The influence of the properties of school uniforms on children with sensory overreactivity

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DECLARATION

I, Wenette Jordaan declare that this thesis, which I hereby submit for the degree Masters in Consumer Science: Clothing Retail Management, at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this or any other tertiary institution.

Wenette Jordaan

February 2022

DEDICATION

I would like to dedicate this study to my supervisor, Dr Lizette Diedericks.
You have wholeheartedly inspired me to write this dissertation.

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I would like to acknowledge and give thanks to various people who have given so much of their time and effort to this study.

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I hope that I have made you proud.

SUMMARY

The influence of the properties of school uniforms on children with sensory overreactivity

By

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Department: Consumer and Food Sciences
Degree: Masters in Consumer Science (Clothing Retail Management)

Many children experience a low threshold towards sensory input and as a result, may experience sensory overreactivity (hypersensitivity) to touch, smell, taste, and intolerance for certain material textures (Cheng & Boggett-Carsjens, 2005; Dunn, 1997; Güçlü, Tanidir, Mukaddes & Ünal, 2007). The nervous system responds with “fight’’ (e.g., tantrums) or ‘flight’’ (e.g., withdrawal) reactions when a child experiences sensory discomfort and irritation (Cheng & Boggett-Carsjens, 2005; Karthikeyan, 2017). Children between the ages of 6-13 years spend approximately five days per week and six to nine hours a day wearing a school uniform which provides a constant sensory input to their body (Dąbrowska, Rotaru, Derler, Spano, Camenzind, Annaheim, Stämpfli, Schmid & Rossi, 2016). The impact of constant discomfort and distraction could be detrimental to a child’s education, social participation, play and activities of daily living. While treatment with an occupational therapist surrounding the effects of Sensory Integration Dysfunction is feasible, it is rather important to address the barriers in the child’s environment that may be the root of the discomfort. It is, therefore, imperative to determine which elements of their school uniforms may cause discomfort and irritation, and subsequently implement measures of adaptation.

This study used an exploratory mixed-method to approach this problem. The initial qualitative phase included focus group interviews and, the second quantitative phase consisted of an online self-administered questionnaire. The garment elements explored included three main categories namely textiles (fibre content and fabrication), design (necklines and collars, sleeve and sleeve finishes, waistline finishes, closures, wearing ease, and decorative trimmings) and construction (seam type, seam class and type of labelling). It was important to include both parents of children with sensory overreactivity and qualified occupational therapists in phase 1 and solely parents in phase 2. Due to the explorative nature of the study, convenience sampling, purposive sampling, snowball sampling, and quota sampling was employed in gathering 10 participants for the virtual focus group discussions and 106 respondents for the online questionnaire. The data collected in the qualitative phase (phase 1) was implemented in the development of the measuring instrument used in the quantitative phase (phase 2). Data analysis in phase 1 consisted of content analysis and in phase 2, only descriptive statistics due to the exploratory nature of this study. The findings of this study indicate that school uniforms indeed contribute to sensory overreactivity which may influence children's quality of life detrimentally. Most influential garment elements include fibre content, rough textures, seam types, collars, long-sleeved garments, embroidery, and labelling. Adaptation guidelines were developed for parents of children with sensory overreactivity, which may also be utilised by occupational therapists. In addition, guidelines for schools, retailers offering school clothing, and manufacturers of school garments were also developed.

This study provides a vast contribution to new knowledge which may be used to enhance the lives of children with sensory overreactivity, as well as parents, occupational therapists and teachers who work with children with sensitivities. It may furthermore benefit sensory scientists, researchers in the field of textiles and clothing and consumer scientists.

Keywords: sensory overreactivity; tactile defensiveness; Sensory Integration Dysfunction; hypersensitivity; school uniforms; textiles; design; construction.

