the answers to them will give the research direction:

Figure 3.1.

Process of Mixed Method Research (Patel, 2015)



The research used an approach which adopts the view in which "qualitative and quantitative approaches can be combined in order to 'compliment' the advantages and disadvantages present within each" (Shannon-Baker, 2016, p. 325), hence, a pragmatic approach was adopted as no one view can be seen as superior (Ihuah, 2013). Pragmatism is based on the premise that an explanation will not be provided for the behaviours studied, but rather the beginning or starting point of an explanation will be initiated from the research (Creswell & Plano Clark, 2011). The pragmatic approach asserts that there are multiple realities to any research question and that the focus of the research question is on the "how, what and why" of the phenomenon being studied (Saunders et al., 2009, cited in Kilpinen, 2017).

Ontology is defined as "the nature of the reality" and following onto that, epistemology is the relationship that the researcher has with that reality (Creswell & Plano Clark, 2011). The research assumed an interpretivist philosophy as it enabled the study to determine the explanation for the existence of the phenomenon from an approach that deemed the researcher as part of the study (Creswell & Plano Clark, 2011). In an interpretivist paradigm, researchers are able to gain a greater understanding of the research topic while also understanding that there are multiple interpretations of the topic (Pham, 2018). A

disadvantage of this approach is that because the researcher is part of the research, the ontological views are often subjective and not objective (Pham, 2018).

Prior to the start of the 21st century, quantitative research and then qualitative studies enjoyed the lime-light in the research world (Creswell & Plano Clark, 2011). A while later, a third methodological or research paradigm came into being and co-existed with the first two paradigms (2011). Greene, Caracelli and Graham (1989) cited in Creswell and Plano-Clark (2011, p. 256) states that a mixed method study "includes at least one quantitative method and one qualitative method, where neither type of method is inherently linked to any particular inquiry paradigm". A mixed method design was adopted for the current study as neither a quantitative nor qualitative study was sufficient to account for the complexity of UPR and symptoms of anxiety, and so it was decided that combining the two methods would allow for a greater understanding of the research problem (Ivankova, Creswell & Stick, 2006).

As a mixed method approach to research includes both quantitative and qualitative strands, thus, a convergent parallel design was used. A convergent parallel design is one where both quantitative and qualitative data are collected simultaneously and analysed individually with triangulation of data taking place at the end of the data analysis process (Creswell & Plano Clark, 2011). In terms of this research the convergent parallel design fits well with the intentions of the research as this research focussed on collecting both quantitative and qualitative data during the same session. Firstly, in the data collection session, the collection of the quantitative data which is in this case the intake interview, the *INPP Screening test for Clinicians and Health Practitioners (INPP)* (Goddard Blythe, 2012) and *the Screening Child Anxiety Related Disorders – Child Version (SCARED)* (Birmaher, 2012) took place. The qualitative semi-structured parent interview which took place after the

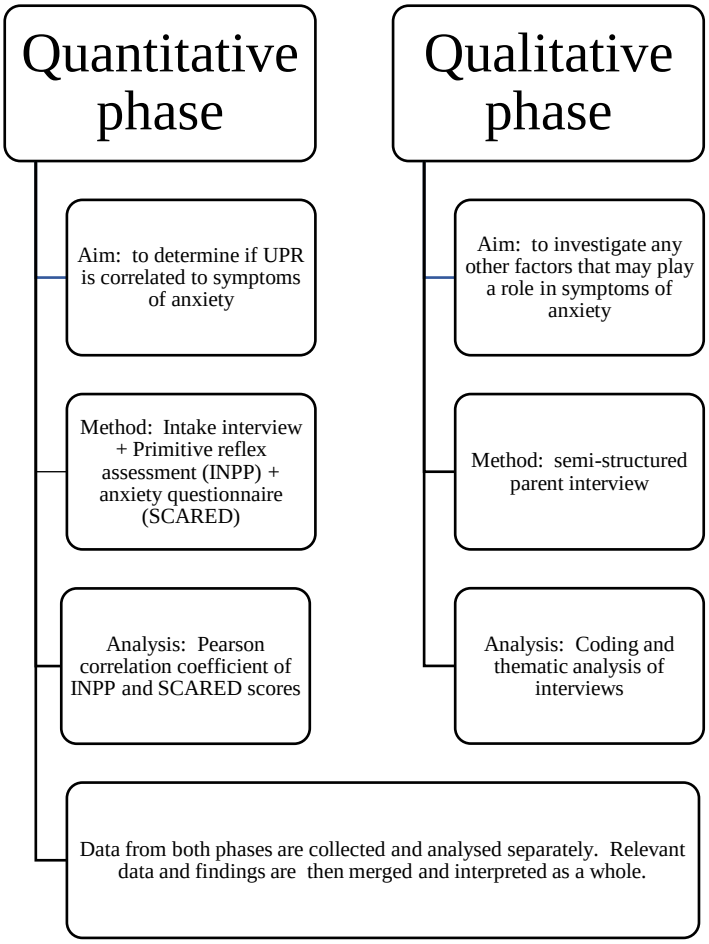
collection of the quantitative data was used to explore other possible factors that may have contributed to the scores of the INPP and SCARED questionnaire (Creswell, 2014).

Once the data of the two quantitative scales (INPP and SCARED) and the intake interview were analysed, the qualitative interviews were transcribed verbatim. The parent interview was analysed using the Tesch principles and used coding and thematic analysis in order to determine the themes that emerged from the semi-structured interviews. Thereafter, themes that were found to be consistent in the qualitative data were contrasted with the quantitative data in an effort to elaborate on the findings (Creswell & Plano Clark, 2011).

The data collection process can be summarised as follows:

Figure 3.2.

Convergent Parallel Design for Current Research



Sample

The quantitative sample size for this study was 20 participants (which is a parent and the child as one set of participants). For the current research, non-randomized sampling was used, namely convenience and purposive sampling.

Inclusion and Exclusion Criteria

The researcher chose the age group of 10-13 years of age as these learners were still in the primary school education phase. It was essential for each child to have UPR as this was one of the variables under investigation. After assessment, all 20 children were found to have UPR at varying levels, thus all 20 children assessed were included in the sample. Child participants were not considered if they were in high school as this would likely have added to the anxiety scores (Galton, Gray & Ruddock, 1999). Learning support is a big part of schooling in both primary and high school in South Africa, however more emphasis is placed on the learner support in primary schools as primary schools have a teacher who is in a dedicated learning support position at a school. This position is known as an ELSEN (Learner with Special Educational Needs) teacher or educator (Manganyi, 2019). According to research by Bojuwoye et al., (2014) in which learners' experiences, of learning support in the Western Cape province of South Afirca, were investigated, primary school learners reported "major sources of support as teachers and peers" (p.10) where high school learners reported that "support from teachers seemed less significant" (p.10). During later phases of school other factors such as a change in school (from primary to high school), potential change in friendship groups, puberty and the increased workload are shown to increase stress and anxiety in learners and as such these factors will not impact as heavily on a learner who is familiar with their primary school surroundings (Galton, Gray & Ruddock, 1999). This impacted on the researcher's decision to keep the age group of the participants to the last phase of primary school, namely grades 4-7. In South African schools, learners begin with

formal examinations in grade 4 (intermediate phase) and after they have completed grade 7 (in the senior phase), these learners will generally move to the high school phase which is often at a different school altogether. Formal school examinations bring with it great amounts of anxiety and while no studies were found on the prevalence of anxiety in primary school children in the age group relevant for this intended research, an article on the prevalence of anxiety in grades 11 and 12 was consulted. The article by Flisher et al. (2012) regarding the mental health of children and adolescents in South Africa, reported that according to their research the prevalence rate of anxiety of grade 11 learners was 57.2%, 65.4% in grade 12 learners and 87% of those grade 12 participants reported to be writing a test or examination within the two weeks following the study. Although my research was not focussed on examination anxiety, this could have been a contributing factor to the symptoms of anxiety in the age group sample of the current research. The current research did not control for examination anxiety. The sample included any learners from any racial group, gender and socio-economic background as long as they were enrolled in formal education at a registered primary school in the Western Cape Province of South Africa. Although the study was open to all who met the above inclusion criteria, parent availability was a key factor. Since the assessment took approximately 2 hours to complete, a number of parents opted not to do the assessment. All of my participants came from well-resourced schools as the learners were referred to me by teachers who had attended my South African Council of Educators (SACE) accredited workshops about primitive reflexes. This meant that parents and children outside of the northern suburbs of Cape Town were unlikely to know of the assessments and therefore may have negatively impacted the sample and ultimately the results of this study as the research may have been inaccessible to participants from under resourced schools.

Convenience Sample

Firstly, a convenience sample was used. Seven of the twenty participants were collected using this method, as they were parents who enquired with the researcher regarding a primitive reflex assessment for their child and who have a child between 10 and 13 years of age. These parents were willing to participate in the research. A convenience sample is one where the participants are accessible to the researcher and likely willing to participate in the research but also fulfil the inclusion criteria (Teddlie & Yu, 2007).

Purposive Sampling

Secondly, the researcher employed purposive sampling, which is usually used in qualitative research, to canvas the remaining 13 participants. Purposive sampling implies employing very specific criteria in order to include participants in the research (Teddlie & Yu, 2007) as only those parents contacting me with a child between the ages of 10 and 13 years were asked to participate in the research. The same criteria were used to collect the seven participants in the convenience sample. When the researcher did not have enough success with the above-mentioned sampling process to obtain the desired sample size the researcher advertised on Facebook – Mind Moves with Tamara (Addendum F) requesting people to contact the researcher if they have a child who fits the inclusion criteria and who would like a Primitive Reflex Assessment done for their child. The post also requested that people share the Facebook post in order to increase the chances of obtaining the desired sample size. Therefore, the purposive sampling technique was used again in the size of the qualitative sample.

Qualitative Data

All the qualitative semi-structured interviews were transcribed verbatim by the researcher. After the quantitative data were analysed the qualitative data were divided into two groups

based on their SCARED scores, the anxious group and the non-anxious group. The SCARED questionnaire (Birmaher, 2012) notes scores that were greater than 25 indicated the possible presence of an Anxiety Disorder. Of the 20 participants, 13 scored a SCARED score of greater than 25 and were included in a group noted as the anxious group while those who scored lower than 24 were grouped as the non-anxious group (n = 7).

Research Instruments and Assessment Procedure

As discussed in Chapter 1, the aim of this research was to explore the relationship between UPR and symptoms of anxiety in a sample of children between 10 and 13 years of age.

All assessments started with a phone call, email or WhatsApp message to the researcher to enquire about a reflex assessment. The first response was to obtain an email address and email the Informed Consent Form (ICF) to the parent which explained in detail what the research was about and the assessments that were to take place. The parent was requested to read the form and to advise the researcher if he/she had any questions. Once the parent replied that he/she was comfortable to participate in the study, the researcher began to arrange a date that was mutually convenient. All assessments were conducted after the end of the school day and were conducted in English. Arrangements were confirmed via email and a reminder WhatsApp message was sent on the day of the assessment. Once the researcher collected the parent and child from the meeting point the researcher walked the parent and child participant to the classroom where the assessments took place. The classroom is an outside prefabricated temporary classroom. There are 30 desks and chairs and one teacher's desk at the front of the class. There are posters on the walls and a white board with a projector at the front of the classroom. The surface on which the testing took place was a black foam mattress in order to ensure that the child participant was comfortable during the testing process.

Whilst walking towards the class from where the participants were collected the researcher spoke to the mother and/or father and asked the child participant questions about their school and their day in an effort to build rapport. Once at my venue the researcher spoke with the child participant in the presence of the parent, in which conversation various questions were intended to create rapport with the child. The researcher asked the child participants various questions about the child's school, how the school day went, what sports or activities the child participant was involved in and about their favourite subjects. In addition, the researcher asked the child participant if they knew why they were coming to the researcher. After hearing the child participant's response, the researcher explained the process using language relevant to the child's level of understanding. The researcher then proceeded to obtain the child participant's permission by asking if they would assist in the research. The researcher emphasised that both the child and parent participant were allowed to say no if they did not want to be assessed and that there would be no consequences for deciding to cease the assessments. The researcher requested that the parent and child participant read and, if they were certain they would like to proceed, sign the ICF. Thereafter the researcher commenced with the questionnaires and assessments.

Firstly, the intake interview, then the INPP test, the SCARED questionnaire and finally the qualitative interview were completed. For the qualitative semi-structured interview, the child participant was asked to wait outside of the classroom or the parent arranged for the child to be collected, in order for the feedback from the primitive reflex assessment to be given and for the qualitative parent interview to take place without the child being present. All interviews and questionnaires were conducted in English. In the following sections each assessment and questionnaire will be discussed in detail.

Intake Questionnaire

The first part of the quantitative data collection took place by conducting an intake interview in which a general history of the child and parent was collected in terms of answering of closed-ended yes/no questions. The child was encouraged to play or wait outside, most did whilst others read, played on the parent's cell phone or drew on the board. Since the questions were fairly straightforward yes/no answers the parent did not insist that the child should be out the classroom for the initial questionnaire.

The researcher was bound by policies and procedures of her practice, which states that an intake interview (Addendum A) must be completed as part of a primitive reflex assessment. Permission to use the intake interview as part of this research was granted (Addendum K). After researching primitive reflexes, it was found that two other primitive reflex assessing organisations also made use of an intake interview, which contained similar questions to the intake interview used by the researcher (De Jager, 2015; Hellerstein, 2010; INPP, 1999). The questionnaire was used to find out about various aspects of the child's and parent's background. Questions ranged from questions about pregnancy, birth, infancy, childhood and family history in terms of learning disorders (see Addendum A). The questions on the intake interview, were based on pre-natal and post-natal factors that could have had an effect on the child participants' development. The questions asked in the parent questionnaire were also noted as intake interview questions from two other authors, Goddard Blythe (1999) and Hellerstein (2010), in order to have a base knowledge of the child and parent participant from which to begin the other assessments, and finally the qualitative semi-structured parent interview (De Jager, 2015). The intake interview, although a practice requirement, assisted the researcher in obtaining preliminary information regarding pre-natal and post-natal factors relating to the child and parent participants as well as family context. The intake interview

also contributed to creating rapport with the parent participant and was a starting point for the qualitative semi-structured interview that followed later in the data collection process.

The INPP Screening Test for Clinicians and Health Practitioners

The primitive reflex assessment is adapted from Sally Goddard Blythe's *The Institute for Neuro-Physiological Psychology Screening Test for Clinicians and Health Practitioners* (INPP) (Goddard Blythe, 2012). The Moro Reflex, Asymmetrical Tonic Neck Reflex (ATNR), Symmetrical Tonic Neck Reflex (STNR), Tonic Labyrinthine Reflex (TLR), Rooting and Sucking Reflex and Palmar and Plantar Reflex were assessed for each child participant. According to Goddard Blythe (2012), the ATNR, STNR and TLR are reflexes that have consistently been found to be unintegrated in school aged children where the child has a barrier to learning. The Moro Reflex has been found to elicit the fight or flight reaction while stimulating the breathing centre of the brain (Konicarova & Bob, 2012). The Moro Reflex when unintegrated beyond four months of life has been linked to "increased sensitivity" (p. 31) of the senses as well as preventing the incoming sensory information from reaching the "conscious brain to analyse the situation and direct an appropriate response" (Goddard Blythe, 2012, p. 31).

The child participant was asked to please remove their shoes for the *INPP Screening Test for Clinicians and Health Practitioners* (Goddard Blythe, 2012) to be conducted in order to assess the child participant's primitive reflexes. Since the primitive reflex assessment requires that the researcher make physical contact with the child, the parent was requested to be present for the assessment. This is due to a number of reasons, firstly it makes the interpretation of the assessment simpler when the parents are present to notice the behaviour, secondly the child is often more at ease and, lastly, as part of the researcher's practice, policy states that another adult must be present in order to safeguard the assessor and child from

disputes later on, if a child felt uncomfortable performing the movements required for the assessment.

Each of the above-mentioned primitive reflexes were stimulated, observed and recorded. The child's response to the stimulus or action was observed and recorded on a 5-point scale ranging from 0 – no response to 4 – a strong primitive response indicating that the primitive reflex has not integrated. The researcher, bound by policies and procedures as a primitive reflex assessor, interpreted the results of the INPP screening test (Goddard Blythe, 2012) and discussed the results with the parent participant. The INPP screening test was developed by Peter Blythe in 1975 and later Sally Goddard Blythe took the knowledge gained from Peter Blythe in the medical field and adapted it to a classroom-based programme and named the test battery the *INPP Screening Test for Clinicians and Health Practitioners* (Goddard Blythe, 2015). Although there is limited research on the reliability and validity of the *INPP Screening Test for Clinicians and Health Practitioners* there are a number of practitioners who use Goddard Blythe's work to assess UPR, and on each of the websites relating to these tests, there are numerous testimonies (Pyramid of potential academy, n.d.; Hellerstein, 2010) on how primitive reflex integration has assisted children with various aspects of their schooling. There are also many studies conducted on primitive reflex integration and their impact on behaviour and learning in a school environment (Conyers & Wilson, 2015; Goddard Blythe, 2012; Hoag, 2015). The aforementioned websites do not contain peer-reviewed articles on primitive reflex assessment and integration, they are, however, parents' personal accounts of the changes that they have seen in their children after they have followed a primitive reflex integration programme. Although these primitive reflex assessments are widely used in practice across the world, the lack of research into their reliability and validity is of serious concern to the researcher and needs to be addressed in future research into primitive reflexes.

Screen for Child Anxiety Related Disorders (SCARED) Child version Questionnaire

Before the start of the SCARED questionnaire (Birmaher, 2012), the child participant was asked whether they would like the parent to be present during that part of the procedure, the majority of the participants wanted their parent to be present (n = 17), only three child participants opted to complete the SCARED questionnaire without their parent being present. Since the child participant could decide whether or not to have the parent participant present, any issues of confidentiality about the child's responses would not have been an issue as the child could choose with whom they disclose the answers. The child participants who opted to have their parents leave scored low (below 25) on the SCARED questionnaire which meant that no intervention was required by the parents. When the parent participant re-entered the classroom for the qualitative interview none of the parents asked about the child participants' responses to the SCARED questionnaire but were more interested in the interpretation of the INPP.

The Screen for Child Anxiety Related Disorders (SCARED) Child version questionnaire (Addendum B) contained 41 items that the child was required to answer by rating each item on a three-point scale namely: "Not True or Hardly Ever True" with a score of zero; "Somewhat True or Sometimes True" or "Very True or Often True" with a score of one, and "Very True" or Often True" with a score of two. The instructions below the SCARED questionnaire (Birmaher, 2012) recommends that for children between 8 and 11 years of age, the researcher explain all questions or have an adult present to answer any questions (Birmaher, 2012). For the sake of consistency across the age groups the researcher opted to read each phrase to all child participants and when the child participant requested clarification or when the body language indicated confusion, the phrase was explained to the child participant.

In the SCARED questionnaire Birmaher (2012) states that a score greater than 25 may indicate the presence of an Anxiety Disorder. The SCARED questionnaire further shows specific scoring for a number of symptoms of Anxiety Disorders within the items scored. The questionnaire shows scores for symptoms of Panic Disorder, Generalized Anxiety Disorder, Separation Anxiety, Social Anxiety Disorder and Significant School Avoidance as sub categories for the questionnaire. The reliability and validity of the SCARED questionnaire in a South African context has not been established but has been reported on in a few other countries. In an article in which the psychometric properties of the SCARED questionnaire were studied and in which comparisons were made between an Italian and Dutch population the questionnaire, as a screening tool for child anxiety, was found to have good reliability across all five factors (Panic Disorder, Generalized Anxiety Disorder, Separation Anxiety Disorder, Social Anxiety Disorder and Significant School Avoidance) and good test-retest reliability and discriminant validity (Crocetti, Hale, Fermani, Raaijmakers & Meeus, 2009). In an article by the developers of the SCARED questionnaire, a replication study was conducted and it was found that the SCARED questionnaire is a reliable and valid screening instrument for childhood anxieties (Birmaher, 1999). Cronbach's alphas were reported to be internally consistent with $\alpha = .89$ and .94 for the total anxiety scores for the Italian and Dutch samples, respectively (Crocetti, et al., 2009).

Parent Semi-Structured Interview

As noted previously a mixed method study was selected due to the complex nature of the Anxiety Disorder and thus a semi-structured interview was included in the data collection process. The purpose of the semi-structured interview is to gather information about the topic from someone with personal experience of the topic (DeJonckheere & Vaughn, 2019) which is in this case the parent. All of the parent participants were mothers, except for one

father. In a mixed method study, semi-structured interviews can be used to explore new concepts or to give greater clarity on the quantitative results (DeJonckheere & Vaughn, 2019). In this study, the intake interview was used to make decisions about which factors to further explore in the qualitative semi-structured interview. Since the researcher had already collected important information from the intake interview, the aim of the qualitative semi-structured interview was to explore the parent's views, including what the parent considered significant and unique, in relation to pre-natal and post-natal influences. There are numerous environmental, genetic and situational factors (Ballas, 2017) that could impact on a child's experience of anxiety, thus a qualitative interview was included to account for any other factors that may have affected the SCARED scores.

The qualitative interview included five open-ended questions, some of which were an overlap of the closed-ended, yes/no questions asked during the intake interview. The purpose of these questions were to allow the parent to elaborate on the intake questionnaire information and for a journey of discovery to begin with the parent giving context to the child, parent and family. The semi-structured parent interview took place at the final stage of the assessment process without the child being present. This was to enable the parent to answer freely without the child overhearing the interview. Care was taken to be sensitive to the parent participant and the information shared. With the parent participant's permission, the interview was voice recorded. The questions relating to this are found in Addendum C.

Data Analysis

The research methodology of a convergent parallel design led the data analysis process. Convergent parallel design is the most common approach to mixed method research and was originally referred to as a triangulation design, as both sets of data were analysed to compare and contrast the results from both strands, with the goal of developing a holistic

understanding of the concept under investigation (Creswell & Plano Clark, 2011). This model is a good fit for the current research as it makes allowances for both the qualitative data and the quantitative data to be explored, to gain a deeper understanding of the factors and their relationships with symptoms of anxiety in children. The aim of this study was to determine whether a relationship exists between UPR and symptoms of Anxiety Disorder in children by studying the INPP scores and the SCARED scores. The analysis of the data for each instrument is discussed below.

Intake Interview

The intake interview (Addendum A) contained 63 phrases which the parent participant answered with "yes" or "no" where applicable. After the collection of data each item was captured on an Excel spreadsheet in columns to correspond with the correct participants' unique code. The data were grouped according to the SCARED scores, namely the anxious group and the non-anxious group. The anxious group obtained SCARED scores of 25 and above, whilst the non-anxious group scored 24 and below on the SCARED scores. This gave a visual representation of the data and a good starting point for the remainder of the data analysis and interpretation (Addendum H).

The INPP Screening Test for Clinicians and Health Practitioners

The INPP screening test (INPP) was administered next, to determine the scores of the UPR. The INPP is an assessment which uses the observation of movements in response to a stimulus to determine the extent of the integration of a primitive reflex. The responses were coded according to the standardised coding applicable to each primitive reflex assessed (Goddard Blythe, 2012). They were coded from 0 – 4 depending on the level of integration, with zero (0) representing full integration and 4 being the highest score of "unintegration".

The scores for each primitive reflex were recorded on an Excel (2013) spreadsheet in a column indicating the reflex at the top and the score according the child participant's unique number (Addendum G). The scores of the eight primitive reflexes that were assessed were recorded. All eight of the reflexes had a two-part score, (front/back; left/right; up/down) meaning sixteen scores were entered onto the Excel spreadsheet. In the last column a total score was calculated by adding all the scores together. The researcher opted to add both scores together to get one score per reflex out of a total of eight. This was done to simplify the results of each primitive reflex and was not calculated as an average in order to maintain the integrity of the reflex assessment. In the reflex assessment a score of 0 and 1 is generally insignificant but a score of 2 - 4 has an increasing impact on the functioning of a child, the closer they get to 4. By averaging a score of 4 and a score of 1 for example, the largely unintegrated score of 4 for the reflex is averaged out at 2.5 which may yield unreliable results. The frequency of the INPP scores are described in the table in Addendum G, and the internal consistency was calculated using Cronbach's alpha and elaborated on further in Chapter 4.

SCARED Questionnaire

The SCARED questionnaire was the last of the quantitative assessments to be completed. Here the response scores ranged from 0 – 2. The SCARED questionnaires were totalled according to the scoring sheet instructions (Birmaher, 2012). The six categories were calculated for a total score; Panic Disorder; Generalised Anxiety Disorder; Separation Anxiety Disorder, Social Anxiety Disorder and School Avoidance were captured in columns on the same Excel sheet as the INPP scores. Each score corresponded with the participant's unique number.

Parent Semi-Structured Interview

After all the interviews were transcribed by the researcher, thus, the task of coding began. Coding can take place manually or by making use of a qualitative statistical package. Upon consultation with the UNISA writing centre it was advised that due to the small sample size, manual coding would be the simpler option. Microsoft Word (2013) was used to transcribe the data and thus for convenience was also used in the coding. First, all twenty transcribed interviews were copied and pasted into one large Word document but were grouped according to those who formed the anxious group (SCARED score >25) and those who were part of the non-anxious group (<25). This was done to differentiate between the two groups and to see if any of the themes uncovered were unique to one group or existed across both groups. The first step according to Tesch (1990) is to read all of the interviews. The researcher read these twice in order to gain an understanding of the data and to ensure that the researcher had an overall impression of the data (1990). Step two, of the Tesch steps, is to select one interview and to read it again and to find out exactly what the essence of the interview is, whilst writing notes in the margin. The researcher used Microsoft Word and so used the highlight function on this program to highlight information from the interviews that may give some insight into the anxiety scores that were noted from the SCARED questionnaire. After highlighting the relevant words, phrases and sentences the researcher used the comment function to begin considering themes under which each of the highlighted ideas could belong (Creswell & Plano Clark, 2011). This was done for the remaining interviews too. Step three indicates that the topics noted in step two must be put into a list with similar topics clustered together (Tesch, 1990). The main topics were then entered onto an Excel sheet with similar topics grouped together. Step four, according to Tesch (1990), explains that the researcher had to go back to the data and abbreviate the topics to form codes. Then the researcher had to write the codes next to the appropriate segments or create

new codes if they did not fit with the codes already entered. Step five, after reviewing the codes, involved deciding on a category name and entering the relevant codes under each category heading. It was important to try to reduce the number of categories if the codes were related or similar. Once the categories were confirmed it was necessary to abbreviate each category heading into a simple heading and to alphabetise the codes. All of the data were then assembled according to categories and another analysis of the data was performed. This was step seven. The final step in the process was to recode the existing data, if necessary. Finally, five themes emerged. The document was then sent to the researcher's supervisor in order to verify the themes. A co-coder is a researcher who analyses a qualitative interview in order to determine whether any additional themes emerge, a co-coder also assists with the validity of the coding (Creswell & Plano Clark, 2017).

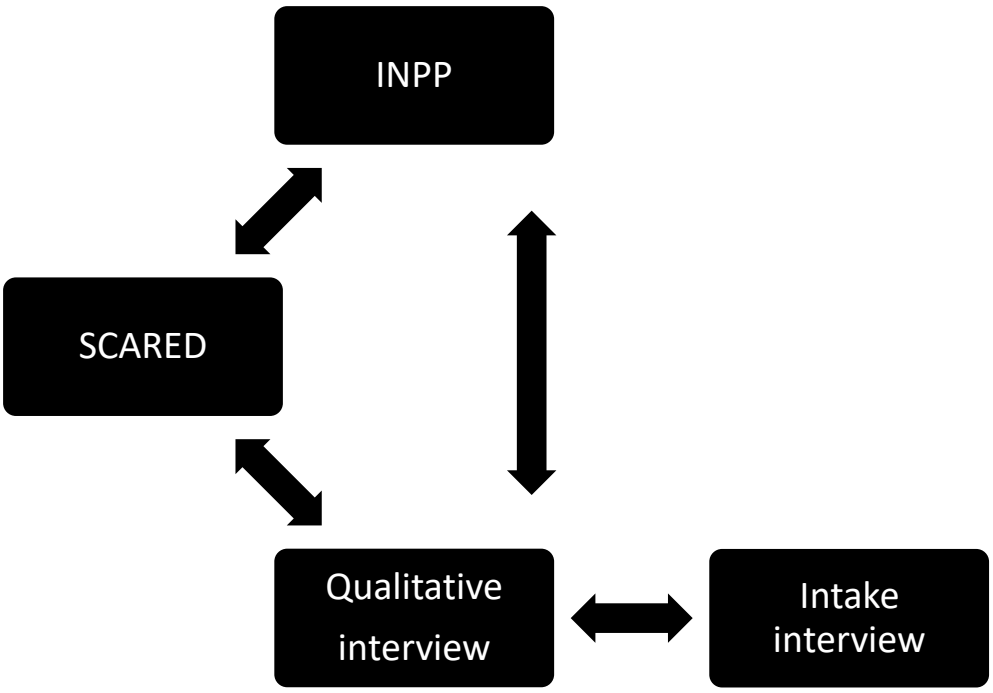
Triangulation of Data

Once all the information for the quantitative data were recorded and organised the process of data analysis began. The first step was to determine whether or not a relationship exists between the INPP scores and the SCARED scores. This was done by performing a Pearson correlation test in Excel. The two columns were highlighted with the total INPP score (x) and total SCARED score (y) and the Excel Correlation function was used. The correlation was then calculated by hand and then checked again using an online correlation calculator. The probability was also noted.

Triangulation of data is the process by which data is compared and contrasted in order to validate the findings (Creswell & Plano Clark, 2011). The current study made use of methodological across-method triangulation. This process involves combining quantitative and qualitative data collection techniques (Bekhet & Zauszniewski, 2012). The triangulation process is summarised in the diagram below.

Figure 3.3.

Triangulation of Data from the Intake Interview, SCARED, INPP and Qualitative Data in Order to Validate Results



Information summarised from the intake interview was read with the themes that emerged from the semi-structured interviews. The intake interview was used to inform, support and explain information received from the parent participant during the qualitative semi-structured interview. The sample was divided into two groups, namely the anxious group which were those child participants who had scores greater than 25 on the SCARED questionnaire and the non-anxious group, those child participants with SCARED scores of 24 and below. Thereafter, the information obtained from the SCARED questionnaire (Birmaher, 2012) and the INPP test (Goddard Blythe, 2012) were studied for each participant. This was done to determine whether any deductions could be concluded from the range of data and to determine whether these themes were only found in the anxious group or if they were consistent across both groups. Chapter 4 will discuss the results of this triangulation.

Limitations of the Study

The research that was conducted used data collected from a child and parent participant, making up a pair (n = 20). Twenty pairs were included in the current research. The SCARED questionnaire is a self-reporting questionnaire that screens for symptoms of Anxiety Disorder and although easy to use, convenient and freely available, it is also open to limitations due to issues relating to the age of the child participants', social desirability, recall bias, the sampling method and accessibility, which is discussed below.

Age of the Child Participant

The child participant was between 10 and 13 years of age at the time of the study. Developmentally there is a large gap between an 11 and a 13 year old. An 11 year old child is still in the concrete operational stage where the thinking process only begins to be more logical and organised whilst 12 to 13 year old children are in the formal operational stage where abstract reasoning and processing begins (Jahoda, 1964; Shaffer & Kipp, 2014). In the current research, 12 out of 20 of the child participants were between the ages of 10 and 11 (mean SCARED score 31.17) with the remaining child participants ages ranging from twelve (n = 4) to thirteen (n = 4) and with a mean SCARED score of 32.63 for these two ages. At the age of 11 and younger, a child is not yet able to think as logically and in as organised a way as a 12 or 13 year old which could result in the younger children having exaggerated symptoms of anxiety (Shaffer & Kip, 2014).

Social Desirability

Bruner and King (2000) noted social desirability bias as one of the most common limitations which affects the validity of a study. Social desirability is the tendency of research subjects

to give socially desirable responses instead of representing their true, perhaps less desirable response (Bruner & King, 2000; Grimm, 2010). The child participants were asked questions about their experiences in the past three months and asked to recall whether the experience in question was "Not True or Hardly Ever True"; "Somewhat True or Sometimes True" or "Very True or Often True". When a child participant gave his/her response to each item of the SCARED questionnaire the researcher chose to take the response at face value, and to not question the response as it could have had a negative effect on the relationship between the researcher and child participant. After the assessments were concluded and the parent participants and researcher engaged in the qualitative interview; in two of the cases the parent participant noted that they thought their child was not being honest in their responses to the SCARED questionnaire. The researcher did not enquire why the parent participant thought the child was not being honest. A factor, to the advantage of the study, is that when a child was in fact an anxious child, the parent would discuss it in the qualitative interview. This ensured that the data could not be entirely manipulated by the child participant.

Recall Bias

Recall bias is a common error in research where a participant may erroneously give incorrect information because of the time that has elapsed between the event and the participation in the research (Althubaiti, 2016). During the qualitative assessment, the parent participants were asked questions relating to the pregnancy and birth of their children. For parents who had their first born participate in the study the recall was somewhat easier for them than for those who had their second or third born child participate in the study. Mullen (1994) found that the amount of maternal talk decreases with birth order and that the first-born child usually enjoys more maternal talk which may have an impact on the ability to recall events. Since the minimum age of the child participants is 10 years, the parents were asked to recall

information that was at a minimum, ten years old. To assist in reducing the recall bias, sub questions were asked in order to prompt the parent participant's memory

Sample Size

The error of sample size lies in having a very small sample which means that finding significant relationships is difficult (Price & Murnan, 2004). The sample size of 20 pairs (child and parent participants) was difficult to obtain due to the nature of the research and the time needed to complete the entire process which may have been a deterrent to many potential participants. The sample size limitation was addressed by the incorporation of a qualitative interview which was used to confirm, reject and explain the information gained from the limited quantitative sample size (Thurmond, 2001).

Accessibility to Research

The sampling process was non-randomised, however, advertising for participants was done by sharing the advert with school teachers in the surrounding areas, and advertising on Facebook. However, the demographics of the sample was 80% white participants with only 20% being coloured. No black, Asian or other racial groups responded to the advertisement. Although not the intention of the sampling techniques adopted, perhaps all racial groups did not have equal opportunity to participate in the current research.

Ethical Considerations

The UNISA ethics policy outlines four basic moral principles to which all research should adhere (University of South Africa, 2007). The four moral principles as contained in the UNISA ethics policy; namely autonomy, beneficence, non-maleficence and justice are aligned to the Belmont report (Office for Human Research Protections, 2016) and the Singapore statement (Anderson, 2010). The Belmont report lays out respect for persons,

beneficence and justice as their primary principles for ethical research (Office for Human Research Protections, 2016) whilst the Singapore statement contains honesty, accountability, professional courtesy and fairness as well as good stewardship as the core ethical principles for conducting ethical research (Anderson, 2010). Regardless of the ethics policy adopted, the underlying right remains the same, the respect for Human Dignity as outlined in the South African Bill of rights (Constitutional Rights, 2014). The Bill of Rights (No. 108 of 1996) states that:

> "Everyone has an inherent (inborn) dignity and the right to have his or her dignity respected and protected. No person should be perceived or treated merely as instruments or objects of the will of others. Every person is entitled to equal concern and to equal respect. This right is related to our constitutional purpose of establishing a society in which all human beings will be given equal dignity and respect" (p.9).

The research, although based on all ethical principles, utilised the UNISA policy of ethical principles as the guiding document for the execution of the current research.

Autonomy

This principle entails that "research should respect the autonomy, rights and dignity of research participants" (University of South Africa, 2007, p. 11). Autonomy is the ability of an individual, in this case the child and parent participant, to make a decision regarding being involved in the research and to respect their rights and dignity (UNISA, 2016). The entire research process was conducted in a way in which the participants' rights and dignity were respected by allowing both the child and parent participant the option of being involved in the research and the ability to withdraw if they felt that they did not want to continue. During

each of the assessments, the procedure was explained to the child and parent participant and permission was requested to continue. During the primitive reflex assessment when it was necessary to make physical contact with the child, permission was requested from both the parent and child participant before the assessment commenced. The primitive reflex assessment was performed in a clinical manner according to the assessment guidelines (De Jager, 2015; Goddard Blythe, 2014). If the child or parent participants were to have exhibited signs of distress during the assessment, the researcher allowed time for the participants to take a break from the assessments, to talk about the feelings associated with the underlying distress, and to continue at another time or if the participant so desired to withdraw from the study. None of the twenty sets of participants showed severe distress or opted to withdraw from the study.

In the SCARED questionnaire the child participant was required to answer questions relating to their feelings of anxiety. This may have required the child participant to remember feelings of anxiety and may have been uncomfortable for them, however the child participant was made aware of the option to withdraw or was asked if they would like to stop answering the questionnaire, continue at a later stage or withdraw from the study. The child participant's emotional state was noted, if the child appeared distressed by the SCARED questionnaire's questions, time was given for the child participant to process their emotions. Thereafter the child participant was asked whether he/she would like to take a break and continue later or if they would like to proceed with the remainder of the questions. Of the children who participated, no negative emotions were noted and the child participants answered the questions without emotional distress.

In the qualitative strand, the parent participant was asked open ended questions as noted in Addendum C. This was done without the child participant being present, to ensure that the parent was able to speak freely. The parent was made aware of the process for the semi-

structured interview by means of the ICF and again before the interview. If a parent had shown feelings of discomfort when discussing their child's history, the researcher paused and waited to determine the extent of the emotional state. One of the parent participants became emotional and the researcher paused to allow the parent participant time to breathe. The researcher asked the parent participant if she would share why she was feeling emotional and the parent participant responded that she was just remembering a difficult time in her life. The parent participant took the pause to breathe, apologised for the emotion and indicated to the researcher to continue by continuing to answer the question posed previously. At the end of the qualitative interview, the researcher asked the parent participant whether she was fine with what had transpired during the interview. The parent participant had assured the researcher that she was fine and no further intervention or referral was required.

Beneficence

Beneficence is research that is done for the benefit of others and that contributes to the welfare of other people (UNISA, 2016). The research, with its focus on symptoms of anxiety, may not have yielded any immediate results for the parent and child participants, however, the primitive reflex assessment when interpreted and discussed with the parent, and the interpretation of the UPR, brought about a sense of understanding of their child. A home programme was prescribed to the child and parent participants to assist in integrating the UPR. The primitive reflex assessment is an assessment developed by Goddard Blythe (2012) which uses various techniques to assess whether a primitive reflex has integrated and become part of the body's skilled and controlled movement.

After the reflex assessment was conducted, the researcher discussed the results with both the parent and child participant. The discussion was done in such a way that the child was able to have a greater understanding of how his/her brain and body works in terms of

learning, as well as about how to improve on his/her learning by integrating UPR and building sensory-motor neural pathways to enable the child to learn better in a school setting. There was time available for questions from both the child and parent participant, which was encouraged numerous times. After the completion of the reflex assessment, a reflex assessment report was sent to the parent participant via email which summarised the discussion that took place during the session. The report included the primitive reflex scores and how the primitive reflexes may be affecting the child participant's ability to concentrate, learn and progress in a classroom environment. Included in the session and later in the report were controlled movement exercises and instructions of how to complete the exercises. Controlled movement is used to mimic the UPR that has not yet integrated. By doing this, the development of the neural pathway can be completed and integrated in order for higher functions associated with learning to take over (Masgutova, 2018).

In the qualitative strand, where the parent participant was involved in a semi structured interview about their child, one parent participant (as noted above) become somewhat emotional during the qualitative interview. The parent participant, after the researcher paused, opted to continue with the interview.

Nonmaleficence

Nonmaleficence is the principle which states that the research should not harm the research participant, which in this research is the child and parent participant (UNISA, 2016). All assessment and interviews were conducted while continuously noting the emotional and physical state of the parent and child participant. The adult participant was asked questions for an intake interview at the start of the assessment process and a qualitative interview was conducted at the end. Neither the intake nor qualitative interview were intended to cause harm to the research participant. Only one of the twenty parent participants became

emotional during the qualitative interview, but after taking some time to breathe and compose herself, the parent participant chose to continue. The child participants were assessed for UPR and were asked questions from the SCARED questionnaire. The SCARED questionnaire was developed to screen children for symptoms of anxiety and although the intention was not to cause discomfort, the possibility for this still existed. The parent participant was present during all but three of the twenty SCARED questionnaires. In the twenty SCARED questionnaires administered to the children participants, no changes in the child participants' emotional persona were noted. The INPP was designed to be unobtrusive, however, with some children being physically touched during the primitive assessment some discomfort was noted (n = 2). Before each of the assessments of UPR was initiated, the process was explained and permission requested to touch the child participant, if touching was required. Each time the child participant gave permission for the assessment to continue. If a child participant displayed feelings of discomfort, the assessment was halted and time given in order to diffuse the emotions and to attempt the assessment again. This was done by allowing the child participant time to ask questions, to go to their parents for assistance or to share their concerns with me. If the feelings were still noted, the child participant was asked whether they would like to continue or move on to the next reflex assessment. In the sample none of the child participants opted to move on to the next reflex and all of the reflex assessments were completed. The SCARED questionnaire is a questionnaire that requires the child participant to merely rate the items in the question in terms of how true these items were for them, in the past three months. In the parent interview, the questions were aimed at being open-ended in nature and thus were designed to be a journey of discovery, allowing the parent participant to reveal as much as he/she feels comfortable with revealing, whilst the researcher gently probed for more information where additional information was relevant.