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CHAPTER 1

A STUDY IN PERSPECTIVE

1.1 INTRODUCTION AND BACKGROUND

Sensory overreactivity may influence individuals to experience adverse responses to sensory stimuli (Tavassoli, Miller, Schoen, Brout, Sullivan & Baron-Cohen, 2018). Sensory overreactivity is a subtype of Sensory Integration Dysfunction (SID) that affects approximately one in twenty people of the general population (Miller, Fuller & Roetenberg, 2014:249; Miller, Nielsen, Schoen & Brett-Green, 2009) and appears to be problematic in typically developing children as well as children suffering from diagnosed conditions (Ayres, Robbins & Pediatric Therapy, 2005; van Jaarsveld, Mailloux, Roley & Raubenheimer, 2014). SID refers to the overarching term which describes how the brain regulates and responds to sensory stimuli (Asmika, Oktafiani, Kusworini, Sujuti & Andarini, 2018; van Jaarsveld *et al.*, 2014). The sensation of touch, as received from the human skin (Jablonski, 2008:7; Yao, Gohel, Li & Chung, 2011) is often implicated in SID. Clothing maintains direct contact with the human skin daily (Harris, 2019) and thus provides sensory input to the body (Dąbrowska *et al.*, 2016). On average, a foundation phase child (between the ages of 6-13 years) spends approximately five days per week and eight to twelve hours per day in their school uniform. The study at hand focuses on school children's clothing and which elements of their school uniforms, specifically textiles, design, and construction affect their sensory system. The study furthermore aims to create several guidelines on how to reduce the defensive responses children can experience due to their school uniforms.

Sensory integration (SI) refers to the capability of the brain to filter and organise sensory stimuli (Asmika *et al.*, 2018; van Jaarsveld *et al.*, 2014). Once the brain receives sensory information from the senses (taste, touch, sight, hearing, smell, movement, gravity, and position), the brain organises it unconsciously to develop specific responses (Ayres *et al.*, 2005). When the organised information flows in an arranged and integrative matter, a child is enabled to respond purposefully to the specific stimuli (Ayres *et al.*, 2005). However, in the event where the process is disturbed, the brain is unable to neither respond appropriately

nor suitably interpret the stimulus. This refers to sensory integration dysfunction or SID (Asmika *et al.*, 2018; Rydeen, 2001). Children with a low threshold to sensory input may have hypersensitivity to touch, smell, and taste sensations, as well as intolerance to certain material textures (Cheng & Boggett-Carsjens, 2005; Dunn, 1997; Güçlü *et al.*, 2007; Kyriacou, Forrester-Jones & Triantafyllopoulou, 2021). This also refers to as sensory overreactivity. As a result, when a child's sensory input from the environment is registered as being potentially dangerous and painful (for example, a collar on a school shirt which constantly rubs the neck and causes a painful sensation) their nervous system will respond with "fight" (e.g. tantrums) or "flight" (e.g. withdrawal) reactions intended for safety and protection (Cheng & Boggett-Carsjens, 2005; Karthikeyan, 2017). This highlights the importance of the exploration of the topic at hand.

A sensory overreactive response to touch may elicit "fight or flight" reactions from affected individuals during the wear of material or clothing garments specifically. Experiencing discomfort during the wear of certain textures and material garments-which most individuals consider as harmless and non-irritating, refers to a specific SID known as tactile defensiveness (Ayres, 1972; Kinnealey, Oliver & Wilbarger, 1995). This dysfunction results in extreme irritability with certain clothing textures or elements of garments regarding their design and construction (Spies & van Rensburg, 2012). The most apparent implication of tactile defensiveness is the fact that individuals with this disorder persistently experience a source of discomfort and distraction. Furthermore, the sensation of irritation is always evident (Belluscio, Jin, Watters, Lee & Hallett, 2011). Bester, Buckle and Franzsen (2011) mentions that treatment with occupational therapists is highly recommended, however, the authors state that it would be even more beneficial to address the barriers in the child's environment which may be the root cause of this discomfort. This may commence with the adaptation of the physical environment and more particularly the material garments' specific elements that are in direct contact with the child's skin. Van Gorp and Adams (2012:62) states that "discomfort" demands great attention from a human being as it hinders productivity which may affect a child's education (Karthikeyan, 2017) and participation in other aspects of daily life. Therefore, by reducing the discomfort, irritation and resulting demand for attention in a specific environment, one can enable participation in age-appropriate activities, such as education (Kyriacou *et al.*, 2021).

Garment elements related to textiles include fibre content, fabrication, and dyes and printing used in the manufacturing process (Kadolph, 2014:4). Elements related to the construction of a garment include the seam type, seam class and labelling can also be categorised under construction elements. Design elements include necklines and collars, sleeve and sleeve finishes, waistline finishes, closures, wearing ease, and decorative elements. Thus, all

textile, design, and construction elements need to be investigated individually to determine which elements provide discomfort and cause irritability. Once determined, the process of practical adaptation to school uniforms and their specific elements can be initiated.

Additional intervention options are more focused on adaptive or therapeutic clothing garments that describe garments that perform over and above their normal functionality and are particularly helpful to those with special needs (Gupta, 2011). These garments include sense-interactive clothing as well as weighted vests. The current study aims to focus on practical and affordable adaptations which can be made to existing school uniforms to reduce sensory stimulation.

When considering children's clothing, close attention should be paid to meet a child's comfort requirements (Bezerra, Carvalho, Rocha & Xu, 2017). Comfort is one of the main features that should respond directly to a child's body movements and active lifestyle (Barbosa & Walkiria, 2008; Bezerra *et al.*, 2017). Different studies reveal some of the greatest contributors to discomfort in everyday clothing. These elements include but are not limited to seams of pants, labels within garments (such as sizing labels or care instructions), textured fabrics, collars on t-shirts as well as closures-specifically elastic closures in pants (Dunn, 1997; Kyriacou *et al.*, 2021; Nederkoorn, Jansen & Havermans, 2015; Roy, Ghosh & Bhatt, 2018). However, there remains a lack of research on children's wear, and more specifically children's school uniforms- an especially relevant category of clothing in South Africa.

Woolworths, Edgars, Ackermans and Pep Stores are classified as some of South Africa's leading clothing retailers that include basic school uniform items in their product offering (Research-and-Markets, 2019; Wilson, 2020). Although effort has been made to make their ranges as inclusive as possible, no leading South African retailer currently stocks school uniforms that specifically accommodate sensory-sensitive children. For the sake of those with sensory overreactivity in South Africa, it is vital to adhere to the demand, as it could be highly beneficial to school-going children. It is furthermore imperative to ensure that any practical adaptations made to uniforms to combat sensory overreactivity remain affordable and uniforms remain geographically accessible to all consumers.

1.2 RESEARCH PROBLEM

Maslow's hierarchy of needs theory has paved the way in highlighting the importance of clothing as a basic human need and consequently, the influence clothing may have on an individual's well-being and quality of life (Ozguner & Ozguner, 2014). Hypersensitivity to

touch was already explored by Hans Asperger in the early 1940s (Asperger, 1944). Since then, research has identified that an individuals' hypersensitivity to touch illustrated their intolerance for specific material textures and the wearing of certain material garments (Güçlü *et al.*, 2007). Thus, since it has been identified that clothing plays a role in the lives of people with sensory overreactivity, it has not yet received sufficient attention in research. When considering clothing subcategories, one which is of great importance to the South African market is the range of children's school uniforms. As mentioned, children spend a large portion of their weekdays at school wearing these specific garments. During the use and wear of these garments, a large amount of academic (Baumann & Krskova, 2016) as well as social and leisure activities take place. Hence, if the textile, design, or construction qualities of the school uniform cause sensory overreactivity, it directly affects the child's education, social participation, play, and other activities of daily living. Hypersensitive children become so distracted by such sensations that it disables them from concentrating on schoolwork, interferes with all fields of learning and may cause behavioural issues (Ayres & Robbins, 1979). Karthikeyan (2017), Kyriacou *et al.* (2021) and Howe and Stagg (2016) furthermore states that it hinders productivity which may affect a child's education. The sad reality is that children are often misjudged as their teachers, peers and parents might not comprehend the battles these children face (Christopher, 2019). Unfortunately, the actual reason behind their behaviour often remains unknown to those close to them, and they remain punished for their expression of discomfort.

The touch sensation is so complex that studies have indicated that this type of stimuli greatly affects one's psychological well-being (Roy *et al.*, 2018). With numerous clothing variables in existence, it is still unknown what *exactly* causes irritation and discomfort *and* to what extent. With regards to textiles, Rowe (2006) mentions how fibre and yarn types may cause irritation at a local level and points out that textile finishes and dyes may also cause overstimulation on contact with the human skin. The design of a garment is also a key factor to examine. For instance, a garment with a turtleneck has been identified to cause major irritation (Biel & Peske, 2009). The specific construction methods used to construct a garment, in particular, the seam class and seam type, can also trigger sensory overstimulation. It is widely recognised that seams irritate (Biel & Peske, 2009; Cheng & Boggett-Carsjens, 2005; Roy *et al.*, 2018; Shin & Gaines, 2017; Shin, Smith & Gaines, 2015), but the specific seam types that are the culprit have not been identified. Flat seams (FS) have been acknowledged as a superior option from a sensory point of view (Biel & Peske, 2009), and it is furthermore assumed that superimposed seams (SS) are the main culprits for irritation. Lastly, elements such as labelling are also known for their role in causing irritability during the wear of clothing (Cheng & Boggett-Carsjens, 2005).