Justice

In the context of research, justice means that "the benefits and risks of research should be fairly distributed among people" (UNISA, 2016, p.11). The participants who agreed to be involved in the research generally came from neighbouring schools in the area of the researcher's practice. No criteria on race and gender were dictated, however, the racial makeup of the sample was mostly made up of white child and parent participants (n =18), only two of the participant sets were coloured (n = 2) and there were no participants from any other racial group. This was likely due to the fact that the practice was set up in an area in the Northern Suburbs of Cape Town where the demographic is comprised of mostly white and coloured families. Another aspect of justice, for the child participant, about the risk of participating in the study, was that they may not have understood the benefit of the study before entering into it. Participating in the study was initiated by the parent participant in order to assist the learner in academic support. The parent participant would have understood that the risk of discomfort for the child participant in the assessment process would be counteracted by the feedback of the INPP which can assist the child participant in their academic progress once the PR was integrated. The child participant had the entire procedure explained to him/her in a way that was age appropriate for the child participant. During the assessment, the parent and child participants were encouraged to ask questions and to complete the recommended controlled movement exercises in order to assist the child participant with primitive reflex integration.

Confidentiality

All twenty sets of participants who participated in the research were assured of confidentiality and that all names would be redacted and an identifying code would be assigned to the paperwork and interviews of all the participants. The intake interview,

SCARED questionnaire and INPP scores were initially collected on hard copy. Thereafter the data were captured on an Excel spreadsheet. The qualitative questionnaires were voice recorded using the voice recorder application on the researcher's smart phone and immediately transferred to a secure pin enabled folder for transcribing. The laptop onto which the data were captured and the smart phone device on which interviews were recorded were password protected. The voice recordings were transferred to a laptop and deleted entirely from the smart phone once each transcription was completed. All data were backed up using the Google Drive application. This information will be stored for a period of 5 years. All data were saved in a composite sheet on an Excel document using an alphanumeric code in order to ensure that all information remains confidential.

Informed Consent

Upon enquiring with the researcher about participation in the research, the ICF (Addendum E) was emailed to the parent participant to read in order to gain a greater understanding of what the research process entailed and the purpose of the research. The parent participant was encouraged to ask any questions in order to ensure that the process of the research was clear to the parent participant. When the parent and child participant arrived for the appointment, the research process was explained to the child participant in language that was age appropriate. The child and parent participants were again encouraged to ask any questions they may have and were then asked if they would sign the informed consent form. This form was only available in English.

Summary

The researcher provided information on the research questions related to the current study. This data collection was based on the research design and convergent parallel design. The sampling process and research instruments were also discussed as well as how the data were

analysed. Finally, the limitations of the study were noted and the chapter concluded with the ethical considerations of the study.

Chapter 4: Results

Introduction

This chapter presents information obtained from 20 parent participants about their experiences of their child's prenatal and postnatal history. As detailed in chapter three, this study used a mixed method study which included a quantitative intake interview which guided the qualitative semi-structured interview. Thematic analysis was used to categorise information obtained from the parent participants into major themes and subthemes. Themes related to the parent participants' experiences of their child's development in terms of unintegrated primitive reflexes (UPR) and symptoms of anxiety were then presented. Themes were presented with quotes of the actual comments and statements derived from the transcribed interviews, which assisted in verifying those themes.

Of importance to note is that the themes identified in this study were not considered mutually exclusive but may overlap and may be repetitive. It is also important for the researcher to acknowledge that the 'lenses' through which the understanding and interpretation of themes occurred, may have been clouded. These themes are therefore not intended to represent an overall certainty about the realities of the participants of the research sample, but to serve as a starting point in this research area. The researcher also acknowledges that the emergent themes are not the only possible themes to describe the relationship between UPR and symptoms of anxiety. Future researchers, looking through their own lenses may discover different or add new themes than those highlighted by the researcher.

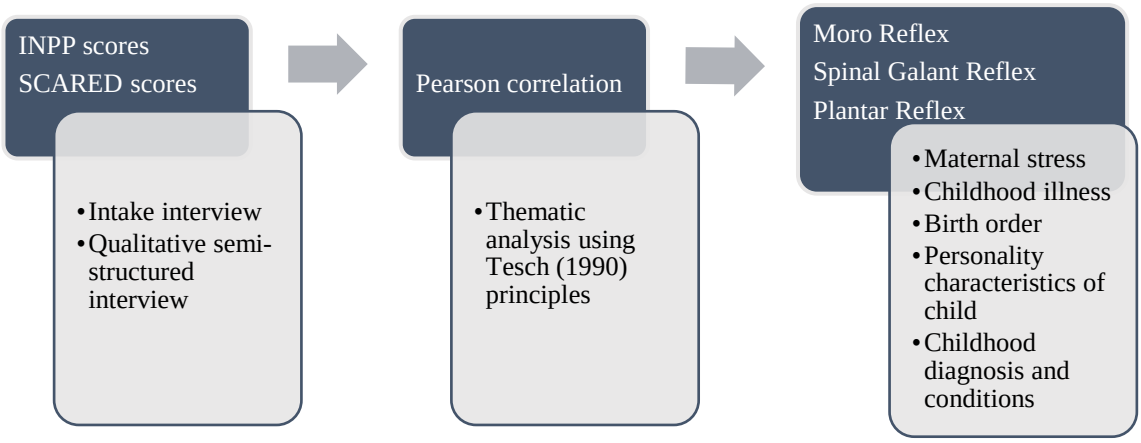
The purpose of this study was to determine whether a relationship exists between UPR and symptoms of anxiety in children between 10 and 13 years of age. Childhood anxiety is one of the most common childhood disorders and extends into adulthood, if not addressed in

the early years (SADAG, n.d.). Due to the lack of education surrounding mental health and the cost to treat mental health issues, few children who show symptoms of anxiety are referred for treatment (Muris et al., 2006). In her practice as a primitive reflex assessor, the researcher noted similarities in the symptoms of anxiety and UPR in children. The symptoms of UPR or neuromotor immaturity (NI) often share the same symptoms, such as increased heart rate, sweating, lack of focus and poor perception (Chow & Tsang, 2007). The research thus set out to explore the relationship between symptoms of anxiety and UPR. If a significant relationship was found then a primitive reflex assessment and integration exercises could lead to an alternative way of identifying and managing childhood anxiety. This could then indicate an inexpensive and easily accessible way in which to address symptoms of anxiety in children.

This section will follow the mixed design of the study, which is a convergent parallel design (Creswell & Plano Clark, 2011). The data analysis of the current study is summarised in the diagram below.

Figure 4.1

Summary of data analysis



The section will begin with a demographic breakdown of the sample, then the primitive reflex assessment results are presented. Thereafter the SCARED questionnaire will be reported on and followed by the reporting on the correlation relationships explored between the two quantitative assessments namely the *Institute for Neuro-Physiological Psychology Screening Test for Clinicians and Health Practitioners* (INPP) (Goddard Blythe, 2012) and the *Screen for Child Anxiety Related Disorders - Child version (*SCARED*)* questionnaire (Birmaher, 2012). The independent variable is the variable that is the influencer of the relationship being investigated while the dependent variable is one which is the outcome being investigated and is dependent on the independent variable (Field & Hole, 2006). In the current research the independent variable is the INPP scores and the SCARED scores, the dependent variable. Finally, the information and themes that emerged from the intake interview and qualitative interviews will be discussed and converged with the quantitative data to interpret the merged results.

Quantitative Strand

Quantitative data can be analysed manually or with a statistics package such as SPSS. The researcher chose Microsoft Office Professional Plus 2013, which contains Excel as part of the package. "Excel can be used for data entry, manipulation and presentation but it also offers a suite of statistical analysis functions and other tools that can be used to run descriptive statistics and to perform several different and useful inferential statistical tests" (Rose, Spinks & Canhoto, 2015, p2). Due to the small sample size (n = 20) of the current research as well as for cost and convenience Excel was used to analyse the statistical data. Excel is the package onto which the raw data were entered, so the researcher deemed it convenient to have the data analysed using the Microsoft Excel package as the data were readily available for analysis. Each test was run and the results were confirmed using online calculators.

Descriptive Statistics

A total of 20 pairs of participants were used, each pair consisted of a parent and child participant. All twenty of the participant pairs were included in the study (n = 20). Since the study was conducted to determine whether a relationship exists between UPR and symptoms of anxiety in children between the ages of 10 and 13, descriptive data pertaining to the child participants were collected. The child participant sample comprised of five female and fifteen male participants. The mean age of the child participants was 11 years and 4 months or 136 months (SD = 1 year/13.5 months). The ethnicity of the child participants were mostly white (90%) whilst the remaining 10% of participants were coloured. No child participants from other racial groups responded to the advertisement to participate in the research or were referred by teachers.

Table 4. 1

Participant's demographic makeup

	Ethnicity		Gender	
Age	White	Coloured	Male	Female
10 years old	4	1	3	2
11 years old	7	0	6	1
12 years old	3	1	4	0
13 years old	4	0	2	2

The above table gives a breakdown of the ethnicity and gender of the participants according to age group. The ages of the child participants were further broken down and converted to months in order to account for maturity and developmental phases. The table below indicates the age in months of each child participant at the time of the assessment. Included in the

table is the gender of each child participant as well as the total SCARED scores and total INPP scores.

Table 4. 2

Age in months for each child participant and gender with additional information included on the SCARED scores and INPP scores

Age groups in months at the time of assessment							
	120-125	126-131	132-137	138-143	144-149	150-156	157-162
Males	2	3	3	1	3	2	1
Females	3	0	0	0	0	1	1
Total (n)	5	3	3	1	3	3	2
Average SCARED scores	36.4	31.0	31.0	30.0	26.0	30.3	37.5
Males	38.0	31.0	31.0	30.0	26.0	26.0	34.0
Females	35.3	0	0	0	0	39.0	41.0
Average INPP scores	16.6	16.7	20.6	18.0	16.7	26.3	22.0
Males	26.0	16.7	20.6	18.0	16.7	23.0	25.0
Females	10.3	0	0	0	0	33.0	19.0

INPP Screening Test for Clinicians and Practitioners

The first assessment conducted with the child participant was the *Institute for Neuro-Physiological Psychology Screening Test for Clinicians and Health Practitioners* (INPP test) (Goddard Blythe, 2012). This assessment is a primitive reflex test which is used to determine the extent to which a primitive reflex is unintegrated. The assessment tested the following reflexes: Moro Reflex, Rooting and Sucking Reflex, Tonic Labyrinthine Reflex (TLR), Palmar Reflex, Plantar Reflex, Asymmetrical Tonic Neck Reflex (ATNR), Spinal Galant Reflex and the Symmetrical Tonic Neck Reflex (STNR). During the INPP assessment, the child participant is given specific instructions on what to do for each of the primitive reflexes that was assessed. The INPP assessment has very specific criteria for scoring for each of the

primitive reflexes assessed for the current research. The assessment rates the child participant's primitive reflex response on a scale of 0 (no response) to a maximum of 4 (a strong response). A score of 0 indicates that a primitive reflex has integrated, while a score of 4 indicates a highly UPR. A score of 2 indicates a considerable lack of integration of a primitive reflex and, therefore, where integration must be focussed on (Goddard Blythe, 2012). The INPP scores were recorded into an Excel spreadsheet as raw data. Each of the assessed primitive reflexes were made up of a total score for each reflex where the score of the forward/backward, left/right and supine/erect were captured. These scores are shown in Addendum G. The table below shows the overall frequency of responses per primitive reflex.

Table 4. 3

Number of children per rating score for each primitive reflex assessed

	Number of children receiving each rating score per primitive reflex assessment				
	0 (No response)	1	2	3	4 (Strong response)
Moro Reflex:					
Supine	0	10	3	4	3
Erect	10	5	2	2	1
Rooting Reflex:					
Left	12	4	2	1	1
Right	9	7	2	1	1
Tonic Labyrinthine Reflex:					
Forward	8	7	3	0	2
Backward	9	9	0	0	2
Palmar Reflex:					
Left	7	9	3	0	1
Right	5	8	5	1	1
Plantar Reflex:					
Left	4	5	2	4	5
Right	2	5	3	3	7
Asymmetrical Tonic Neck Reflex:					
Left	7	7	5	0	1
Right	7	6	6	0	1
Spinal Galant					

Reflex:					
Left	9	3	2	2	4
Right	8	4	1	2	5
Symmetrical					
Tonic Neck					
Reflex:	11	7	2	0	0
Front	15	3	1	1	0
Back					

The primitive reflex assessment was calculated to have good internal consistency, with Cronbach's alpha calculated using the following formula:

$$\alpha = \frac{k}{k-1} \times \left(1 - \frac{\sum \sigma \frac{2}{i}}{\sigma \frac{2}{x}}\right)$$

Cronbach's alpha considers r >0.7 to be acceptable and r >0.8 to be good in terms of internal consistency (Gliem & Gliem, 2003). The Cronbach's alpha of the reflex assessment was calculated as 0.77 which deems the internal consistency as good. The primitive reflex scores represent the independent variable of this study. The independent variable when represented on a graph is shown on the *x*-axis and is that variable which is used to detect the effects on the dependant variable, which is the symptoms of anxiety (Helmenstine, 2018).

SCARED Questionnaire

The *Screen for Child Anxiety Related Disorders - Child version* (SCARED) questionnaire is not intended to be a diagnostic tool but a screening tool for symptoms of anxiety in children (Rappaport, Pagliaccio, Pine & Jarch, 2017). This questionnaire is intended to be a starting point in the diagnosis of anxiety in children between 8 and 18 years of age and cannot be used to replace an interview and observation-based diagnosis for childhood anxiety (Ivarsson, Skarphedinsson, Andersson & Jarbin, 2018). The SCARED questionnaire is a self-report questionnaire which was developed to merely screen for symptoms of anxiety. The questionnaire is divided into several categories which screen for symptoms of anxiety

according to the DSM–5 sub-categories (APA, 2013). A total score is calculated from all the items and when the score is greater than 25 it may indicate the presence of an Anxiety Disorder (Birmaher, 2012). The SCARED questionnaire (Addendum H) further divides the scores of specific items into categories to screen for specific symptoms of anxiety such as symptoms of Panic Disorder, Generalised Anxiety Disorder, Separation Anxiety Disorder, Social Anxiety Disorder and Significant School Avoidance (Birmaher, 2012 & APA, 2013). The total SCARED score was established by adding up each of the five subcategories and the overall score was represented by the summative score for each participant. Although not a direct symptom of anxiety, school avoidance is often seen as a result of separation anxiety or social anxiety and is not a sub-category of anxiety, however, school avoidance can be noted as an indirect effect of the symptoms of anxiety (Wimmer, 2010). The subcategories and applicable items from the SCARED questionnaire are summarised in the table below:

Table 4. 4

Summary of the SCARED questionnaire and significant scores for symptoms of anxiety for the various sub-categories

	Applicable items	Scores of significance
Anxiety disorder	All items, 1–41	≥25
Panic Disorder	1, 6, 9, 12, 15, 18, 19, 22, 24, 27, 30, 34, 38	≥7
Generalized Anxiety Disorder	5, 7, 14, 21, 23, 28, 33, 35, 37	≥9
Separation Anxiety	4, 8, 13, 16, 20, 25, 29, 31	≥5
Social Anxiety Disorder	3, 10, 26, 32, 39, 40, 41	≥8
Significant School Avoidance	2, 11, 17, 36	≥3

The internal consistency was calculated using Cronbach's alpha on the measuring instrument for symptoms of anxiety using the SCARED questionnaire. None of the items were removed as the instrument was shown to be internally consistent ($\alpha = 0.81$).

Relationship between Symptoms of Anxiety and UPR

After the internal consistency of both quantitative assessments were established (the INPP and SCARED), it remained to determine the extent, if any, of the relationship between the two variables. The hypothesis under investigation was:

H_0 *There is no correlation between UPR and symptoms of Anxiety Disorder in children between the ages of 10 and 13 years old*

H_1 There is a correlation between UPR and symptoms of Panic Disorder.

H_2 There is a correlation between UPR and symptoms of Generalised Anxiety Disorder.

H_3 There is a correlation between UPR and symptoms of Separation Anxiety Disorder.

H_4 There is a correlation between UPR and symptoms of Social Anxiety Disorder.

H_5 There is a correlation between UPR and symptoms of School Avoidance.

H_6 There is a specific primitive reflex profile in children who score high (greater than 25) on the SCARED scale.

A Pearson's correlation coefficient was run on the dependent and independent variables to determine if a correlational relationship exists. The independent variable, the INPP scores, was therefore calculated with the dependent variable, the SCARED scores.

The fact that each of the reflex scores are scored based on two sub-tests either forward/backward, left/right and supine/erect made statistical analysis difficult. An average reflex score was considered, however, the researcher believed that important information would be lost if the score was rounded down or inflated by rounding up in the calculation of the mean score. Thus, each score of the raw data per reflex was added together to show one single score per reflex assessed. It was noted that there was a difference in scores between the two directions of the tests i.e. forward/backward and left/right. In the Rooting and Sucking Reflex, five of the child participants had different scores on each side of the body. In the TLR, seven children showed different scores between forward and backward. The palmar, plantar, ATNR and spinal Galant had nine, five, three and eight differing scores between left and right respectively. The STNR had seven scores differing between front and back. In the Moro Reflex however, the erect and supine tests are both intended to measure vestibular functioning but are determined by two completely different tests. In the supine test, children are requested to lie on their backs during the assessment, whereas during the erect testing children were requested to stand upright. Both tests yielded different scores in nineteen of the twenty child participants. The cumulative scores for the supine test was 40 in comparison to the erect test which had a cumulative score of 19.

The table below shows the cumulative score for each of the INPP reflex scores relevant for this current study.

Table 4. 5

INPP scores for each child participant (n = 20) for each sub category

Participant code	Moro Reflex	Rooting & sucking Reflex	Tonic Labyrinthine Reflex	Palmar Reflex	Plantar Reflex	Asymmetrical Tonic neck Reflex	Spinal Galant Reflex	Symmetrical Tonic Neck Reflex
Sw1	1	8	0	8	8	0	8	0
Dd1	2	6	2	2	7	0	6	0
Ab2	1	1	0	0	0	2	0	0
Ab1	1	0	0	0	2	3	0	0
Nk1	3	1	2	2	2	4	1	4
Sc1	1	0	1	1	8	3	8	1
Sc2	7	0	1	2	8	0	1	0
Ke1	4	0	2	0	6	0	1	1
Du1	4	2	1	3	6	2	5	2
De1	6	4	2	2	1	3	1	4
He1	3	2	2	3	6	2	0	0
Fr1	6	2	8	2	2	8	4	0
Co1	3	0	1	4	2	2	2	0
Co2	1	0	8	5	8	0	1	0
Pr1	1	0	3	0	2	0	1	1
Pr2	5	1	0	3	8	2	8	1
Br1	1	3	0	3	4	4	0	1
Hd1	1	0	0	1	0	0	0	0
Jh2	5	3	3	2	6	4	8	2
Jh1	3	0	2	1	3	4	6	2

Once the raw data were captured and re-checked against the questionnaires and assessment instruments, the Pearson's correlation coefficient (r) was used to determine the correlational relationship between the two variables of the quantitative strand, namely the INPP scores for the UPR and the SCARED scores, for symptoms of anxiety. The Pearson correlation coefficient is the measure of the strength of the direction of the relationship between two variables (Field & Hole, 2006). The relationship of both data sets, which is 20 sets of data, were used. A total of fifty-four Pearson's correlation and linear regression tests were run with data from grouped scores (of the INPP and SCARED categories) as well as total scores between the INPP scores and the SCARED scores. The formula that was used to calculate the Pearson correlation coefficient is shown below and was verified using the Excel function for correlation.

$$r = \frac{n(\sum x\,y) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2]\,[n\sum y^2 - (\sum y)^2]}}$$

The Pearson's correlation coefficient between the total SCARED score and the total INPP score was calculated. UPR and symptoms of anxiety were found to be weakly positively correlated, $r = 0.34$. This indicates that there is a weak positive correlation in scores but is not statistically significant. The correlation of two variables is represented as a value from -1 to +1. The closer the R score is to +1 the greater the correlation will be in the positive direction, if the score is closer to 0, the relationship is seen as negligible (Field & Hole, 2006). When the relationship is positive the implication is that as one variable (the independent) increases, so too does the dependent variable (Creswell & Plano Clark, 2011). After the Pearson's correlation coefficient was calculated the scores were further investigated by performing a Linear Regression test. This test is run to describe or explain the relationship between two variables. The linear regression was run using the Excel data analysis function of regression. The two data sets, namely the INPP and SCARED scores, were imported as the *x* and *y* axis. The following results were returned:

Table 4. 6

Results from the linear regression function run in Microsoft Excel

Regression Statistics	
Multiple R	0.337711385
R Square	0.114048979
Adjusted R Square	0.064829478
Standard Error	9.076405679
Observations	20

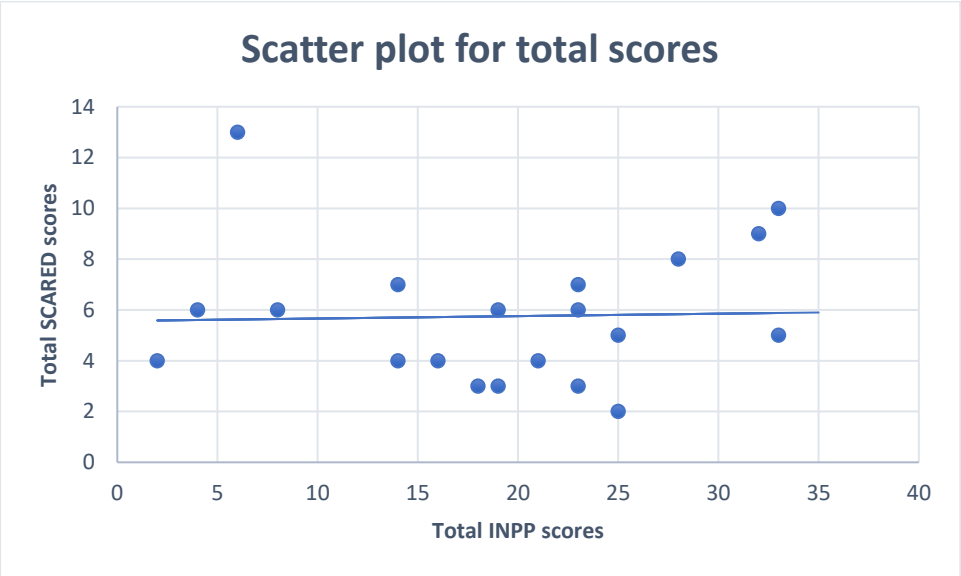
ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	190.8894792	190.8894792	2.317150249	0.145328521
Residual	18	1482.860521	82.38114005		
Total	19	1673.75			

A scatter plot summarises the results of the total SCARED scores and total INPP scores (Figure 4.2). There was a weak positive correlation between the SCARED scores and those from the INPP assessment. The relationship was not statistically significant (p = 0.143) and so it can be concluded that there is no relationship between primitive reflexes (INPP scores) and symptoms of anxiety (SCARED scores). Stronger correlational relationships exist between specific INPP scores and SCARED subtest scores. These will be discussed later in the chapter.