To minimize the sensory stimulation from clothing and decrease its adverse effects, all the properties of a school uniform should be investigated and explored to contribute to a better quality of life for children with sensory overreactivity. This study is focused on the consumer and refers to parents who are responsible for purchasing school uniform garments from various retailers, but also the child with sensory overreactivity who is exposed to wearing these particular garments. When the school uniform consists of standardised garments (i.e., grey trousers and white collared shirts), parents can choose between different clothing retailers and establish which garment options might be the most "sensory-friendly". Other schools have custom-designed uniforms which means that parents can find themselves in the situation whereby they are forced to buy school uniforms from private clothing manufacturers. In this situation, garment options are relatively limited. When options are limited, the need for small adaptations is necessary. The study, therefore, aims to support parents of children with sensory overreactivity in finding ways to decrease and combat irritation from school uniforms.

1.3 JUSTIFICATION

This multidisciplinary study will provide theoretical, managerial as well as real-life contributions. From a theoretical point of view, there is very limited research that specifically focuses on both sensory overreactivity and clothing. Many studies have focused on sensory integration in children suffering from autistic spectrum disorders (ASD) (Asmika *et al.*, 2018; Baranek, Foster & Berkson, 1997; Blakemore, Tavassoli, Calò, Thomas, Catmur, Frith & Haggard, 2006; Blanche & Schaaf, 2001; Dunn, 1997; Shin & Gaines, 2017) as well as the influence of therapeutic garments on children with ASD or neurodevelopmental disorders (Bester *et al.*, 2011; Gupta, 2011; Koo, 2014; Shin & Gaines, 2017; Tomchek & Dunn, 2007). These studies related to therapeutic garments have indicated contrasting opinions and have presented mixed results when it came to presenting the benefits of wearing specifically weighted vests. Other therapy garments such as compression clothing and air pressure garments have also produced mixed results in some examinations which suggest that evidence surrounding these garments is unclear. For the purpose of this study, the researcher felt that many studies have explored the topics surrounding therapeutic garments and have thus specifically chosen to explore "everyday" clothing worn by South African children- specifically school uniforms. Studies based on this topic remain extremely limited. It also became apparent that therapeutic garments were only attainable by certain individuals and were quite inaccessible to individuals with financial and geographical constraints. In addition, if evidence surrounding the benefits of such therapeutic garments were unclear, a

different approach was needed to combat the limitations these individuals face with regards to their clothing.

Regarding the challenges associated with school uniforms and conceptualising interventions to make garments more sensory-friendly, it was imperative to apply the simplest and ‘’least invasive’’ adaptations first. This is based on the Adaptation Hierarchy Framework by Dugan, Campbell and Wilcox (2006) (Campbell, Milbourne & Wilcox, 2008) which entails a hierarchy for conceptualising adaptation interventions from “least restrictive’’ to ‘’most restrictive’’. This suggests that one should always initiate the process with the simplest adaptation, before implementing extreme measures.

Still, limited research exists in terms of adaptations that can be made to clothing, specifically school uniforms, to increase the well-being of children. Studies by both Turner and Harrison (2014) and Kittayapong, Olanratmanee, Maskhao, Byass, Logan, Tozan, Louis, Gubler and Wilder-Smith (2017) have focused on ways to protect foundation phase children from sun exposure and dengue infections in Australia and Thailand respectively. Both studies have reported the serious influence school uniforms exhibit on children and the ideal opportunity these garments may present in addressing general well-being. No specific mention, however, made to any conditions the children suffer from and thus, to the best of the researcher’s knowledge, no current studies focus specifically on the influence of school uniforms on children with sensory overreactivity. The findings of this study may therefore address an important theoretical gap in the existing literature and create a basis for further research. Since it is a multidisciplinary study, scholars from various disciplines will be able to benefit from this study. These include occupational therapists (health), sensory scientists, consumer scientists, and scholars in the field of clothing and textiles.

Clothing retailers may benefit from this study when developing a “sensory-friendly” school uniform range specifically for children with tactile defensiveness. Certain retailers in the United States and United Arab Emirates offer existing ranges of adapted school uniforms that form part of their product ranges. These retailers include Marks & Spencer and JCPenny, amongst others (Florida-Autism-Centre, 2018). Currently, none of the leading South African retailers has a similar range and, therefore, it opens a window of opportunity, especially when considering cost-effective strategies to suit the needs of South African consumers.

Ultimately, this research study has many real-life contributions. Considering education and a child’s school experience, the findings from this study can positively influence both a child’s academic performance and learning experience. It can also play a role in enhancing socialisation, play, and activities of daily living. The research will assist schools, particularly

special needs schools, to make minor adjustments to their school uniform to be less sensory irritant. This may have a major impact on children's emotional state and behaviour since their levels of discomfort will be addressed. A positive behavioural change from the learners' side automatically improves the morale of teachers, parents, and peers who are associated with these learners (Spies & van Rensburg, 2012). Therefore, not only the children living with sensory overreactivity, but also the people that surround them (family members, teachers and, peers) could benefit from the findings of this study. In addition, it will help occupational therapists and parents to understand how clothing, specifically the properties of school uniforms, can heighten sensory overreactivity. It can also assist in creating awareness surrounding other choices of school uniform garments (e.g., a jersey versus a jacket) which may assist parents to make informed choices for their children.

To summarise, this study will make a vast contribution to new knowledge in various disciplines which has the potential to enhance the lives of many people, specifically children with sensory overreactivity.

1.4 RESEARCH AIM AND OBJECTIVES

1.4.1 Aim

The main aim of this study was to explore and describe potential sensory triggers residing in school uniforms and to develop practical adaptations to reduce sensory overreactivity.

1.4.2 Objectives

The following objectives were formulated to explore the topic under study.

1. To explore and describe the influence of the properties of school uniforms on children with sensory overreactivity. Specifically focusing on:
   1.1 The influence of different textile properties.
   1.2 The influence of different garment design properties.
   1.3 The influence of different construction properties.

2. To develop a guideline that indicates easy and affordable changes that can be made to school uniforms that will reduce adverse sensory responses.

1.5 RESEARCH DESIGN AND METHODOLOGY

The following section presents an overview of the research design and methodology implemented in the study. A comprehensive explanation is presented in Chapter 3.

1.5.1 Research design

The relatively unfamiliar subject explored in this study lent itself to an exploratory mixed-method approach. As indicated in Figure 1.1, an exploratory mixed-method design occurs sequentially, by first exploring the topic in the qualitative phase, followed by the integration of the findings from the qualitative phase in the quantitative phase (Creswell & Creswell, 2018:8). By exploring the topic in this manner, the researcher can gain a comprehensive understanding of the subject matter of each individual phase. The first phase of this study was purely explorative and consisted of two qualitative focus group discussions. The views and findings of the participants were used to develop the measuring instrument for the second phase that consisted of a survey using an online questionnaire. The study's cross-sectional nature enabled the collection of information from the given sample to occur only once (Malhotra, Birks & Nunan, 2017:911).

The advantage of using such a research design is that it enhances the reliability and validity of the research outcomes (Abowitz & Toole, 2010). It also has the ability to answer variable questions and has the function of being used in a variety of research fields such as psychology, healthcare, education, and human behaviour (Brause, 2000; Calabrese, 2006; Finn, 2005; Phillips & Pugh, 2005). Therefore, it is indeed fit for this interdisciplinary study.

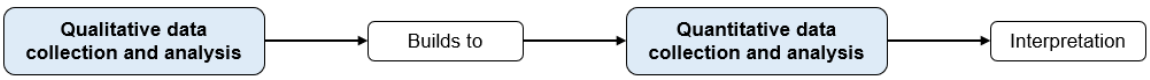


FIGURE 1.1: EXPLORATORY MIXED-METHOD APPROACH (Creswell & Plano Clark, 2018:69)

1.5.2 Unit of analysis, sample, and sampling

The unit of analysis of this study, as indicated in Table 1.1, was parents of children with sensory overreactivity and occupational therapists (OT's) that treat children with sensory overreactivity regularly. The primary focus was placed on children with sensory overreactivity however, the researcher felt that both parents and OT's would be able to identify elements of school uniforms that caused sensory irritation. The study focused specifically on children between the ages of 6-13 years old, as similar studies proved children are mostly affected by sensory intolerance in this age group range (Bar-Shalita, Vatine, Seltzer & Parush, 2009;

Ben-Sasson, Carter & Briggs-Gowan, 2009; Bester *et al.*, 2011; van Jaarsveld *et al.*, 2014). For the purpose of this study, non-probability sampling methods were used across all phases and included convenience sampling, purposive sampling, snowball sampling, and quota sampling was also used during the qualitative phase.