Figure 4. 2

Scatter Plot for Total Anxiety Scores according to the SCARED Questionnaire and Total Primitive Reflex Scores according to the INPP Assessment.



The R^2 of 0.114048979 indicates that 11% of the anxiety scores can be attributed to UPR. This number is low; however, low levels are generally accepted in the field of psychology and human behaviour is unpredictable (Itaoka, 2012). This low R^2 leaves room for other factors to be explored as contributors to the symptoms of anxiety as experienced by the child participants. In this research the significance level (α) of 0.05 was set but the Regression analysis revealed $p = 0.145$. The researcher does not have convincing evidence of the relationship and, thus, fails to reject the null hypothesis. It should be added, there exists the

possibility of a Type II error. A Type II error is one where the researcher incorrectly accepts the null hypotheses when there may in fact be a relationship between the two variables (Lieberman & Cunningham, 2009). The power of a hypothesis test is the probability of not committing a Type II error (Field, 2005). There are three factors that can affect the power namely, sample size; significance level or the true value being tested (Field, 2005). In the current research, the sample size (n = 20) was small and contributed to the low power of the hypothesis. As mentioned in a previous chapter, the sample was difficult to collect as the topics which are essential for this research are sensitive. Another factor is that the time necessary to complete the full data collection process took between 2.5 to 3 hours and may have deterred potential participants from agreeing to participate in the research.

The next step is to explore the alternative hypothesis to determine whether any of the alternative hypotheses listed below were found to be statistically significant. The following hypotheses were investigated using the same procedure as the null hypothesis:

H_1 There is a correlation between UPR and symptoms of Panic Disorder.

H_2 There is a correlation between UPR and symptoms of Generalised Anxiety Disorder.

H_3 There is a correlation between UPR and symptoms of Separation Anxiety Disorder.

H_4 There is a correlation between UPR and symptoms of Social Anxiety Disorder.

H_5 There is a correlation between UPR and symptoms of School Avoidance

H_6 There is a specific primitive reflex profile in children who score high (greater than 25) on the SCARED scale.

The Pearson correlation coefficient was run for the total scores on the SCARED scores and the INPP scores to test the null hypothesis for the current study. The total scores for the

SCARED questionnaire was run using each of the anxiety subcategories and the INPP was broken up into each of the primitive reflexes assessed and run for each respective combination to determine if an alternative hypothesis could yield any significant results. The table below summarises the r and p scores. The shaded blocks show statistically significant relationships between the anxiety score and the UPR score.

Table 4. 7

Relationship between each assessed primitive reflex and the symptoms for each sub-type of anxiety according to the SCARED questionnaire. Shaded scores indicate a statistically significant relationship

	Total Panic Score		Total GAD Score		Total Separation Score		Total Social Anxiety Score		Total School Avoidance Score		**Total Anxiety Score**	
	r	p	r	p	r	p	r	p	r	p	r	p
Moro Reflex	0.094	0.693	0.224	0.342	-0.098	0.684	0.562	0.009	0.163	0.492	0.270	0.250
Rooting and Sucking Reflex	-0.285	0.224	0.031	0.898	0.074	0.755	0.018	0.940	0.184	0.440	-0.022	0.930
Tonic Labyrinthine Reflex	0.130	0.585	-0.241	0.306	-0.122	0.641	0.199	0.399	-0.222	0.35	-0.081	0.734
Palmar Reflex	-0.261	0.268	0.005	0.984	-0.002	0.997	-0.058	0.808	0.173	0.47	-0.075	0.753
Plantar Reflex	0.061	0.798	0.720	0.000	0.084	0.723	0.340	0.147	0.289	0.22	0.46	0.039
Asymmetrical Tonic Neck Reflex	0.277	0.237	-0.140	0.556	0.209	0.375	0.122	0.610	-0.026	0.914	0.091	0.703
Spinal Galant Reflex	0.154	0.518	0.563	0.010	0.274	0.243	0.401	0.080	0.372	0.110	0.497	0.026
Symmetrical Tonic Neck Reflex	-0.232	0.327	-0.020	0.940	-0.124	0.603	0.110	0.643	-0.243	0.303	-0.13	0.590
Total reflex scores	0.033	0.892	0.384	0.095	0.119	0.617	0.451	0.045	0.240	0.307	0.337	0.145

Apart from the statistically significant relationship as noted in the table above, the primitive reflexes were further divided to determine the extent of the relationship between the primitive reflex and the symptoms of anxiety. Each primitive reflex score consists of two components, either left/right, forward/backward, front/back and in the case of the Moro Reflex – supine or erect. A Pearson correlation was run with each of these sub-categories and the anxiety sub-type to determine whether the direction of the primitive reflex test scores had a significant impact on the relationship between symptoms of anxiety and primitive reflexes. The table below summarises the Pearson correlation scores.

Table 4. 8

Pearson correlation scores between each sub-test per primitive reflex assessed

	Panic	GAD	Separation	Social	School
Moro supine	-0.0995.	0.0131	-0.1155	0.4043	-0.1817
Moro erect	0.2476	0.3532	-0.0501	0.5337	0.438
Rooting Left	-0.2209	0.0627	0.1161	0.1403	0.2454
Rooting Right	-0.3381	-0.0041	0.0276	-0.1107	0.1116
TLR Forward	0.1297	-0.266	-0.0282	0.1779	-0.2013
TLR Backwards	0.119	-0.1945	-0.1895	0.2048	-0.2236
Palmar Left	-0.2769	0.0054	0.0541	-0.1973	0.0891
Palmar Right	-0.2131	0.0036	-0.0541	0.0789	0.2297
Plantar Left	0.0536	0.6764	0.0653	0.2746	0.2358
Plantar Right	0.0662	0.7262	0.1001	0.3843	0.33
ATNR Left	0.2449	-0.0784	0.1875	0.1877	-0.0342
ATNR Right	0.2989	-0.1967	0.2235	0.0526	-0.0174
Spinal Galant Left	0.1689	0.5057	0.2806	0.3542	0.4194

Spinal Galant Right	0.1689	0.5687	0.2433	0.4111	0.2941
STNR front	-0.205	0.093	-0.0225	0.041	-0.3039
STNR back	-0.1892	-0.1087	-0.1741	0.1372	-0.123

H_1 There is a correlation between UPR and symptoms of Panic Disorder.

The dependent and independent variables were found to not have a statistically significant relationship, $r = 0.03$, $p = 0.892$. The symptoms of Panic Disorder as listed on the SCARED questionnaire were further investigated by running each primitive reflex test with the symptoms of Panic Disorder scores. As indicated in Table 5 no statistically significant relationship was noted. Nor was any statistically significant relationship noted when the Pearson correlation was run with each subtest, therefore, an UPR is not correlated with symptoms of panic.

H_2 There is a correlation between UPR and symptoms of Generalised Anxiety Disorder.

This alternative hypothesis investigated the relationship between the total scores of UPR and the total score of symptoms of Generalised Anxiety Disorder by calculating the r and p values. This relationship was not significant $r = 0.38$, $p = 0.095$, however, a significant relationship was found between the Plantar Reflex and symptoms of Generalised Anxiety Disorder ($r = 0.72$, $p = 0.000$) as well as the Spinal Galant Reflex and symptoms of Generalised Anxiety Disorder ($r = 0.56$, $p = 0.010$). When further investigated, the Plantar Reflex left ($r = 0.67$, $p = 0.001$) and right ($r = 0.726$, $p = 0.000$) showed a statistically significant relationship with symptoms Of Generalised Anxiety Disorder. The Spinal Galant left ($r = 0.51$, $p = 0.023$) and right ($r = 0.57$, $p = 0.008$) were also further mined to determine the extent of the relationship between the two sub-types and symptoms of Generalised Anxiety Disorder and were both found to be significantly correlated. Therefore, it may be

deduced that an unintegrated Plantar Reflex and Spinal Galant Reflex may contribute to symptoms of anxiety in children.

H_3 There is a correlation between UPR and symptoms of Separation Anxiety.

The relationship between symptoms of separation Anxiety and UPR was calculated and found to not be statistically significant, $r = 0.12$, $p = 0.617$. All other combinations of relationships were run and no statistically significant relationships were found with any of the specific primitive reflexes, it may thus be concluded that UPR do not contribute to symptoms of Separation Anxiety.

H_4 There is a correlation between UPR and symptoms of Social Anxiety Disorder.

Symptoms of Social Anxiety Disorder and primitive reflex scores were investigated and were found to be statistically significant to the total primitive reflex scores as well as the Moro Reflex scores. The total scores for symptoms of social anxiety and the total primitive reflex scores were found to have a moderately positive correlation, $r = 0.45$, $p = 0.045$. The Moro Reflex presented as positively correlated and significantly related, $r = 0.56$, $p = 0.009$ and when explored in terms of the two individual tests supine ($r = 0.40$, $p = 0.077$) and erect ($r = 0.534$, $p = 0.015$) only the erect test was statistically significant. None of the other seven reflexes showed any significant relationships with symptoms of Social Anxiety Disorder.

H_5 There is a correlation between UPR and symptoms of School Avoidance.

As mentioned above, School Avoidance is not a diagnosable Anxiety Disorder but more of an indirect symptom of anxiety, however, the statistical analysis was still included in the research to determine whether any relationship could be determined from its inclusion in the study. The same statistical tests were run on the total scores of school avoidance and total

INPP scores (r = 0.24, p = 0.307) as well as individual primitive reflex scores, however, no significant relationship was found to exist between the variables.

Although not an alternative hypothesis, a positive correlation and statistically significant relationship was discovered between the Spinal Galant and total anxiety scores, *r* (18) = 0.497, p = 0.026. The Spinal Galant Reflex's relation to the total anxiety score was further investigated by calculating the correlation between the left (r = 0.47, p = 0.036) and right (r = 0.48, p = 0.327) scores with both UPR scores found to be statistically significant with the total scores of the SCARED assessment.

The next section investigates the themes uncovered from the qualitative assessment and intake interview to determine if there may be any other reason for the SCARED score results as noted in the quantitative analysis.

Qualitative Strand

The qualitative data comprised of the intake interview and the information collected by conducting a semi structured interview with the parent participant without the child participant present. The qualitative semi-structured interviews were grouped according to the scores obtained on the SCARED questionnaire, as the anxious and non-anxious group. This was done in order to group the child participants accordingly and to discuss each factor in relation to the grouping of the child participant. The anxious group included those child participants who obtained a score of 25 or more according to the SCARED questionnaire (n =13) which shows significant symptoms of anxiety (Birmaher, 2012), and the non-anxious group were those children who obtained a total score of 24 or less (n = 7).

Intake Interview

The information obtained from the intake interview questions (Addendum A) was conducted at the beginning of the data collection process in order to explore the child participants' birth,

childhood history and health, and maternal health. This was done to gain a greater understanding of the child participant and possible factors that could have been associated with the INPP and SCARED scores and to inform the qualitative semi-structured interview with the parent participant. The intake interview is summarised in Addendum A and is presented below in terms of prenatal and post-natal factors.

Prenatal Factors. In the anxious group five of the child participants, compared to none of the non-anxious group, had family members with learning difficulties. In the anxious group one instance was noted were the child participants were conceived with assistance, these two child participants are from the same family and are twins (Pr1 & Pr2). Only one of the non-anxious child participants was conceived with assistance (Br1). Hyperemesis Gravidarum, which is severe nausea and vomiting throughout the pregnancy (Boelig, 2017) indicated three pregnancies in the anxious group where this was noted, as opposed to one pregnancy in the non-anxious group. One parent participant (Ke1) in the anxious group noted a viral infection during the first twelve weeks of pregnancy as opposed to two parent participants (De1 & Co1) in the non-anxious group. Seven of the anxious group's parent participants noted various severe stressors during their pregnancy in comparison to two parent participants in the non-anxious group. In terms of pregnancy and birth, the anxious group's parent participants noted the following: Four breech presentations of the infant at birth, four difficult births where forceps or suction was used to assist in labour and nine Caesarean sections as the type of birth while in the non-anxious group no babies presented as breach, two parent participants reported a difficult labour and five child participants were born via Caesarean section. Only one child participant (Jh2) was born prematurely at 28 weeks and also displayed the highest SCARED score for symptoms of anxiety (score = 52) and tied highest score with Sw1 on the INPP for UPR (score = 33).

Post-Natal Factors. One child participant had prolonged jaundice, which is longer than a month, (Fr1) and was from the anxious group. The anxious group had three child participants who had problems with feeding in the first six weeks as opposed to two from the non-anxious group. Four of the non-anxious group were breastfed for longer than three months while in the anxious group 11 of the group were breastfed longer than three months. Four out of thirteen in the anxious group and one out of seven in the non-anxious group had poor sleeping patterns. Incorrect crawling, which is when a child fails to do the four-point bilateral crawl, was reported as characteristic of one child participant in each of the groups. Only three children were reported to have walked before 10 months, all of whom were from the anxious group. No excessive rocking, head banging or eczema was reported in the non-anxious group, while in the anxious group no children, one child and two children were reported for these behaviours respectively. Four anxious children versus three non-anxious children were reported to have suffered from Asthma or Croup and six of the anxious children were reported to have suffered from recurring ear infections compared to one in the non-anxious group. Travel or motion sickness was reported by five parent participants from the anxious group in comparison to three from the non-anxious group of children. Finally, two non-anxious children were reported to have had prolonged thumb sucking, while none of the anxious children were reported to do so.

Semi-Structured Qualitative Interview

The semi-structured qualitative interviews were informed by the information collected in the intake interview. The qualitative interviews were based on five questions and allowed room for the parent participant to elaborate when necessary. The qualitative semi-structured interviews were transcribed by the researcher and coded using Tesch principles (1990). The emerged themes were namely maternal stress, both pre and post-natal; childhood illness such

as ear and respiratory infections, gastro-intestinal problems and other health issues; birth order, personality characteristics of the child and various other childhood diagnoses are discussed in the next section.

Table 4. 9

Major themes and sub-themes found from the qualitative interview

Codes	Sub-themes	Themes
High stress – money Low stress – second child Natural conception ICSI assisted conception High Stress - work stress Low stress during pregnancy Stress - genetic disorder Physical stress - Severe back pain & depression post birth Other stress – panic attacks Stress – conception & previous miscarriage	Prenatal stress Post-natal stress	Maternal Stress
Stomach – gluten intolerances Ears – grommets Other issues - Hard knock on head Allergy related hay fever Diagnosis - Asperger's /Dyslexia Respiratory illness - RSV Other issues - Low muscle tone Stomach –Dairy intolerance/allergy/Digestive issues Other illness -Tonsils removed Other illness - Bacterial meningitis	Ear infection Respiratory infection Gastro-intestinal problems Other health issues	Childhood health
More tolerant Youngest of 3		Birth order
Neuroticism - Perfectionist Stress - Hard on herself Anxiety - Worrier / nervous Anxious /Emotional outbursts Personality - Passionate and calm Withdrawn/closed book Introvert/introverted/Reserved		Personality Characteristics of the child

Extroverted/Sociable Mature for age Emotionally immature/		
Auditory processing issues Aniridia ADD ASD On Ritalin		Childhood diagnosis and other conditions

Theme 1: Maternal Stress. In modern society stress has become part of the norm. Stress is defined as any event or circumstance where adaption to the event causes strain, however, maternal stress is any event during the pregnancy (prenatal) and after birth (post-natal) that may be perceived as emotionally or physically taxing on or by the mother (Mulder et al., 2002). This theme had two sub-themes, namely, pre-natal maternal stress and post-natal maternal stress.

Maternal Stress during the Pre-Natal Phase. Pre-natal stressors are those which have caused distress during the duration of the pregnancy, from conception until the birth of the child (Weinstock, 2008). In the anxious group nine of the parent participants spoke of stress during their pregnancy while five of the parent participants from the non-anxious group (n = 5) also noted pre-natal stress. The types of stress experienced before and during the pregnancy period ranged from panic attacks, unplanned pregnancy, previous miscarriages, assisted conception, to health problems in the mother of the anxious child group, and were similar to those stressors mentioned by the parent participants of the non-anxious group. One mother (Jh2) admitted "I had a lot of issues that was going on. So panic attacks was a lot, a lot of the anxiety" while another mother He1 said "I had a miscarriage before that but it was a year before so I think maybe a little bit of stress about it, I want a baby and I want to see this one through and not have a miscarriage."

Maternal Stress during the Post-Natal Phase. Post-natal stress is any period after the birth of a child where a mother may experience stress in her role as primary care giver (Nolvi et al., 2016). In the anxious group only one parent participant noted the difficulties, associated with being a first-time inexperienced mother, as being stressful. An economic stressor of money was not unique to either group with a total of three parent participants across both groups noting this stressor (anxious group = 2; non-anxious group = 1). One mother from the non-anxious group (Nk1) spoke of her hereditary depression for which she was on antidepressant medication throughout her pregnancy and post-partum, "[Depression] is something I inherited from my father. He had depression". The depression was not only in the non-anxious group but was also noted by one mother in the anxious group (Ke1), however, the mother did not take antidepressants for her depression and this was mentioned by her as "And eventually when he was six months old I just got to a point where I needed to operate but that was when the depression I developed from that they say is called hormonal depression".

Children are often exposed to a number of illnesses in their childhood as their immune systems are still developing (Weinstock, 2008). Weinstock (2008) states that exposure to maternal stress may inhibit the developing immune system and in so doing make the infant more susceptible to respiratory and other common childhood infections. Some of the common childhood health problems noted in the qualitative interviews include ear infections, respiratory infections and digestive problems. Nine parent participants expressed pre-natal and/or post-natal maternal stress. Seven of those who had expressed maternal stress were from the anxious group with four of the anxious group experiencing health issues. Sc1 and Ke1 both experienced illnesses such as chronic ear infections and respiratory infections while Jh2 contracted viral meningitis at six years of age. Digestive problems were only experienced by one child participant, Du1, who mentioned "his tummy. He has quite a lot of

tummy issues. You know it's aching perhaps or it is nausea" when asked about his general health. Although maternal stress may have contributed to a lower immune system, childhood illnesses are common and not unique to either the anxious or non-anxious group thus post-natal stress, as a factor in anxiety, was not significantly noted as a factor in the current research.