Convenience sampling featured in both the qualitative and quantitative phases as various insights could be easily generated especially due to the research' exploratory nature. Additionally, this sampling method was also included due to financial and time constraints (Malhotra *et al.*, 2017:421). Purposive sampling was used to identify individuals based on their experience (Leedy, Ormrod & Johnson, 2021:272) and the use of snowball sampling allowed participants to be recruited by respondents who already formed part of the sample, and whom all fit into the same category (Gliner, Morgan & Leech, 2017:151). An initial group of individuals was selected who possessed desired characteristics which in return helped obtain sufficient referrals (Malhotra *et al.*, 2017:424). Quota sampling was implemented to ensure that an adequate number of occupational therapists, as well as parents of children with sensory overreactivity, were recruited for the qualitative phase. Snowball sampling was especially of great assistance in identifying an adequate sample for the quantitative phase.

TABLE 1.1: SAMPLE QUALITATIVE PHASE

	Focus group A	**Focus group B**
Occupational therapists	2	2
Parents	5	3
Total	**6***	**4***

**Some individuals identified as both occupational therapists and parents of children with sensory overreactivity. Therefore, the total respondents for focus group A remain 6 and for focus group B, 4.*

1.5.3 Measuring Instrument

The exploratory mixed-method design enabled the prioritisation of the qualitative phase. Once completed, the researcher was able to build on the data obtained and proceed with the development of the measuring instrument for the quantitative phase, which stemmed from the exploratory results obtained in the qualitative phase (Clark & Creswell, 2014:123). The first phase of the study was conducted by implementing two focus groups and the discussion was aided with the use of a topic guide. The measuring instrument of phase 2 lent itself to a self-administered online questionnaire.

1.5.3.1 Phase 1: Qualitative phase

As mentioned, the first phase of the study was conducted with the use of two focus groups. Kumar (2018:124) explains that focus groups are an ideal way of obtaining individuals' perceptions in qualitative research. Due to the Covid-19 pandemic, the focus groups discussions had to be virtual. Blackboard Collaborate was used and the discussions were recorded with the participants' consent. To encourage discussion with regards to sensory sensitivity and children's school uniforms, a topic guide (Table 3.1) was developed prior to the data gathering (Malhotra *et al.*, 2017:188).

Typical of a qualitative research study (Creswell & Creswell, 2018:43) the researcher commenced the interview with an open-ended question asking participants what they have noticed irritate children while specifically wearing their school uniforms. No reference was initially made to specific aspects that were mentioned in the literature in order to grant participants the chance to provide their views as freely as possible and eliminate possible interviewer bias (Kumar, 2018:145). Once the topic no longer incited new discussions and no new information emerged, the researcher continued to the following questions in the topic guide.

It was important to initiate the discussion with common adaptations that could be made to irritant uniforms, as it was assumed that many participants have noticed their children experience discomfort and have implemented at home adaptations. A set of samples which consisted of different types of fabrics, seams, collars, and wrist finishes in the form of swatches, were sent to participants prior to the focus group discussion (see Section 3.3.3.1 together with Table 3.2 and Table 3.3). This added to the interactivity of the virtual focus group. The researcher aimed to obtain feedback from the participants regarding the acceptance of the school uniforms and their components, general feedback of the various school uniform swatches, overall acceptance, and suggestions on how it may be improved. When no new data came to the fore, the researcher assumed data saturation occurred (Creswell & Creswell, 2018) (Creswell & Creswell, 2018:464) and data collection was stopped.

1.5.3.2 Phase 2: Quantitative phase

The online questionnaire consisted of three sections; Section A, Section B, and Section C (see Addendum C). Respondents' consent was required for them to partake in the research (see Addendum B)- this was presented in **Section A**. **Section B** included information relevant to the child and focused on questions related to their demographic data. Although demographic questions may be regarded as sensitive and might discourage respondents from answering the questionnaire, especially if placed at the start of a survey (Malhotra *et*

al., 2017:384,394), it was important to include demographic questions at the beginning as these served as screening questions. Firstly, participants had to acknowledge whether they had a child that has mild to severe overreactive responses towards light touch input and whether the child wears a school uniform to school. Questions related to age identification, gender, and area of residence followed. Specific questions regarding sensory overreactivity were also present. Questions related to school uniforms and their different elements followed the screening questions were completed.

Section C related to the properties of school uniforms that present sensory issues. In the first phase of the study, specific properties had already been identified, however, in the second phase, respondents were requested to rate the levels of different variables using a five-point itemised rating scale (a Likert-type scale) ranging from “never” to “always”, and ‘’strongly disagree” to “strongly agree”. Respondents were asked to indicate their child’s emotional state when wearing specific school garments, their level of agreement to specific statements related to the fibre content and trims of garments, their frequency in the engagement of at-home adaptations, and preferred seam and label type. Since most respondents were not familiar with the technical terms associated with clothing production, examples in the form of pictures as well as short definitions were provided in the questionnaire. Table 1.2 summarises the structure of the final questionnaire.

TABLE 1.2: STRUCTURE OF THE FINAL QUESTIONNAIRE

SECTION	CONTENT
SECTION A	Consent form
SECTION B	Demographic data & screening questions
SECTION C	Clothing properties

1.5.4 Data Collection

The process of data gathering in the first phase commenced by the researcher virtually once ethical clearance had been obtained from the Faculty of Natural and Agricultural Sciences at the University of Pretoria. An effort was made to accommodate both parents and occupational therapists on a convenient day and time when actual data collection took place. Two final dates and times were chosen, and participants were informed accordingly. Sessions were recorded using audio taping with permission from the participants. The researcher served as the moderator during the focus group discussions and led discussions with the aid of the topic guide developed prior to the commencement of the focus group. Data collection for the qualitative phase took place in July 2021.

With the use of the questionnaire in the second phase, it was essential to pre-test the research instrument to ensure all questions were understood and interpreted correctly by respondents in the study. The pre-test for the questionnaire occurred in early July 2021 whereby the final data collection commenced at the end of July 2021. The survey was hosted on Qualtrics and the link to the online questionnaire was sent to possible respondents. Respondents were recruited through various digital communication platforms. The researcher contacted 11 Facebook pages related to Sensory Processing Disorder and Autism support groups and shared an invitational link to the questionnaire aimed at the group members. Furthermore, possible respondents were invited to the online questionnaire via WhatsApp and e-mail using the same link. The researcher was aware of the fact that this data collection method may yield a low return rate (Creswell & Creswell, 2018:172), and therefore, both the WhatsApp message and e-mail was accompanied by a cover letter motivating potential respondents to complete the questionnaire, by stating the value their responses will provide to the world of research. Despite the regular advantages associated with conducting online questionnaires, this survey method seemed most appropriate due to the Covid-19 pandemic. Researchers were able to avoid physical contact with respondents (i.e., social distancing) and respondents were able to complete the questionnaires promptly and without any difficulty.

1.5.5 Data Analysis

Qualitative and quantitative research requires different data analysis strategies (Leedy *et al.*, 2021:45). The recordings in the qualitative phase were transcribed using Otter-ai, an automated audio transcription application. Once the transcription was completed, the researcher listened to the recordings while reading through the transcription to ensure accuracy. The coding of the transcriptions was aided with the use of Atlas.ti software. Content analysis- one of the main methods in analysing qualitative data (Kumar, 2018:332) was used to determine common themes that emerged during the focus group discussions while simultaneously assisting in structuring and summarising the data (Malhotra *et al.*, 2017:254).

The data for phase 2 was captured and coded automatically with the use of Qualtrics software, which occurred as the respondents completed the questionnaire. The dataset was exported to Microsoft Excel for data cleaning (e.g., removal of unfinished questionnaires) and further data analysis. Due to the exploratory nature of this study, only descriptive statistical analysis was implemented in the study and included frequencies, percentages, and means (Leedy, Ormrod & Johnson, 2019:387).

1.6 QUALITY OF THE STUDY

Qualitative and quantitative research are subject to their own measures with regards to quality assessment. While qualitative research is measured in terms of trustworthiness, quantitative research is based on validity and reliability.

1.6.1 Quality of the study: Phase 1 (trustworthiness)

In qualitative research, the quality of the study is measured in terms of trustworthiness (Kumar, 2018:171). Trustworthiness is enhanced by four specific factors which affect the validity and reliability of the research, and these include credibility, transferability, dependability, and confirmability (Guba & Lincoln, 1994:114; Kumar, 2018:172). Finally, reflexivity was also used to enhance the study's legitimacy (Creswell & Creswell, 2018:172).

Credibility refers to a circumstance whereby the results obtained in the study are agreeable to the participants of the specific research study and, it is in the researcher's best interest to convey the beliefs of respondents accurately. Credibility was enhanced with the implementation of multiple methodologies (i.e., focus groups and a self-administered questionnaire) as it added complexity to the current research study.

Transferability in qualitative research describes the ability of the results of a specific study to be generalised to a larger population, and more specifically, in other contexts and settings (Kumar, 2018:172). To enhance the transferability of the results, Pratt and Yezierski (2018) suggest recruiting participants with different demographic characteristics and Nieuwenhuis (2016:124) suggests using quota sampling. Therefore, both approaches were pursued in this study.