Theme 2: Childhood Health. Following on from the previous section, childhood illness may contribute to symptoms of anxiety in children. Ear infections, respiratory infections, gastrointestinal problems and other health issues will be reported on in this section.

Ear Infections. Ear infections or acute otitis media (AOM) are common illnesses in children, with an estimated 80% of children having at least one episode before their third birthday, and with chronic AOM at approximately 5% globally (Biagio, Swanepoel, Laurent & Lundberg, 2014). In the current study, six child participants in the anxious group were reported, by the parent participants, to have had recurring ear infections (n = 6) whilst only 14% in the non-anxious group (n = 1) were reported to have experienced recurring ear infections.

Respiratory Infections. Respiratory syncytial virus (RSV), a common name given to infections of the lungs and respiratory tract, was reported by two parent participants in the anxious group with the non-anxious group noting Asthma in one child participant. The parent participant stated that the asthma is hereditary as she also suffers from Asthma (Br1). Asthma is lung disease in which the airway is inflamed causing wheezing and coughing and

when seen in young children is often the main reason for this wheezing and coughing and not another respiratory infection (Jartti & Gern, 2017).

Gastro-intestinal problems. Gastro-intestinal problems, tummy issues or food intolerances were noted by three parent participants about their children (Sc1; Du1 & Ke1) who were part of the anxious group. Sc1 reported "huge gluten intolerances in my husband's family. I'm watching her sugar level"; while Ke2 mentioned that they have "taken him completely off dairy now for two years which has improved his sinus and ear issues". None of the children in the non-anxious group were reported to have any stomach or digestive issues. Gastro-intestinal problems are often noted in literature as a psychosomatic symptom of anxiety (Alderman, Brush & Ehmann, 2019) while Shanahan et al., (2015) state that childhood somatic pains can predict adult emotional disorders.

Other Health Issues. Other health issues that emerged from the qualitative interviews included one participant from the anxious group having been hospitalised for viral meningitis at the age of six years (Jh2). This child participant Jh2 presented with the highest SCARED scores as well as INPP scores for UPR. One anxious child (Jh1) had her tonsils removed at the age of seven while another child from the anxious group (Ab2) broke her arm at the age of three. In the non-anxious group headaches and migraines were noted in two of the child participants who are brothers (Co1 & Co2). One child had suffered a head trauma when she was knocked on her head by a passing vehicle's mirror (Sw1) and had an INPP score of 33 and SCARED score of 39 indicating that perhaps the head trauma may have contributed to the UPR and consequently the symptoms of anxiety experienced by the child.

Theme 3: Birth Order. The birth order of all the participants was noted to determine whether birth order could have contributed to the symptoms of anxiety experienced by the children in the sample. In the sample of 20 child participants, one pair were twins and five pairs were siblings. The table below shows the birth order of the child participants.

Table 4. 10

Table indicating birth order and the total SCARED scores according to groups of anxious and non-anxious

		Number	Average SCARED scores
First born males	Anxious group	6	36.2
	Non-anxious group	4	21.8
First born females	Anxious group	1	41.0
	Non-anxious group	0	0
Second born males	Anxious group	1	28
	Non-anxious group	2	24.0
Second born females	Anxious group	3	42.0
	Non-anxious group	0	0
Third born males	Anxious group	0	0
	Non-anxious group	0	0
Third born females	Anxious group	0	0
	Non-anxious group	1	19
Twin boys	Anxious group	2	34.5

Two of the mothers of children in the anxious group noted the characteristics of their pregnancies. The one noted in her pregnancy with her second child that “it was all still new with the first but now I was pregnant again so it wasn’t as stressful because I knew what was

coming" (Ab2). The other mother mentioned that it "was a normal pregnancy, it was my second pregnancy so I knew a bit more about what to expect" (Sw1) when asked if she had experienced any stress during her pregnancy.

Theme 4: Personality Characteristics of the Child. In the qualitative semi-structured interview, the first question asked to the parent participant was to describe their child to the researcher in their own words. The following descriptors came up as common personality traits of both the anxious and non-anxious group. Three child participants, two being boys and one a girl, all from the anxious group were described as being "mature" (Sc2 & Ke1) or as having an "old soul" (Fr1). Two of the anxious child participants, one boy and one girl, were in contrast described as "emotionally immature" (Sw1; Jh2; Fr1) by their mothers. Participant Sc2 was described by the parent participant as being "serious, very hard on herself" as a "perfectionist" and as being creative when "feeling at her lowest" which may suggest depressive tendencies. Sc2 had a SCARED score of 41 and had an average INPP score of 19. One parent (De1) indicated poor social skills and awkwardness when describing their child's interaction with other children, however, this child did not have significant anxiety scores according to the SCARED questionnaire. Two of the anxious group children were reported as being "sensitive" (Sc1 & Ke1) which means that these children are easily affected by social and environmental stimuli which may provoke anxiety (Hudson & Rapee, 2001) and may be unrelated to UPR.

Theme 5: Childhood Diagnosis and Conditions. Child participants in both the anxious group (n = 6) and non-anxious group (n = 3) were diagnosed with a range of difficulties, conditions or disorders. The parent participants referred to their child's

diagnoses during the qualitative interviews where the children were diagnosed by a health professional.

The following diagnoses were noted by the parents of the child participants. From the anxious group of child participants, one child (Fr1) was diagnosed as having Asperger's syndrome and low muscle tone. The same child has an eye condition known as Aniridia. Aniridia is a genetic eye condition where a person is born with no iris. This means that the eye cannot control how much light is let into the pupil and thus makes the child extremely sensitive to light (Hingorani, Hanson & van Heyningen, 2012). This child participant (Fr1) had a SCARED score of 34, which is slightly above the average score of 31.8 whilst his INPP score was 32, which is much higher than the average INPP score of 19. Two children (Sc1 & Du1) from the anxious group were diagnosed with an Auditory Processing Disorder (APD) which is when a child has performed well on a hearing test but cannot follow an auditory instruction or process that has been spoken to them (Geffner & Ross-Swain, 2018). One of these children, (Sc1) also has a history of ear infections and grommets, however, this child performs well at school. The other child with a medical diagnosis of APD (Du1) has in addition been diagnosed with low muscle tone and dyslexia. Although not professionally diagnosed, two parent participants have described their children (Sc2 & Pr1) in a way that may indicate a Sensory Processing Disorder (SPD). Sc2 was described as saying "mommy the lights are too much I just need them to stop now" while Pr1 was described as not liking touch and "nervous especially in new situations and where he feels a little bit out of his comfort zone".

In the non-anxious group, one child (Dd1) was diagnosed with SPD but had undergone both OT and play therapy to be able to deal with correctly processing information from a number of inputs. This may have had an impact on the symptoms of anxiety noted, which reduced the SCARED score.

Along with diagnoses comes interventions. In the non-anxious group Attention Deficit Hyperactivity Disorder (ADHD) medication was prescribed to two of the child participants (Nk1 & De1). One child had received a number of interventions which ranged from play therapy and speech therapy to occupational therapy (Dd1). In the anxious group, two child participants (Jh1 & Jh2) from the same family were on ADHD medication, one child participant (Ke1) had undergone emotional intelligence training at five years of age and one child participant (Fr1) is in a special needs school where input from several specialists and specialist teachers are an everyday occurrence.

Triangulation of Data

As mentioned in the previous chapter, a mixed method approach was used in the current research. This usually takes place when one method alone cannot be used to fully explain a phenomenon or relationship (Creswell, 2014). In this study both quantitative data, in the form of the INPP and the SCARED questionnaire, and qualitative data, namely the intake interview and semi-structured qualitative interview were collected. Qualitative data from the intake interview and qualitative semi-structured interviews were analysed and coded to form five main themes. The quantitative data were analysed using Pearson's correlation co-efficient and then a linear regression was run on the same quantitative data. The results of the quantitative hypotheses were presented earlier in the chapter, however, as noted in chapter one, anxiety and the symptoms thereof are not associated with only one variable and thus qualitative data were included in the current study. The qualitative data were analysed to determine whether any themes could be uncovered from what the parent participant reported and whether these factors could be related to the SCARED scores as presented by the child participants. Following the process of quantitative and qualitative analysis the next step according to Denzin (1978) is to bring the two types of data together to use the results to strengthen one's argument (Creswell, 2011) and is often used to improve the reliability and

validity of the current research (Thurmond, 2001). The data were therefore divided into the anxious group (those scoring 25 or more on the SCARED assessment) and the non-anxious group (those scoring 24 and less on the SCARED assessment). The results of the SCARED scores, INPP scores and qualitative themes were tabulated onto an Excel spreadsheet. Similarities, differences and relationships between all variables were noted.

An analysis of the qualitative data revealed five themes namely: Maternal stress, childhood health, birth order, personality characteristics of the child and childhood diagnosis and conditions. The child participant with the highest SCARED scores (SCARED = 52) was also the child with the highest INPP scores (INPP 33). This same child is a first-born child whose mother experienced severe stress during her pregnancy and gave birth at 28 weeks. This child participant was the only child participant to be born prematurely and, thus, this did not emerge as a theme in the qualitative analysis, however, future research should investigate this more thoroughly. The child is currently on ADHD medication (Ritalin) and was described as emotionally immature for his age. In contrast, the child participant with the lowest SCARED score (SCARED = 19) obtained an INPP score of 2 for unintegrated primitive reflexes. This child is the third born child out of three in her family and has been described as caring, self-confident and independent by her mother. If one were to just look at these two child participants' SCARED scores, INPP scores and qualitative descriptors the results would appear clear in terms of the relationship between UPR and other factors such as birth order, childhood diagnosis and conditions and symptoms of anxiety. This is, however, not the case when one investigates the relationship between the quantitative scores and qualitative themes of the other participants.

Severe stress by the mother was a common theme in those children (n = 9) who had high SCARED scores (>25), however the same is not common for the INPP scores. Two of the anxious children, from the same family, had very low INPP scores (INPP of 4 and 6). In the

non-anxious group, two child participants scored low on the SCARED and slightly above and below average for the INPP scores (14 and 23, Mean = 19). Two of the child participants who scored 24 on the SCARED questionnaire scored 25 and 19 on the INPP assessment. The child participant who scored 25 has had a number of learning difficulties diagnosed and has received therapy for those difficulties. The child participant who scored 19 was on medication for ADHD which could have had a positive impact on his anxiety score by reducing the symptoms of anxiety. The results presented in this chapter will be discussed in greater detail in the following chapter.

Summary

This chapter began with information of the descriptive statistics of the quantitative strand. This was followed by a breakdown of the results of the INPP and the SCARED questionnaire's results and the relationship between the two quantitative data. Thereafter the qualitative data were presented with the qualitative data analysis described in detail. The themes that emerged namely maternal stress, childhood health, birth order, personality characteristics of the child and childhood diagnosis and conditions were considered with the quantitative data results in a process of triangulation. An in-depth discussion of the results will follow in the next chapter.

Chapter 5: Discussion

Introduction

In the previous chapter the demographics of the child participants were reported, thereafter the results of the statistical analysis of the quantitative data were presented. Following that, the analysis of the intake interview coupled with the semi-structured qualitative interview were analysed and the five main themes to emerge were presented. The data were then interrogated as a group and converged to make deductions about the relationship between unintegrated primitive reflexes (UPR) and the qualitative themes. The qualitative themes, namely: Maternal stress during the pre and post-natal phase; childhood health; birth order; personality characteristics of the child; and childhood diagnosis and conditions, were analysed in terms of their relationship to symptoms of anxiety. This process of triangulation is intended to ensure the accuracy of the collected data and the interpretation thereof (Mertens & Hesse-Biber, 2012). The data were collected from twenty child and parent participants' pairs where the child participant met the inclusion criteria of being between 10 and 13 years of age, in formal schooling in the northern suburbs of Cape Town, in the Western Cape province of South Africa. All child participants presented with UPR in varying degrees.

This chapter will discuss the findings in relation to the literature as well as the limitations and strengths of the study and, finally, a brief summary of the chapter will be provided. The chapter will conclude with recommendations for future studies.

Summary of Research Design

A convergent parallel mixed methods design was adopted in order to collect data using both quantitative and qualitative methods. Data collection began after ethical clearance was obtained from the Department of Psychology Ethics Committee of UNISA (PERC 17084) on

12 February 2018 (Addendum D). The quantitative data were collected using the *Institute for Neuro-Physiological Psychology Screening Test for Clinicians and Health Practitioners* (INPP) (Goddard Blythe, 2012) to assess UPR and the *Screen for Child Anxiety Related Disorders - Child version* (SCARED) questionnaire (Birmaher, 2012) to assess for symptoms of Anxiety Disorder. The sample contained twenty child and parent pairs (n = 20). The quantitative data were statistically analysed using Microsoft Excel (2013) and Cronbach's alpha to determine the internal consistency of both the SCARED questionnaire ($\alpha = 0.81$) and the INPP assessment ($\alpha = 0.77$). Thereafter a Pearson correlation coefficient and linear regression was conducted to determine the relationship between the total anxiety scores (SCARED scores) and total UPR (INPP ratings). Then the individual relationship between the INPP scores of each UPR and SCARED sub-scores were analysed. The intake interview (De Jager, 2017) was used to create rapport, gain an understanding of the child and parent and later to inform and support the themes discussed in the qualitative semi-structured parent interview. Each item in the intake interview was entered onto a table and the data assigned to one of two groups, namely the anxious group and non-anxious group. The qualitative semi-structured interviews were transcribed and coded to identify themes that developed. The contribution of these themes to the presence of the UPR scores and/or anxiety scores was interrogated. In the qualitative semi-structured interviews, an interview schedule is used in order for the researcher to cover specific topics whilst also allowing the participants to discuss issues important to them (Archer & Smith, 2014).

Research Questions

The following quantitative and qualitative research questions will be discussed in relation to literature and the final findings reported.

Quantitative research questions:

- Is there a correlation between UPR scores, as measured by the *INPP Screening Test for Clinicians and Health Practitioners* (INPP) (Goddard Blythe, 2012) and anxiety questionnaire scores, as measured by the *Screen for Child Anxiety Related Disorders (SCARED) Child version* questionnaire (Birmaher, 2012)?
    - Is there a correlation between UPR scores and the presence of symptoms which may indicate symptoms of Panic Disorder?
    - Is there a correlation between UPR scores and the presence of symptoms which may indicate symptoms of Generalised Anxiety Disorder?
    - Is there a correlation between UPR and the presence of symptoms which may indicate symptoms of Separation Anxiety Disorder?
    - Is there a correlation between UPR scores and the presence of symptoms which may indicate symptoms of Social Anxiety Disorder?
    - Is there a correlation between UPR scores and the presence of symptoms which may indicate symptoms of significant school avoidance?
- Is there a specific primitive reflex profile in children who score high (greater than 25) on the SCARED scale?

Qualitative research questions:

- What pre-natal factors are associated with symptoms of anxiety in children between the ages of 10-13 years who demonstrate the presence of UPR?
- What post-natal factors are associated with symptoms of anxiety in children between the ages of 10-13 years who demonstrate the presence of UPR?

Discussion of Findings

This section will discuss each of the research questions by integrating the findings from the quantitative and qualitative data.

The Relationship between UPR and Symptoms of Anxiety

UPR and symptoms of anxiety were found to be weakly positively correlated, $r = 0.34$, $p = 0.143$. This research question investigated the relationship between the total INPP scores and the total SCARED scores and found that no significant relationship exists. With regards to this relationship, the two assessments that were used to determine the UPR rating and the anxiety scores contained a number of sub-tests which contained specific primitive reflexes and symptoms of specific Anxiety Disorders. Demographic factors such as ethnicity, gender and age of the child participants contributed to the explanation of the scores of the INPP and SCARED questionnaire.

Ethnicity of the Child Participant

Of the sample, 80% were white, (n = 18) while only 10% (n = 2) were coloured. No child participants from other racial groups (e.g. Blacks and Indians) were referred to the study by teachers nor did they respond to the research advertisement. The sample size of the study is small and when compared to the demographic breakup of the area in which the assessment was located, the demographic breakup is consistent with the population statistics despite racial integration after apartheid. The area, which is in Cape Town, has the following racial makeup according to the 2011 Census: 82.2% white, 10.1% coloured, 5.5% black/African, 1% Asian and 1.2% other (Stats SA, 2011). Another possibility for the lack of racial representation of the South African population, is that during the apartheid era, psychology was used as a tool to promote the agenda of the white Nationalist Government and as such

was perceived as racist by the majority black population (Leach, Akhurst & Basson, 2003). This perception has fostered a mistrust of psychology in black South Africans with black people, rather visiting traditional healers, who understand their culture, than psychologists who are majority white (Cooper, 2014 & Leach et al., 2003).

Gender of the Child Participants

In the sample of child participants, the distribution of male and female participants were skewed in favour of male participants. There were a total of 15 male participants and only 5 female participants in the child participant sample. What the researcher found to be of interest is the responsiveness of parent participants (primarily mothers of boys) to the advertisement or referral. The American Psychological Association found Anxiety Disorder to be more prevalent in females than males, with females accounting for 60% of Anxiety diagnoses (APA, 2013). The rate of anxiety in boys and girls in the current research is consistent with findings by Ohannessian, Milan and Vannucci (2016) that girls report higher anxiety symptom levels than boys of the same age. In the current study, the average SCARED score for girls was 37,2 whilst the average SCARED score for the boys was 29,9. Ohannessian (2016) and Saddock et al. (2015) state that anxiety and Anxiety Disorders are more prevalent in women than in men. Upon closer inspection, the advert that was posted on the researcher's Facebook page, and that was sent to teachers at neighbouring schools, named the working title of the dissertation and in the description listed some descriptors such as anxiety, difficulty in concentrating and completing tasks and sitting still (Addendum F). These descriptors were included in the pamphlet that was attached to the research advertisement. The aim of the advert was to attract a sample of children between 10 and 13 years of age, wherein anxiety was not part of the inclusion criteria of the sample. Although not specifically noted, the researcher noted that perhaps some of the parent participants did

not agree to the study based on the assumption of anxiety symptoms, but rather on learning difficulties such as Attention Deficit Hyperactivity Disorder (ADHD), which is three times more likely to occur in boys than girls (Ung, 2018). This could potentially have skewed the sample to include children participants with other learning disorders, such as ADHD which could have accounted for the large male sample.

Age of the Child Participants

The age of the child participants in the current study ranged from 10 to 13 years old. This age range spans over two of Piaget's stages of cognitive development, namely, the concrete operational phase and the formal operational stage (Piaget, 1959). The experience of anxiety symptoms at different developmental stages, according to Piaget, is somewhat contradictory to the sample. According to Piaget's stages of development, in the concrete operational stage, symptoms of anxiety should be more noticeable and should reduce once the child enters the formal operations stage at approximately 13 years of age (Jahoda, 1964; Shaffer & Kipp, 2014), however, the child participants who were already 13 years old, had the highest anxiety scores according to the SCARED questionnaire in comparison to their younger counterparts. In the current sample, there were three participants who were 13 years old at the time of assessment. The two participants from the anxious group are females while the one 13-year-old child participant from the non-anxious group was male. There are two possible reasons for this observation, the first is that in a country like South Africa, the average age of onset of a girls' first menstruation or menarche is 12.7 years of age, (152 months) which is consistent with the high SCARED score (mean SCARED score – 41.0) at 150 – 162 months (Stein et al., 2016). In boys, the SCARED scores (mean scared score – 38.0) were higher at 120 months which is consistent with the age of onset of puberty in boys (Stein et al., 2016). Physical and psychological changes can bring about feelings of stress or

anxiety as the child meanders through new phases of life. Deardorff et al., (2007) state that puberty and gender interact to predict social anxiety symptoms in early adolescence. In the current study, symptoms of social anxiety, along with symptoms of Generalised Anxiety Disorder were found to be correlated with unintegrated primitive reflexes of the Moro Reflex, Spinal Galant Reflex and Plantar Reflex and could thus explain the high anxiety scores in these age groups for both males and females. In this group of 13 year olds, all three child participants scored high for UPR of the Plantar and Spinal Galant Reflex.

Another possible explanation for the high SCARED scores in 13 year old girls is as Qualter, Whitely, Hutchinson and Pope (2007) state, as a child begins to transition from primary to high school a child may encounter stress at the thought of a change in environment with new social roles and social settings and that this may be a source of stress, which may present as symptoms of anxiety. These two female 13-year-old child participants (Sw1 and Sc2) presented with a number of other factors that may have contributed to the SCARED scores and will be discussed hereafter.

Sw1 and Sc2 presented with anxiety scores on the SCARED questionnaire (Birmaher, 2012) that may indicate the presence of Generalised Anxiety Disorder, Separation Anxiety Disorder, Social Anxiety Disorder and Significant School Avoidance. Sw1 presented with the highest total UPR scores from the INPP (Goddard Blythe, 2012) with significant UPR ratings for the Rooting and Sucking Reflex, Palmar Reflex, Plantar Reflex and Spinal Galant Reflex. This child was described as anxious, as having a low self-esteem and emotionally immature for her age. It was also mentioned by her parent that she had received grommets after recurrent ear infections and had received a hard knock to her head when she was two years old. Sc2, was described as being a perfectionist and sensory processing problems were alluded to by the parent participant during the qualitative semi-structured interview. Sc2 was found to have UPR of the Moro Reflex and Plantar Reflex. It is thus difficult to determine

whether a UPR is solely responsible for the high SCARED scores in the child participants. Various aspects of development will be discussed in the following research questions.

The Relationship between UPR and Symptoms of Panic Disorder

The Pearson correlation revealed no statistically significant relationship between symptoms of Panic Disorder and total INPP scores, $r = 0.033$, $p = 0.892$. No statistically significant relationship was found in any combination of correlation tests between symptoms of Panic Disorder and specific UPR. According to the SCARED questionnaire, a score of seven and higher may indicate symptoms of a Panic Disorder. In the anxious group, a total of five child participants showed scores of greater than seven for the symptoms of Panic Disorder, with zero of the non-anxious group showing significant symptoms of those symptoms. The child participant (Ab1) who scored the highest score for symptoms of Panic Disorder (Panic Disorder score = 13) also presented with a very low INPP score (INPP score = 6) with only the ATNR presenting as significantly unintegrated (INPP score = 3). Another 10-year-old, female child participant (Sc1) who scored 7 on the SCARED questionnaire (Goddard Blythe, 2012) for Panic Disorder symptoms, had a much higher INPP total score of 23 with significant UPR scores for the Plantar Reflex (INPP score = 8) and Spinal Galant Reflex (INPP score = 8). Both of these child participants were second born in their family. The only notable differences between these two girls, which may account for the differences in INPP scores, is that Sc1 was described as having auditory processing problems, as well as having had grommets and a gluten intolerance. A male child participant, Ke1, was 11 years old at the time of assessment and like Sc1, scored 7 on the SCARED questionnaire for symptoms of Panic Disorder, and also had a history of respiratory and ear issues during early childhood. His mother also reported an intolerance, but his was to dairy. These intolerances are less severe than an allergy, however, when the body has trouble digesting these foods this

can cause the body to manifest stress in a number of ways, such as anxiety, irritability and hyperactivity (Golemac & Hallowell, 2015). In these two instances it is possible that the food intolerances may be producing many of the symptoms accounted for by the high SCARED scores and not UPR. Lillestøl et al. report that patients with Anxiety Disorders often report somatic symptoms rather than emotional symptoms (2010). These authors go on to state that "autonomic symptoms such as hyperventilation, sweating and heart palpitations frequently occur in Anxiety Disorders", particularly Panic Disorder (Lillestøl et al., 2010, p. 43). Conversely, Culpepper (2009) explains that an event that is appraised as stressful, will result in the fight or flight response. As explained in Chapter 2, during the fight or flight response, epinephrine and norepinephrine are released, which affect the cardiovascular, respiratory, renal and endocrine systems and other non-essential systems such as the digestive system, which are inhibited. If the child remains in the stress state, the digestive system does not function optimally which may result in an inability to digest the contents of the colon and will result in gastro-intestinal problems such as pain which may be perceived as food sensitivities and allergies (Culpepper, 2009).

The Relationship between UPR and Symptoms of Generalised Anxiety Disorder

A Pearson correlation was run between the total INPP scores and the total SCARED scores. The relationship between the two were found to be non-significant, $r = 0.38$, $p = 0.095$, however, a significant relationship was found between the plantar Reflex and symptoms of Generalised Anxiety Disorder ($r = 0.72$, $p = 0.000$) as well as the Spinal Galant Reflex and symptoms of Generalised Anxiety Disorder ($r = 0.56$, $p = 0.010$).

The Spinal Galant Reflex is responsible for the development of posture in the body (Adams & Craft, 2014). When a child has an unintegrated Spinal Galant Reflex they may appear to be clumsy, uncoordinated and fidgety (Hurst, van der Weyer, Smith & Adler,

2006). Adams and Craft (2014) noted that a UPR of the Spinal Galant may interfere with a child's ability to correctly interpret orientation of time and space, possibly contributing to feelings of fear, unease or anxiety. The Plantar Reflex when unintegrated will cause the toes of the foot, when stimulated, to curl inwards in a grasping fashion (Futagi & Suzuki, 2010; Goddard Blythe, 2003). In a mature brain, where the Plantar Reflex has integrated, an individual has greater postural control over his or her body and better balance and as such can delegate greater attention to higher order thinking (Futagi et al., 2012), however, if the Plantar Reflex remains unintegrated then insufficient spinal control is present, which is elicited by the immature structures of the brain namely the brain stem, basal ganglia and cerebellum, which affords more attention to the task of keeping the body in an upright position than other high order skills (Futagi & Suzuki, 2010). The unintegrated Plantar Reflex and symptoms of Generalised Anxiety Disorder ($r = 0.720$; $p = 0.000$) is the strongest relationship to have emerged from the current research. This relationship was one that the researcher had not anticipated as research on the Plantar Reflex is somewhat limited (Futagi & Suzuki, 2010). The available research on the Plantar Reflex is focussed primarily on the delayed start and not on the lack of integration on the Plantar Reflex.

One child participant from the non-anxious group, who only presented with symptoms of GAD, also showed a high INPP score for both spinal Galant and Plantar Reflex (INPP score = 8; INPP score = 8). This child participant from the non-anxious group, Dd1, had no other significant scores from the SCARED questionnaire but was reported to have had extensive therapy to assist in learning difficulties he had experienced earlier in his childhood. These ranged from poor motor planning, stuttering and anxiety and as a result he was exposed to intervention which included speech therapy and occupational therapy. His mother also mentioned that he underwent play therapy to learn how to detach from her. Play therapy uses play to allow children the necessary space to express themselves freely and to learn how to

cope with their emotions and has been found to be an effective measure in assisting children in dealing with symptoms of anxiety (Wilson & Ray, 2018). According to Iverach et al. (2016) stuttering in children is associated with an increase in anxiety symptoms, particularly for social anxiety (2016). This is in contrast to the one child who was reported to stutter in his earlier years, who did not present with symptoms of social anxiety. This child showed a high score only for GAD. One possible reason for the low overall score for anxiety symptoms may be attributed to all the therapies which the child participant was exposed to and, thus, the child was taught to control his breathing, thoughts and reactions to a stressor. The UPR is not the only possible explanation for the high SCARED scores of Generalised Anxiety Disorder.

The Relationship between UPR and Symptoms of Separation Anxiety Disorder

No statistically significant relationship was calculated between symptoms of separation anxiety and any of the primitive reflex scores. In the anxious group, only one child participant, Du1, did not have a SCARED score (>5) indicating the symptoms for separation anxiety. Du1 was described by his mother as being introverted, not social and being late to start speaking, at approximately the age of 4. The mother also mentioned that he had Dyslexia and a diagnosis of Auditory Processing Disorder (ADP). According to Yalçınkaya and Keith (2008), ADP is diagnosed in children where hearing is deemed normal but when one of the following skills are lacking: “sound localization and lateralization, auditory discrimination, auditory pattern recognition, and temporal aspects of audition” (p. 101). APD is often difficult to diagnose as APD may exhibit symptoms similar to other diagnosable disorders such as ADHD, reading disability such as dyslexia and Autism Spectrum Disorder (ASD) (2008). The parent participant made no mention of ADHD during the intake or qualitative semi-structured interview but did mention social awkwardness and dyslexia.

Children with dyslexia have been found to be vulnerable to low self-esteem and high levels of anxiety, particularly GAD (Novita, 2016). Du1 also presented with a significant SCARED score for GAD (SCARED score = 12). It is thus not clear whether the separation anxiety symptoms are due to UPR or other factors such as a diagnosis of a learning disability.

The Relationship between UPR and Symptoms of Social Anxiety Disorder

The total scores for symptoms of Social Anxiety and the total primitive reflex scores were found to have a moderately positive correlation, $r = 0.45$, $p = 0.045$. In the sample of anxious children, 10 children showed symptoms of Social Anxiety Disorder. Social Anxiety Disorder presents as the feelings or fear that children experience when interacting with peers and/or adults (APA, 2013). In the current study, Jh2 presented with the highest SCARED score for symptoms of Social Anxiety (SCARED score = 13). He also presented with UPR of the Moro Reflex, Plantar Reflex and Spinal Galant Reflex, all three of these UPR were found to be significant. Jh2 was on medication for ADHD, was described by his mother as emotionally immature and as having a low self-esteem. His mother also noted that during her pregnancy with him she was stressed to the point of panic attacks. Jh2 was born prematurely at 28 weeks. Kane, Schetter, Glynn, Hobel and Sandman (2014) found that maternal cortisol, that is the anxiety hormone released during pregnancy, can affect the developing feotus in a number of ways. The cortisol stimulates placental corticotrophin-releasing hormone (pCRH), which when high predicts preterm birth, behavioural and physiological stress reactivity in foetuses, infants and children and lower cognitive processing abilities in children (Kane et al., 2014). Prenatal stress could, thus, have a negative impact on the developing foetus because of the elevated amount of cortisol released in utero. Stress has been found to have a negative effect on the development of the hippocampus and too much cortisol can be toxic to neurons causing the neurons to begin to die (Freberg, 2019). Primitive reflexes have the task of

developing neural pathways between the senses, brain and muscles, and so stress is counterproductive to this process (Freberg, 2019; Goddard Blythe, 2009). High cortisol levels in mothers, as a result of stress during pregnancy or birth, can result in neurodevelopmental delays in children which may be the underlying reason for UPR (Desorbay, 2013).

The Moro erect test was found to be statistically significant ($r = 0.534$, $p = 0.015$). The Moro reflex is closely associated with the development of the vestibular system and ultimately balance (Adams & Craft, 2014). The Moro erect test is performed with the child standing upright with the child participant's arms placed 90° from the child's body. The child participant is asked to fall backwards whilst keeping the body straight, the assessor assures the child that she will be caught. Since this is in great contrast to the body position of the Moro supine assessment, where the child participant is requested to lie flat on a surface, it seems that a greater fear response is evoked from the lack of balance and stability, thus, eliciting a higher UPR score of the Moro, this is consistent with the findings of Masgutova and Masgutov (2015). Masgutova and Masgutov state that when a child has an immature vestibular system, possibly due to an UPR of the Moro Reflex, and experiences a shift in gravity, the body needs to overcompensate and activates the fight or flight response which may lead to impulsive behaviour (2015). Erez et al. (2004) found that balance dysfunction is related to symptoms of Anxiety Disorder in children and that balance dysfunction may be a trigger for anxiety as children are often expected to play, run, climb and balance on raised surfaces. The child's attempts to avoid those situations may in fact be cause for the anxiety and its associated symptoms (Bart et al., 2009). However, the current research did not go further to probe possible reasons for this and therefore the link remains assumption until future research can investigate this link in more detail.

The Relationship between UPR and Significant School Avoidance

A Pearson correlation in the current study found no statistically significant relationship between symptoms of school avoidance and UPR. In the anxious group, eight child participants showed signs of significant school avoidance. The child with the highest score for significant school avoidance is Jh2. Jh2, who was discussed earlier, is the only child participant to have scored significantly on the SCARED questionnaire (Birmaher, 2012) for symptoms of every subtest namely, Panic Disorder, Generalised Anxiety Disorder, Social Anxiety Disorder, Separation Anxiety Disorder and Significant School Avoidance. Jh2 also presented with ADHD for which he was on medication. Children with ADHD and comorbid anxiety account for 25% of those diagnosed with ADHD (Sciberras et al., 2015). When a child is diagnosed with a learning disability such as ADHD, the child may experience common reactions such as a lack of teacher support, difficulties in keeping up with the work pace or difficulties in establishing a peer group (Sciberras et al., 2015). These challenges may cause a child to experience anxiety symptoms as a result of his or her learning disability, and when he or she is then expected to go to school, this may result in school refusal or significant school avoidance. It is, thus, not clear whether the school avoidance is due to a UPR or to anxiety which is co-morbid to another diagnosis, such as ADHD.

Primitive Reflex Profile of Anxious Children

The statistical analysis revealed the Moro Reflex, Plantar Reflex and Spinal Galant Reflex to be statistically significant, however, this combination of UPR was only found in two child participants in the anxious group and zero from the non-anxious group. In the anxious group (n = 13), eight child participants had an unintegrated Moro Reflex, eight presented with an unintegrated Plantar Reflex and five showed signs for an unintegrated Spinal Galant Reflex. The findings do not suggest that there is a specific reflex profile, however, the exploration of

the Moro Reflex, Plantar Reflex and Spinal Galant Reflex and their concurrent representation may be a good starting point for further research into a primitive reflex profile associated with anxiety symptoms. Although the anxious group did not present with a primitive reflex profile, it shared a number of characteristics which ranged from pre-natal and post-natal maternal stress, problems related to childhood health, birth order, personality characteristics and childhood diagnosis. These will be discussed in the following qualitative research questions.

Pre-Natal Factors Associated with Symptoms of Anxiety

Maternal Stress during Pre-Natal Phase

Three child participants were conceived with fertility assistance (Pr1 & Pr2 who are twins and Br1). Mulder et al., (2002) found that in some studies, IVF patients have higher anxiety scores than women who conceived naturally and that this may in part be due to anxiety disrupting the sexual and reproductive abilities. Br1 was described by his mother as being "chilled" while at the same time "stressed" and "worried". Apart from hereditary asthma, no other significant factors were noted, and were not an explanation for his low SCARED scores. Pr1 and Pr2 scored 30 and 39 respectively for the total SCARED scores, which are significantly lower than Br1. This is likely due to the fact that a multiple pregnancy, such as for twins, has an increased risk than for singleton pregnancies. The risk for twin pregnancies includes pre-mature labour, hyper-tension, low birth weight and as a result an overall increase in stress (Davies, 2005). The stress the twins' mother was under during pregnancy was likely a combination of the stress related to IVF conception and also due to the fact that she was carrying multiple foetuses. Multiple pregnancies are more stressful than singleton pregnancies, which may have other effects, these include reduced brain growth (smaller head circumference) and may result in infants who cry more and are more difficult to soothe

(Mulder et al., 2002). Pr1 was not found to have any significant UPR while Pr2 had a UPR of the Moro, Plantar and Spinal Galant Reflex. Pr2 was described as an emotional, sensitive and anxious child while his twin, Pr1 was described as sensitive, introverted and nervous. Pr2 was born first by a minute because Pr1 presented as breech, which the mother reported was due to the fact that Pr2 had no space to turn in utero. Research shows no long term differences in the outcome of children presenting as breech versus cephalic at 10 years post birth (Pradhan, Mohajer & Deshpande, 2005).

Jh2 had the highest SCARED score and second highest INPP scores (SCARED = 52; INPP = 32). Jh2's mother had expressed great stress during her pregnancy with reports of panic attacks. Panic attacks result in an individual reacting to a situation in the fight or flight mode. There is an increase in cortisol production which can have a detrimental effect on neurons of both the foetus and mother. Kane, Schetter, Glynn, Hobel and Sandman (2014) state that maternal cortisol, that is the anxiety hormone released during pregnancy, can affect the developing feotus in a number of ways. The cortisol stimulates the placental corticotrophin-releasing hormone (pCRH), which when high predicts preterm birth, behavioural and physiological stress reactivity in foetuses, infants and children and lower cognitive processing abilities in children (Kane et al., 2014). Prenatal stress could thus have a negative impact on the developing foetus because of the elevated amount of cortisol released in utero. The average SCARED score of the child participants whose mothers had been exposed to severe stress was 40 whilst the scores of the children of the parent participants who did not report severe stress, noted an average SCARED score of 33. The current study's findings are consistent with the literature (Monk & Hane, 2016; Tronick & Reck, 2009) which reports a higher average SCARED score for children with mothers who expressed stress during pregnancy, both prenatally and postnatally.

Post-Natal Factors Associated with Symptoms of Anxiety

Maternal Stress during Post-Natal Phase

Of the two children who had mothers who reported depression after the birth of their child (Ke1 & Nk1), only Ke1 was found to have a SCARED score of more than 25. Ke1's mother expressed that she was in immense pain from a herniated disc in her spine and at about six months after Ke1's birth underwent an operation to rectify the disc. Before the operation the parent participant reported a depressed period, however she opted to not take medication for the depression. Feldman et al., (2009) reported that maternal depression has been found to have an impact on the mother's ability to care for her child, which in Ke's case and in combination with her severe back pain could have been exacerbated. Feldman et al., (2009, p919) state that when a mother reports post-natal depression, the children were found to show "poor cognitive, neuropsychological, social, and emotional skills across childhood and up to adolescence." Feldman et al., (2009) also report that when mothers are depressed they lack the ability to regulate their own mood and so when an infant reaches the age of between six and 12 months and starts to look to the primary caregiver for cues on how to regulate negative emotions, the mother is unable to provide a suitable framework in which to guide the infant to regulating emotion. This could have had a great impact on the ability of these two child participants to regulate their emotions and thus may have impacted on their anxiety scores on the SCARED questionnaire. Nk 1 on the other hand, scored 24 on the SCARED questionnaire, which is not seen as a significant score for symptoms of anxiety, and did not have high INPP scores. NK1, however, was reported to be on ADHD medication. Konicarova and Bob (2012) found that children diagnosed with ADHD have a high occurrence of UPR. ADHD medication may have a reducing effect on both ADHD and consequently comorbid anxiety symptoms (Golubchik, Rapaport & Weizman, 2017) resulting in a lower SCARED score and skewing the results of the current study.

Childhood Health

The findings from the qualitative interview revealed that nine of the children from the anxious group had a strong presence of common childhood illness in the first five years of life, whilst of the children in the non-anxious group only three children were reported as having a history of common childhood illness. These common childhood illnesses were reported as acute media otitis (AOM), upper respiratory infections and gastrointestinal problems. During the first five years children go through two stages of cognitive development, the sensorimotor phase from birth until 24 months, where after the child moves into the pre-operational stage until approximately seven years of age (Piaget, 1959; Shaffer & Kip, 2014). In the sensorimotor phase, development occurs through movement and through the child's senses (Shaffer & Kip, 2014), if a child has recurrent childhood illness such as AOM or respiratory infection these senses (sight, hearing, smell, taste) will be negatively impacted and so too will the learning that should have occurred with these senses. An incomplete sensorimotor cognitive development phase will result in a delayed pre-operational stage too (Piaget, 1959; Shaffer & Kip, 2014). As noted in Chapter 2, respiratory infections and recurrent ear infections can also negatively affect a child's balance by having a negative impact on the healthy development of the child's vestibular system, located in the ear. Although the Moro reflex is instrumental in the development of the vestibular system and ultimately balance (Shefer et al., 2015), the poor balance attributed to a poorly functioning vestibular system might be due to infection rather than a UPR. However, the current sample had contradictory results. The child participant, Jh2 who had the highest SCARED and INPP scores, and a combined INPP score of five for the erect and supine test, was not reported as having recurring ear infections in his preschool years, he did, however, have viral meningitis which is the inflammation of the meninges which is the tissue that covers the brain and spinal cord and is the same area from which primitive reflexes originate (Al-Janabi et al., 2016). In

terms of the viral meningitis, disease or infection of the related area, namely the spinal cord, these may have a negative impact on the integrated primitive reflexes, rendering them unintegrated. Al-Janabi et al., (2016) found that survivors of meningitis may display one of more of the following after-effects, namely, emotional problems, mild/moderate learning disabilities, balance problems and speech or language problems. Jh2 showed symptoms of emotional problems and a mild learning disability (ADHD) which may have been due to his diagnosis of meningitis. The effects of meningitis on symptoms of anxiety are a good starting point for future research into anxiety.

Another of the child participants, Sw1 had a hard hit to her head at the age of five and recurrent ear infections but did not score high on either of the Moro Reflex assessments (supine – 1; erect – 0). Both these child participants had trauma to the head, one physical trauma and the other viral. Traumatic brain injury (TBI) has been found to be a prominent cause of neurologic and psychosocial dysfunction (van der Horn, Spikman, Jacobs & van der Naalt, 2013) and that a Mood Disorder and/or Anxiety Disorder was common after a head injury in early childhood (Luis & Mittenberg, 2002). Gieysztor et al. (2018) state that brain injury may result in a previously integrated reflex, becoming unintegrated again. It is therefore possible that the TBI resulted in UPR which led to symptoms of anxiety.

In terms of gastrointestinal problems in the child participants, the non-anxious group did not have any parent participant report issues such as stomach pains or food allergies or intolerances, however the anxious group had this reported on three occasions. Sc1 and Ke1 reported gluten and dairy intolerances and had SCARED scores of 42 and 39, respectively. Both of these child participants scored high for an unintegrated Plantar Reflex (Sc1 = 4 & 4; Ke1 = 3 & 3). The gastrointestinal problems could be psychosomatic symptoms of anxiety and this anxiety is often an “early manifestation of developing depressive symptoms” (Wong & Fong, 2015, p.458). So it is possible that the gastro-intestinal problems these child

participants experienced could be a symptom of anxiety rather than a physical health issue. Another possibility is that the Plantar Reflex, when unintegrated, may cause the child to feel unsteady on their feet, resulting in feelings associated with balance dysfunction (Futagi & Suzuki, 2010). Balance dysfunction can result in a child perceiving the world as intimidating and unsafe whilst promoting feelings of incompetence and anxiety in completing the most basic of tasks (Bart et al., 2008).

Birth Order of the Child

Birth order as a contributor to anxiety symptoms was explored. The current study's sample was too small to be able to generalise about this theme, however, the average SCARED scores of first-born anxious males (mean = 36.2) were on average higher than those of second born anxious males (mean = 28.0) suggesting that in this current study's small sample, birth order could have been an influencing factor in symptoms of anxiety. In the four sets of siblings included in the current research the average SCARED score for the first born children was 36, whilst the average SCARED score for the later born siblings was 34.8. At first glance, these averages may appear to confirm the research done by Sulloway (1999; 2001), however, when these scores were examined, a further three of the four sibling relationships showed SCARED scores higher in the later born sibling than in the first born sibling. It was only in the sibling relationship of Jh2 and Jh1 where the first born sibling scored higher (Jh2 - SCARED score of 52) than the later born sibling (Jh1 - SCARED score of 28). Jh2, however, had many other additional factors to his high SCARED score, namely premature birth at 28 weeks, a maternal history of panic attacks, viral meningitis in childhood and a diagnosis of ADHD. The current study does not support literature from Sulloway on the effect of birth order and possible anxiety in children.

Personality Characteristics of the Child

A personality factor, such as neuroticism, of the Five Factor Model of Personality shows a possible relationship between the personality trait and symptoms of Anxiety Disorder (Sulloway, 1999). Descriptors used to describe a number of child participants (n = 6) include "being hard on herself", "perfectionistic" or as "having a low self-esteem". In the current research, Ab1 and Ab2 were both described as perfectionists by their parent participants, however, they did not score significantly (score greater than 7 on the SCARED questionnaire) for symptoms of social anxiety. This is in contrast to the research done by Newby et al., (2017) who found a relationship between perfectionism and social anxiety. Ab1 and Ab2 did not have any significant INPP scores, they, in fact, presented with very low INPP scores (total INPP scores: Ab1 = 6; Ab2 = 4). This suggests that the need for perfectionism may be a factor in the high SCARED scores and not UPR.

Childhood Diagnosis and Conditions

In the current sample, diagnoses among the child participants ranged from eye conditions such as Aniridia, to ASD, ADHD and sensory and auditory processing difficulties (n = 7). Sensory Processing Disorder (SPD) is described when there are deficits in the way in which information from all the bodily senses are organised and processed, and it is believed that "difficulty in tolerating or processing sensory information is a characteristic that may be seen in many developmental behavioural disorders, including Autism Spectrum Disorders, Attention Deficit Hyperactivity Disorder, Developmental Coordination Disorders, and Childhood Anxiety Disorders" (Zimmer & Desch, 2012, p.1186) and not due to a UPR.

All of the above-mentioned disorders are possible contributors to symptoms of anxiety as they are often experienced with symptoms of anxiety (Reynolds & Lane, 2009). In a diagnosis like Aniridia, the child (Fr1) is extremely sensitive to light and as such cannot

regulate the amount of light that enters into the eye for processing (Hingorani, Hanson & van Heyningen, 2012). This child was also described as having poor social skills, low muscle tone, as having Asperger's syndrome and being "very rigid in his ways". He is a first born and his mother experienced some stress during pregnancy about passing on Aniridia to her child, although this was not described as severe stress. Fr1 was observed to have above average INPP and SCARED scores (32 and 34). Primitive reflexes have been implicated in ASD (Chinello, 2016) and ASD and anxiety symptoms have been found to be comorbid (Sadock et al., 2015) as children with ASD fear uncertainty and change, which are both anxiety evoking (South, Rodgers & Hecke, 2017). This child participant had many factors that may account for the symptoms of anxiety with which he presented and which are not related to UPR.

It is, thus, difficult to determine whether the relationship exists between primitive reflexes and these disorders or the primitive reflexes and symptoms of anxiety, therefore, a diagnosis of a comorbid disorder might be a factor in the symptoms of anxiety experienced by these child participants. In addition, a diagnosis by a practicing health professional usually involves a plan in order to treat or manage the diagnosis. If the anxiety symptoms are co-morbid to the presenting disorder, the anxiety symptoms should decrease with treatment (Golubchik et al., 2017). In two of the child participants (Dd1 & Ni1), the SCARED scores did not qualify them for the anxious group. Dd1 underwent a number of interventions to assist with the learning difficulties he experienced while Ni1 was described as emotionally stable but was on Ritalin for ADHD. If these child participants had not undergone intervention, perhaps their anxiety symptoms on the SCARED questionnaire (Birmaher, 2012) would have been higher.

In contrast, two brothers (Jh1 & Jh2) were both on Ritalin for ADHD but scored 28 and 52 respectively on the SCARED questionnaire. Since the parent participant sought out the

research, after being referred by Jh2's teacher, it is the researcher's assumption that the medication was not assisting the child participants adequately to increase concentration. If the anxiety was co-morbid to the ADHD and the dosage correct, the parent participant would have noted a difference in the child participants' behaviour (Golubchik et al., 2017), which was not the case. In the current study, these child participants' may have experienced co-morbid anxiety to their diagnosis of ADHD.

Summary of Findings

When the UPR of the Moro, Plantar and Spinal Galant are present, important aspects of the development process, such as sensory integration and motor control, may be affected. This may impact negatively on an individual's ability to balance, exhibit postural control or correctly input sensory information for processing. According to MacLean (1990), since the limbic system is built upon the reptilian brain, if the reptilian brain, which hosts primitive reflexes, is underdeveloped it will negatively impact the development of the limbic system and ultimately the neo-cortex. The limbic system is responsible for emotional control and the neocortex for executive skills such as organisation, planning, reasoning and attention (MacLean, 1990). In the current study, the Moro, Plantar and Spinal Galant Reflexes were found to be statistically significantly correlated with symptoms of anxiety. When a Moro Reflex is integrated in a developmentally normal child, the vestibular system, which contributes to balance, functions sufficiently and positively contributes to good balance in the individual. When a Plantar Reflex is no longer unintegrated, the feet are able to uncurl and allow for a sturdy base for balance to occur. The Spinal Galant, when fully integrated, allows the individual to stand upright with good postural control, this in turn affords more attention to be paid to higher brain functions, enabling them to take place (Berne, 2006). Since the result of integration of these primitive reflexes (Moro, Plantar and Spinal Galant) is good

postural control and balance, it is therefore possible to accept that these three reflexes, Moro, Plantar and Spinal Galant, when not integrated, will negatively impact on an individual's ability to balance in an upright position. This means that the UPR will affect balance and that balance may affect the child's ability to feel safe in an upright position (Kaga, 2014). This feeling of lack of safety in an upright position may evoke symptoms of fear, which can be perceived as symptoms of anxiety (2014). Research into balance dysfunction shows a causal relationship between balance and postural control and anxiety in adults, albeit indirect, with limited research on the same relationship in children (Erez et al., 2004). The current research thus notes that the common factor between these three UPR and symptoms of anxiety is balance, or the dysfunction thereof. These three UPR, namely the Moro Reflex, Plantar Reflex and Spinal Galant Reflex are, according to the current research, noted as statistically significant, however, they are not common in all children with high SCARED scores and as such no primitive reflex profile exists in the current study. Only two of the anxious child participants were found to have these three UPR and cannot be noted as a common profile to predict anxiety symptoms in children. Although three UPR in the current research were found to be statistically significant, there were a number of other factors that may have influenced either the INPP scores or the SCARED scores. These reflexes alone do not contribute to symptoms of anxiety, as pre and post-natal maternal stress was noted to have added to higher SCARED scores than those in the non-anxious group. Additionally, when children were often ill with common childhood illnesses such as AOM, respiratory infection and digestive issues, they were found to have higher levels of anxiety than the non-anxious group. When a child had physical trauma to the head and another viral meningitis, high levels of anxiety were noted, suggesting that head trauma could be a factor in symptoms of anxiety. Birth order did not reveal any convincing evidence of its contribution to symptoms of anxiety in the current sample. Neuroticism and its descriptors were not overtly mentioned

in the qualitative interviews, however, the descriptor of perfectionism was noted strongly in the anxious group and, thus, has been noted as a factor in symptoms of anxiety. Childhood diagnosis was a complex matter to unpack as anxiety is comorbid to a number of other diagnoses presented by the child participants namely, ADHD, ASD, APD and SPD. UPR have been found in children who have been diagnosed with other disorders, thus, it is not clear if the UPR or the other diagnoses are the reason for the symptoms of anxiety. Treatment of ADHD using medication can have a reducing effect on both symptoms of anxiety and ADHD. However, in two cases, children on ADHD medication presented with high SCARED scores, leaving the conclusion unclear about whether or not a diagnosis of ADHD can contribute to symptoms of anxiety. The researcher could, thus, not confidently rule out or attribute a diagnosis as contributory to anxiety symptoms.

Limitations of the Study

Findings from the current study are limited as the sample is not only small, but may be biased due to the sampling method adopted for the current research. The sampling method used was two-fold, first convenience then purposive, however, the sample was small and under-representative of the South African population. The time required for the full assessment was approximately 2 hours, which was likely to have been too long for many parent participants enquiring about the research and may have skewed the sample.

Another way in which the sample may have been skewed is due to the wording on the advertisement requesting participants (Addendum F). Words such as “anxiety disorders”, “poor auditory processing”, “tactile defensiveness”, “ADHD”, “delayed language development”, “dyslexia”, “poor muscle tone” and “poor perception” were displayed on the pamphlet. Parents viewing the advert may have had diagnoses or concerns about some of these descriptors and, thus, the number of comorbid disorders were noted in the sample. This

could have impacted on the results of the current study as these comorbid disorders complicate the description of the relationship between UPR and symptoms of anxiety. A way in which this potential issue was counteracted, is that once the parent participant had made contact with the researcher, the informed consent form was sent to the parent participant via email and presented in hardcopy on the day of the assessment, to ensure they understood the scope of the research.

The SCARED questionnaire is a self-report measure of a child's experiences of certain situations. The current study made use of only the child version of the questionnaire. According to Scaini et al. (2017) both the child and parent questionnaire should be used to have an overall indication of the child participant's anxiety. The assessment session was planned to take about two full hours, including the parent questionnaire which would have increased the time of the entire session. To counteract this, and as a strength of the current study, it was decided by the researcher that the semi-structured parent interview would add greater value to the current research. In future research, it is recommended to include the SCARED parent questionnaire in the data collection process to ensure a more validated quantitative perspective of the child's experiences of anxiety symptoms. An advantage of the SCARED questionnaire is that the items were easy to understand for the sample age group, and since the questionnaire was made available for free by the author, it was cost effective.

Recommendations for Future Research

The current research can be expanded upon in many ways. The first being the sample size and demographic representation suggested for future research. The sampling process should preferably be more randomised and would ideally be larger and more representative of the demographic constituency of South Africa. Due to the comorbid nature of anxiety with many other diagnoses, it is recommended that in future studies of this nature no other comorbid

diagnoses should be present to ensure that symptoms of anxiety are the primary focus of the research, or that more structured assessments of the presenting co-morbid diagnoses or conditions should be included in the methodology of the research.

In terms of other research of this type, emphasis on the Plantar Reflex and its impact on symptoms of anxiety would make for an informative study, as research on the Plantar Reflex is limited. In subsequent studies, the remediation of primitive reflexes, particularly the Plantar Reflex, could be explored to determine whether the integration of the Plantar Reflex could reduce the symptoms associated with anxiety. Potentially research into balance dysfunction and its relationship with Anxiety Disorders could be explored by researching balance dysfunction specifically and its impact on Anxiety Disorder in children. This could then be expanded upon by studying the effects of balance interventions on Anxiety Disorder in children.

Further suggestions include determining whether a primitive reflex profile exists for children who display symptoms of anxiety. It is suggested that children with another diagnosis should not be included in any future studies to ensure that co-morbid anxiety is not a major factor to the anxiety experienced.

Summary

This chapter began with a brief overview of the background of the research followed by a summary of the research design and methods adopted. The results reported in chapter 4 were expanded upon by discussing how they relate to the current research questions, and how the findings of this research relates to scientific literature. Thereafter, the Chapter was concluded with limitations and strengths of the study and recommendations for future research.

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Addendum A: Parent Questionnaire

MIND MOVES INSTITUTE

PARENT QUESTIONNAIRE

Date of Assessment:	
Bill Payer Information	
Full Name:	
Email Address:	
Cell Number:	
Home Language:	
Postal Address:	
Town:	
Postal Code:	
Momentum Multiply Membership?	***YES*** ***NO***
Multiply Membership number:	
Client Information **** Please enter the same information if client is the same as the bill payer*	
Name: Boy Girl	
Surname:	
Date of Birth:	
Reason for Consultation:	

HISTORY	***YES***	***NO***	***COMMENTS***
Any learning difficulties in either family (both families			
Natural conception			
Assisted conception			
Pregnancy	***YES***	***NO***	***COMMENTS***
Hyper emesis (severe sickness)			
Severe viral infection during the first 12 weeks			
Smoking			
Excessive alcohol consumption and/or drug abuse			
Radiation			
Accident or infection			
Threatened miscarriage			
Hypertension (High blood pressure)			
Placental insufficiency (small for date)			
Toxoplasmosis			
Severe stress			
Uncontrolled diabetes			
Birth	***YES***	***NO***	***COMMENTS***
Breech			
Placenta previa (low lying placenta)			
Difficult labour			
High forceps or ventouse extraction			

Caesarean			
Cord around the neck			
Premature (more than 2 weeks early)			
Post-mature (more than 2 weeks late)			
Covered with a white coating			
Overly dry/cracked skin			
Newborn disorders	***YES***	***NO***	***COMMENTS***
Low birth weight (under 2,3kg)			
Incubation			
Distorted scull			
Prolonged jaundice			
Requiring resuscitation			
Blue baby			
Heavy bruising			
Problems with feeding the first 6 months			
Breast feeding 3 months+			
Colic			
Infancy	***YES***	***NO***	***COMMENTS***
Illness involving a high fever, delirium or convulsion in the first 18 months			
Adverse reaction to any of the inoculations			
Very quiet baby			
Poor sleeping patterns			
Crawled on hands and feet, not on knees			
Bum slide or bunny hop instead of crawling			
Walked before 10 months			
Walked later than 18 months			
Talked later than 18 months			
Excessive rocking			
Head banging			
Eczema			
Asthma/croup			
Childhood and school history	***YES***	***NO***	***COMMENTS***
Recurring ear infections			
Travel sickness			
Difficulty with dressing him/herself			
Prolonged thumb sucking			
Prolonged bedwetting (age 6 and older)			
Difficulty establishing hand dominance			
Difficulty telling left from right			
Difficulty learning to ride a two wheel bicycle			
Difficulty learning to read			
Difficulty learning to write			
Reversals letters/numbers			
Difficulty making the transition from printing to cursive writing			
Difficulty in learning to tell the time (clock face)			

Addendum B: SCARED Questionnaire

Screen for Child Anxiety Related Disorders (SCARED)
CHILD Version—Page 1 of 2 (to be filled out by the CHILD)

Developed by Boris Birmaher, M.D., Suneeta Khetarpal, M.D., Marlane Cully, M.Ed., David Brent, M.D., and Sandra McKenzie, Ph.D., Western Psychiatric Institute and Clinic, University of Pittsburgh *(October, 1995). E-mail:* birmaherb@upmc.edu

See: Birmaher, B., Brent, D. A., Chiappetta, L., Bridge, J., Monga, S., & Baugher, M. (1999). Psychometric properties of the Screen for Child Anxiety Related Emotional Disorders (SCARED): a replication study. *Journal of the American Academy of Child and Adolescent Psychiatry, 38*(10), 1230–6.

Name: _____ Date: _____

Directions:
Below is a list of sentences that describe how people feel. Read each phrase and decide if it is "Not True or Hardly Ever True" or "Somewhat True or Sometimes True" or "Very True or Often True" for you. Then, for each sentence, fill in one circle that corresponds to the response that seems to describe you *for the last 3 months*.

	0 Not True or Hardly Ever True	1 Somewhat True or Sometimes True	2 Very True or Often True	
1. When I feel frightened, it is hard to breathe	O	O	O	**PN**
2. I get headaches when I am at school.	O	O	O	**SH**
3. I don't like to be with people I don't know well.	O	O	O	**SC**
4. I get scared if I sleep away from home.	O	O	O	**SP**
5. I worry about other people liking me.	O	O	O	**GD**
6. When I get frightened, I feel like passing out.	O	O	O	**PN**
7. I am nervous.	O	O	O	**GD**
8. I follow my mother or father wherever they go.	O	O	O	**SP**
9. People tell me that I look nervous.	O	O	O	**PN**
10. I feel nervous with people I don't know well.	O	O	O	**SC**
11. I get stomachaches at school.	O	O	O	**SH**
12. When I get frightened, I feel like I am going crazy.	O	O	O	**PN**
13. I worry about sleeping alone.	O	O	O	**SP**
14. I worry about being as good as other kids.	O	O	O	**GD**
15. When I get frightened, I feel like things are not real.	O	O	O	**PN**
16. I have nightmares about something bad happening to my parents.	O	O	O	**SP**
17. I worry about going to school.	O	O	O	**SH**
18. When I get frightened, my heart beats fast.	O	O	O	**PN**
19. I get shaky.	O	O	O	**PN**
20. I have nightmares about something bad happening to me.	O	O	O	**SP**

Screen for Child Anxiety Related Disorders (SCARED)

CHILD Version—Page 2 of 2 (to be filled out by the CHILD)

	0 Not True or Hardly Ever True	1 Somewhat True or Sometimes True	2 Very True or Often True	
21. I worry about things working out for me.	O	O	O	GD
22. When I get frightened, I sweat a lot.	O	O	O	PN
23. I am a worrier.	O	O	O	GD
24. I get really frightened for no reason at all.	O	O	O	PN
25. I am afraid to be alone in the house.	O	O	O	SP
26. It is hard for me to talk with people I don't know well.	O	O	O	SC
27. When I get frightened, I feel like I am choking.	O	O	O	PN
28. People tell me that I worry too much.	O	O	O	GD
29. I don't like to be away from my family.	O	O	O	SP
30. I am afraid of having anxiety (or panic) attacks.	O	O	O	PN
31. I worry that something bad might happen to my parents.	O	O	O	SP
32. I feel shy with people I don't know well.	O	O	O	SC
33. I worry about what is going to happen in the future.	O	O	O	GD
34. When I get frightened, I feel like throwing up.	O	O	O	PN
35. I worry about how well I do things.	O	O	O	GD
36. I am scared to go to school.	O	O	O	SH
37. I worry about things that have already happened.	O	O	O	GD
38. When I get frightened, I feel dizzy.	O	O	O	PN
39. I feel nervous when I am with other children or adults and I have to do something while they watch me (for example: read aloud, speak, play a game, play a sport).	O	O	O	SC
40. I feel nervous when I am going to parties, dances, or any place where there will be people that I don't know well.	O	O	O	SC
41. I am shy.	O	O	O	SC

SCORING:

A total score of ≥ **25** may indicate the presence of an **Anxiety Disorder**. Scores higher than 30 are more specific. **TOTAL =**

A score of **7** for items 1, 6, 9, 12, 15, 18, 19, 22, 24, 27, 30, 34, 38 may indicate **Panic Disorder** or **Significant Somatic Symptoms**. **PN =**

A score of **9** for items 5, 7, 14, 21, 23, 28, 33, 35, 37 may indicate **Generalized Anxiety Disorder**. **GD =**

A score of **5** for items 4, 8, 13, 16, 20, 25, 29, 31 may indicate **Separation Anxiety SOC**. **SP =**

A score of **8** for items 3, 10, 26, 32, 39, 40, 41 may indicate **Social Anxiety Disorder**. **SC =**

A score of **3** for items 2, 11, 17, 36 may indicate **Significant School Avoidance**. **SH =**

For children ages 8 to 11, it is recommended that the clinician explain all questions, or have the child answer the questionnaire sitting with an adult in case they have any questions.

The SCARED is available at no cost at www.wpic.pitt.edu/research under tools and assessments, or at www.pediatric bipolar.pitt.edu under instruments.

March 27, 2012

Addendum C: Semi-structured parent interview

1. Can you describe your child, in your own words tell me about him/her.
2. Can you tell me how you found out about your pregnancy?
3. Can you tell me about any significant health issues about your or your child's health?
4. Have you noticed that your child is different in any way from other children his/her age?

Addendum D: Ethical Clearance Form

PERC-17084

UNISA university of south africa

Department of Psychology

Ethical Clearance for M/D students: Research on human participants

The Ethics Committee of the Department of Psychology at Unisa has evaluated this research proposal for a Higher Degree in Psychology in light of appropriate ethical requirements, with special reference to the requirements of the Code of Conduct for Psychologists of the HPCSA and the Unisa Policy on Research Ethics.

Student Name: Tamara-Lyn Carter **Student no.:** 45041555

Supervisor: Ms. H LHenderson **Affiliation:** Department of Psychology, Unisa

Title of project:

A mixed methods study of aberrant primitive reflexes and symptoms of anxiety in learners aged 10-13 years in the Western Cape Province of South Africa: A Mind Moves © approach

The proposal was evaluated for adherence to appropriate ethical standards as required by the Psychology Department and the College of Human Sciences of Unisa.

The application was approved by the departmental Ethics Committee on the understanding that signed letters of informed consent is to be obtained from the parents/guardians of each of the minor children participating in the study. All ethical conditions related to voluntary participation, informed consent, anonymity, confidentiality of the information and the right to withdraw from the research must be explained to them.

Date of issue: 2018-02-09 *This clearance is valid until 31 December 2022*

Signed:

Prof P Kruger
[For the Ethics Committee
Department of Psychology, Unisa]

The proposed research may now commence with the proviso that:

1) *The researcher/s will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.*
2) *Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study, as well as changes in the methodology, should be communicated in writing to the Psychology Department Ethics Review Committee.*
3) *An amended application should be submitted if there are substantial changes from the existing proposal, especially if those changes affect any of the study-related risks for the research participants.*
4) *The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study.*

Please note that research where participants are drawn from Unisa staff, students or data bases requires permission from the Senate Research and Innovation Committee (SENRIC) before the research commences.

Addendum E: Informed consent form

UNIVERSITY OF SOUTH AFRICA

CONSENT TO PARTICIPATE IN RESEARCH

TITLE: A MIXED METHODS STUDY OF UNINTEGRATED PRIMITIVE REFLEXES AND SYMPTOMS OF ANXIETY IN LEARNERS AGED 10-13 YEARS OF AGE

My name is Tamara-Lyn Carter and I am a Master's degree student in Research Psychology at Unisa. My supervisor is Ms Hester-Louise Henderson. I would like to ask if you would agree to take part in a research study conducted by me. You are being approached as a possible research participant as you have made contact with me regarding a *Reflex Assessment*. Your son/daughter fits the sample profile as he/she is between the ages of ten and thirteen years old.

Purpose of the study

The purpose of the study is to explore the relationship, if any, between unintegrated primitive reflexes, those which will be assessed with the *INPP Screening Test for Clinicians and Health Practitioners* and your child's experiences of anxiety.

Participation in the study will involve the following:

- If you agree to take part in the research study you will be asked to sign this informed consent form.
- I will also explain to your child, in terms that they will be able to understand, the research and their role in the research. I will obtain their signed consent regarding their

participation in the research. I will explain to them what the nature of their participation will be and what information you as parent will be sharing with me.

- The completion of the *INPP Screening Test for Clinicians and Health Practitioners* to determine your son/daughters reflex profile. This will take approximately 30 minutes.
- The completion of a self-reporting (by your child) questionnaire to screen for your child's experiences of anxiety. The name of the screening questionnaire is the *Screening Child Anxiety Related Disorders – Child Version* (SCARED). This questionnaire will be done in approximately 20 minutes.
- An interview conducted by myself (without your child present) regarding aspects such as your pregnancy, your child's birth story, infancy, health and your child's developmental history. This will take approximately 60 minutes to complete.

Potential risks and discomfort

You made contact with me enquiring about a *Reflex Assessment*. This assessment is a non-invasive assessment of your child's primitive reflex response to a stimulus or certain movements. However there might be some risk involved in so far as these procedures may evoke strong emotions in both you and your child. If you or your child feel uncomfortable and do not want to answer any of the questions you may choose not to answer the relevant questions or you may choose to withdraw from the study at any time you wish. As part of the *INPP Screening Test for Clinicians and Health Practitioners* protocol there will be a time after the assessment where I will discuss your son's/daughter's reflex profile with you as well as a plan forward i.e. a home programme. This home programme will include controlled movements that are specific to the reflex profile of your child. These movements are specific controlled movements which mimic the movements of primitive reflexes to ensure that the development of the neural pathways of the brain are completed. These controlled movements

will be explained and demonstrated to you and your child and sent to you in a computer generated report. This is included in the reflex assessment. Once you have completed the home programme with your child you may need to visit with me again to update your child's reflex profile. This carries a cost of R360 for every follow up appointment going forward.

The feedback on the *Screening for Child Anxiety Related Disorders – Child Version* questionnaire will not be done in the same session as the feedback of the primitive reflexes. If your child presents with severe symptoms of anxiety I will make contact with you and provide you with the details of the South African Depression and Anxiety Group's (SADAG) details in order for you to receive information, support and telephonic or face to face counselling for you or your child.

The parent interview may be used to uncover any contextual factors that may have contributed to your child's Primitive Reflex profile but will only be analysed in depth at a later stage for the research. Feedback will not be given back individually but the research will be made available to you once my research has been completed. The risk associated with this interview is that it may elicit strong emotions about you or your child or bring up memories that may leave you feeling emotional. If you need to debrief after the interview I will provide you with the details of the South African Depression and Anxiety Group's (SADAG) details in order for you to receive information, support and telephonic or face to face counselling.

Potential benefits to subjects and society

The Reflex Profile that will emerge after the reflex assessment will give you, as a parent, great insight into the way in which your child functions, processes information and learns in a

classroom environment. Using the reflex profile findings, a number of your child's behaviours will be explained in terms of the unintegrated primitive reflex profiles. After the discussion of the reflex profile the home programme will be explained to you and the controlled movements will be demonstrated to you and your child. The SCARED questionnaire and the interview will not be discussed with you but will be used for research purposes, however, neither you nor your child will directly benefit from these. If the research proves to be fruitful your participation in the research may assist other children with anxiety in the future.

Payment for participation

You will not be required to pay the standard fee of R670 for the reflex assessment. No payment will be made to you or your son/daughter for participating in the research.

Confidentiality

My supervisor and I will have access to your child's primitive reflex scores, SCARED questionnaire scores and the voice recorded interview with you. If the interview is not transcribed by myself, the transcriber who will have access to your interview, however, will be transcribing it under the same confidentiality parameters that are required throughout this research process. Your unique code will be used on all documentation collected from you. Neither you nor your child's name will be made available. All collected information will be stored in a secure place at my home in a locked cabinet to which only I will have access. The reflex scoring sheet, the SCARED questionnaire and the audio and transcribed interview will be captured and stored on my password protected laptop. The interview between you and I will be voice recorded using the voice recorder function on my smart phone/tablet. The

interview will be transcribed verbatim and all names mentioned in the recording will be replaced by a pseudonym to ensure confidentiality and anonymity.

Signature of the research subject(s)

The information above was described to me by Tamara-Lyn Carter in English and I am in command of this language or it was satisfactorily translated to me. I was given the opportunity to ask questions and these questions were answered to my satisfaction.

I, _____ (parent), hereby consent voluntarily to my and my son's/daughter's participation in this study which includes the *INPP Reflex Assessment*, the *Screening for Child Anxieties and Related Disorders – Child version*. I also consent to my voluntary participation to the parent interview. I give my permission to the researcher to voice record the interview. I have been given a copy of this form for my records.

_____ _____

Signature of subject Date

I, _____ (child), hereby consent voluntarily to participating in this study which includes an *INPP Reflex Assessment* and the *Screening for Child Anxieties and Related Disorders – Child* questionnaire. I also agree to my parent conducting an interview regarding aspects of my health, personality and environment with the researcher.

_____ _____

Signature of the child Date

I, Tamara-Lyn Carter, declare that I have explained the information given in this document to _____ (parent & child). The parent and child participants were encouraged and given ample time to ask me any questions. The interview was conducted in English.

_____ _____

Signature of investigator Date

Addendum F: Facebook advertisement for research participants

Hi Moms! I am an Advanced Mind Moves Instructor and Master's degree student. I am researching whether there is a relationship between primitive reflexes and symptoms of anxiety in children between the ages of 10-13 years old. If you would like to understand your 10-13 year old child better with a Mind Moves Primitive Reflex assessment and assist me in my research, please contact me at tamara.carter@mindmoves.co.za for more information.

MMi

MIND MOVES INSTITUTE

MOVES THAT MEND THE MIND

DOES YOUR CHILD EXHIBIT ANY OF THESE?

ADD/ADHD

Poor auditory processing

Anxiety disorders

Tactile defensiveness

Dyslexia

Poor balance

Poor perception

Low muscle tone

Delayed language development

THEY MAY BE SUFFERING FROM PRIMITIVE REFLEX RETENTION

GET A COMPREHENSIVE **reflex assessment** AND KNOW FOR SURE

SEE BACK FOR DETAILS

www.mindmoves.co.za

WHAT IS PRIMITIVE REFLEX RETENTION?

Is your child a victim of active primitive reflexes?

A simple, comprehensive reflex assessment will tell you for sure.

Primitive reflexes wire your child's nervous system between conception and the first 6 months after birth. After that, they should become dormant so the learning brain can take over. In some children, due to trauma, injury or early complications, primitive reflexes may remain active, trying to complete their function.

But they hamper your smart kid's cognitive development, diminishing their confidence and leaving them feeling anxious and confused.

Now there's a solution.

Mind Moves® was developed from the ground-breaking work of Dr Melodie De Jager, D.Phil (RAU) - founder and CEO of the Mind Moves Institute.

It's a scientifically-proven method that rapidly completes the work of primitive reflexes so they can go to sleep for good, freeing your child to develop naturally. And continued use of Mind Moves nurtures excellence in learning throughout school.

MIND MOVES INSTITUTE

MOVES THAT MEND THE MIND

021 461 3716

facebook

www.mindmoves.co.za

CALL NOW

Make your appointment today and give your child the chance to enjoy lasting confidence in their abilities. Your accredited Advanced Mind Moves Instructor is waiting to assist you.

Tamara Carter
071 538 8903

Addendum G: INPP raw data for each primitive reflex assessed per child participant

Moro		Rooting & sucking reflex		Tonic Labyrinthine reflex		Palmar reflex		Plantar reflex		Asymmetrical Tonic neck reflex		Spinal Galant reflex		Symmetrical Tonic Neck Reflex	
Supine	Erect	Left	Right	Forward	Backward	Left	Right	Left	Right	Left	Right	Left	Right	Front	Back
1	0	4	4	0	0	4	4	4	4	0	0	4	4	0	0
1	1	3	3	1	1	1	1	3	4	0	0	3	3	0	0
1	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0
1	0	0	0	0	0	0	0	1	1	1	2	0	0	0	0
3	0	0	1	1	1	1	1	1	1	2	2	0	1	2	2
1	0	0	0	1	0	0	1	4	4	2	1	4	4	1	0
4	3	0	0	0	1	1	1	4	4	0	0	1	0	0	0
3	1	0	0	1	1	0	0	3	3	0	0	0	1	1	0
3	1	1	1	0	1	1	2	3	3	1	1	1	4	1	1
4	2	2	2	1	1	1	1	0	1	1	2	0	1	1	3
2	1	1	1	1	1	1	2	3	3	1	1	0	0	0	0
4	2	1	1	4	4	1	1	1	1	4	4	2	2	0	0
2	1	0	0	1	0	2	2	1	1	1	1	2	0	0	0
1	0	0	0	4	4	2	3	4	4	0	0	1	0	0	0
1	0	0	0	2	1	0	0	0	2	0	0	0	1	1	0
1	4	0	1	0	0	2	1	4	4	1	1	4	4	0	1
1	0	1	2	0	0	1	2	2	2	2	2	0	0	1	0
1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2	3	2	1	2	1	0	2	2	4	2	2	4	4	1	1
3	0	0	0	2	0	1	0	1	2	2	2	3	3	2	0

Addendum H: SCARED scores of child participants

SCARED scores								
Unique code	Gender	Age	Total score	Panic score	General anxiety	Separation anxiety	Social anxiety	School avoidance
Sw1	F	13	39	5	10	12	8	4
Dd1	M	13	24	2	10	3	7	2
Ab2	M	12	28	6	6	7	5	4
Ab1	F	10	45	13	10	13	5	4
Nk1	M	10	24	3	8	6	7	0
Sc1	F	10	42	7	13	9	12	1
Sc2	F	13	41	6	15	6	11	3
Ke1	M	11	39	7	9	7	10	2
Du1	M	13	34	5	12	4	9	3
De1	M	12	20	3	3	5	9	0
He1	M	11	30	3	7	8	9	3
Fr1	M	11	34	9	5	8	11	1
Co1	M	10	24	4	4	5	7	4
Co2	M	12	23	6	6	4	6	1
Pr1	M	11	30	6	7	8	8	1
Pr2	M	11	39	8	12	7	8	4
Br1	M	11	20	4	6	4	5	1
He1	F	11	19	4	3	3	9	0
Jh2	M	12	52	10	12	9	13	8
Jh1	M	10	28	4	9	8	6	1

Addendum I: Intake interview questions raw data according to the group allocation based on scores >25 in the SCARED questionnaire.

	Anxious Group													Non-Anxious group						
	Sw1	Ab2	Ab1	Sc1	Sc2	Ke1	Du1	He1	Fr1	Pr1	Pr2	Jh2	Jh1	De1	Dd1	Nk1	Co1	Co2	Br1	Hd1
Learning difficulties	N	Y	Y	Y	Y	N	N	N	N	N	N	Y	Y	N	N	N	N	N	N	N
Conception N/A	N	N	N	N	N	N	N	N	N	A	A	N	N	N	N	N	N	N	A	N
Hyperemesis	N	N	N	N	N	Y	N	N	N	N	N	Y	Y	N	Y	N	N	N	N	N
Viral infection	N	N	N	N	N	Y	N	N	N	N	N	N	N	Y	N	N	Y	N	N	N
Smoking	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Alcohol	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Radiation	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Accident/infection	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Threatened Miscarriage	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Hypertension	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Placental insufficiency	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Toxoplasmosis	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Severe stress	N	Y	Y	Y	Y	Y	y	N	N	N	N	Y	N	Y	N	N	Y	N	N	N
Uncontrolled Diabetes	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N
Breech	N	N	N	N	N	Y	N	Y	Y	Y	N	N	N	N	N	N	N	N	N	N
Placenta Previa	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Difficult labour	Y	N	N	N	Y	Y	N	N	N	N	N	Y	N	Y	N	N	N	Y	N	N
Caesarean	N	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	N	N	Y	Y	N	Y	Y	Y
Cord around neck	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Post/pre-mature	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N
Low birth weight	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
White coating	N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y
Dry/cracked skin	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Low birth weight	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Incubation	N	N	N	N	N	N	Y	Y	Y	Y	N	N	Y	N	N	Y	N	N	Y	N
Distorted skull	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Jaundice	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Resuscitation	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Blue baby	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Heavy bruising	N	N	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N
Problems feeding	N	N	N	N	N	Y	N	Y	Y	N	N	N	N	N	N	N	N	Y	Y	N
Breastfeeding 3m+	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	N	N	Y	Y	N	Y
Colic	N	N	N	N	Y	Y	N	N	N	N	N	N	N	N	Y	N	N	N	N	N
High fever, convulsion	N	N	N	N	N	Y	N	N	N	N	N	N	Y	N	N	N	Y	N	N	N
Inoculations	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Very quiet baby	N	N	N	Y	N	N	N	N	Y	Y	N	Y	N	N	N	N	Y	N	N	Y

Poor sleeping	Y	N	N	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	Y	N	N
Incorrect crawl	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	Y	N	N
Walked <10 mon.	Y	N	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Walked < 18mon.	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N
Talked >18 mon.	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	N
Excessive rocking	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Head banging	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Eczema	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Asthma/croup	Y	N	N	Y	N	Y	N	N	Y	N	N	N	N	N	Y	N	N	N	Y	Y
Recurring ear infections	Y	N	N	Y	N	Y	N	Y	N	Y	Y	N	N	N	Y	N	N	N	N	N
Travel sickness	N	N	N	Y	N	Y	Y	N	N	Y	Y	N	N	N	Y	N	Y	N	Y	N
Prolonged thumb sucking	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	N	Y	N	N
Prolonged bedwetting	N	Y	N	N	N	N	N	N	N	Y	N	Y	N	N	N	N	N	N	N	N
Hand dominance	N	N	N	N	N	Y	N	N	N	N	N	Y	N	N	N	N	N	N	N	N
Left/right difficulty	N	N	N	Y	N	N	Y	N	N	N	N	Y	N	N	N	N	N	N	N	N
Bike difficulties	N	N	N	N	N	Y	Y	N	N	N	N	N	N	N	Y	N	N	N	N	N
Reading difficulty	N	N	N	Y	N	N	Y	N	N	N	N	Y	N	N	N	N	Y	N	N	Y
Writing difficulty	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	N	N	Y	N	N	Y
Reversals	N	Y	N	N	N	N	Y	N	N	N	N	Y	N	N	Y	N	N	N	N	Y
Cursive difficulty	N	N	N	N	N	N	Y	N	N	N	N	N	N	N	Y	N	N	N	N	Y
Time reading difficulty	N	N	N	Y	N	N	N	N	N	N	N	N	N	N	Y	N	Y	N	N	Y

Note: N = no, Y = yes and N/A = Normal conception, A = Assisted conception

Addendum J: Proof of statistical consultation

To whom it may concern

Tamara-Lyn Carter, an MSc student, consulted with me regarding the quantitative statistical analysis used in her dissertation. We had several meetings during which various statistical models and approaches employed in psychology were reviewed and discussed.

Jaroslaw Adamiak (Unisa)

Cape Town 2019-12-11

Addendum K: Proof of editorial consultation

27 February 2020

EDITOR REPORT

I, the undersigned, confirm that I have proofread the following Dissertation: *An exploration of the relationship between unintegrated primitive reflexes and symptoms of anxiety in children between 10-13 years in the Western Cape province of South Africa* presented to me by Tamara-Lynn Carter, UNISA, MA Soc. Sci. in Psychology Student (4504-1555).

The following elements were proofread to verify:

- the spelling, grammar and semantics of the text
- that the appropriate referencing convention was applied across the bibliography and in-text citations
- UK English (as opposed to US or SA English)
- the text formatting within tables & figures
- checking headings and subheadings
- ensuring that the above are compatible with the table of contents and introductory material
- verifying that all in-text citation were present in the bibliography, and *vice versa*.

Disclaimer:
Although the utmost care has been taken to identify errors in this document, it is possible that, on occasion, human error might prevail. Seeing that the ultimate responsibility remains with the student, I am not liable for any losses resulting from missed errors.

Please feel free to contact me in the event of questions or any further proofreading requirements.

I wish Tamara everything of the best with her dissertation and with this interesting and useful field of study.

Timothy Nicol
Copy-editor/Proofreader

Mobile: +27 (72) 472 6819
Email: tknicol23@gmail.com

Residential address:
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Pinehurst
Durbanville
7550
South Africa

Addendum L: Permission

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PO Box 44389, Linden, Johannesburg, 2104
011 888 5434 / 072 234 0528 / Fax 086 577 7372
institute@mindmoves.co.za / www.mindmoves.co.za

To whom it may concern:

RE: PERMISSION TO USE THE MIND MOVES REFLEX ASSESSMENT FOR RESEARCH

I, Dr Melodie de Jager, the owner and developer of the Mind Moves Reflex Assessment hereby give permission for Tamara-Lyn Carter to use the above mentioned assessment in her research. I am aware of the topic that Mrs Carter intends to investigate: *A mixed methods study of aberrant primitive reflexes and symptoms of anxiety in learners aged 10-13 years of age: A Mind Moves © approach.*

I confirm that I have trained Tamara-Lyn in both the assessment of primitive reflexes and the scoring protocol according to the Mind Moves Reflex Assessment. Tamara-Lyn received her certification of competence on 15 August 2015. I am aware that the results of the research topic will be published on a public domain.

Please feel free to contact me if you have any further queries.

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Mind Moves Institute