Dependability in qualitative research highlights the idea of whether one would be able to acquire the same results if the data was collected a second time around. Although difficult to achieve in qualitative research due to the flexibility in obtaining the data, it may be achieved using detailed record-keeping by using a variety of data recording strategies (Kumar, 2018:172; Leedy *et al.*, 2019:282). To increase the study's dependability, previous researchers conducted the data collection until data saturation occurred (Asmaningrum & Tsai, 2018). Hence, a similar approach was implemented.

The degree to which the results of a study may be substantiated and confirmed by other researchers displays the confirmability of a study (Kumar, 2018:172). Objectivity in quantitative research parallels this concept and is often discussed in topics related to bias. As one of the leading downfalls in the trustworthiness of a study (Kumar, 2018:219),

researchers must ensure that personal bias gets eliminated to the furthest extent and objective research reports are written. The questions in the topic guide were formulated in such a manner to reduce bias as far as possible.

1.6.2 Quality of the study: Phase 2 (validity and reliability)

Validity is concerned with the accuracy and truthfulness of the findings and indicates the extent to which the research measures what it intends to measure (LeCompte & Goetz, 1982:32; Malhotra *et al.*, 2017:361). Different types of validity exist namely content validity, face validity, concurrent validity, predictive validity, criterion validity, and construct validity (Babbie, 2016:191; Malhotra *et al.*, 2017:362). Kumar (2018:167) states that both content and face validity moderate whether questions in the measuring instrument reflect the objective of the study. Not only should the questions be representative of the objectives but be well-balanced in the sense that all questions should have equal representation in, for the purpose of this study, the questionnaire. The literature review, as well as the findings from the two focus groups, enhanced the content validity of the measuring instrument.

The concept of reliability is focused on the ability of the measuring instrument to yield consistent results when one collects the same type of information, under the same or similar conditions, on different occasions Kumar (2018:169). Hence, if the measuring instrument produces scores across different measurements whereby the association between the scores is high, one could regard the results as consistent and thus reliable (Malhotra *et al.,* 2017:359).

Different approaches exist in assessing the reliability of a study and it includes test-retest reliability, alternative-forms reliability as well as internal consistency reliability (Malhotra *et al.,* 2017:358). As mentioned, the study was firstly explored utilising a qualitative scale. Therefore, the development and subsequently, quantitative phase (phase 2), was dependent on the initial qualitative phase (phase 1). To validate the findings, the data obtained in the qualitative phase was used to develop the quantitative measuring instrument (Creswell & Plano Clark, 2018:155). To assess reliability, a pre-test questionnaire was implemented and tested with the use of a pilot sample of respondents.

1.7 ETHICS

Ethics is concerned with the morality of human behaviour and is an important code of conduct in mixed-method research (Creswell & Creswell, 2018:171; Miller, Birch, Mauthner

& Jessop, 2012). From an academic institution's point of view, it is in the researcher's best interest to follow the institution's professional standards and be granted the necessary ethical approval to conduct the study (Creswell, 2014:93). Therefore, data collection only commenced once ethical clearance had been obtained from the Faculty of Natural and Agricultural Science Research Ethics Committee at the University of Pretoria (see Addendum A)

The researcher had an ethical responsibility towards all participants (phase 1) and respondents (phase 2) of the study in ensuring they were not exposed to forms of harm. It was important to approach all participants sensitively and respect their vulnerability in taking part in the research study (Leedy *et al.*, 2021:135; Sieber, 2000). Furthermore, it was important to ensure they were aware that their participation was entirely voluntary and that they had the right to withdraw at any time (Leedy *et al.*, 2019:121; Malhotra *et al.*, 2017:892). During the qualitative phase of this study, all participants were informed that audio recordings would be used during the focus group discussion and their consent was required before the start of any recordings, as suggested by Malhotra *et al.* (2017:894). All participants' contributions were treated as confidential, and codes were assigned in the place of their personal names to ensure anonymity. During the quantitative phase, respondents were presented with a consent form outlining the purpose of the study, and what purpose the research in the field of consumer science would signify (Kumar, 2018:338; Malhotra *et al.*, 2017:892) (see Addendum B). No questions of personal nature which could possibly reveal their identity were asked, and the questionnaire was therefore completely anonymous.

Emphasis was placed on ethical interpretation of the data, which included unbiased reporting and continual reflection of analysis. Furthermore, an effort was made to ensure no misrepresentation of data occurred and prominence was placed on truthful and honest reporting (Leedy & Ormrod, 2014:123; Malhotra *et al.*, 2017:897-898). The researcher aimed to avoid plagiarism and gave credit to the resources consulted as per the guidelines of the Department of Consumer and Food Science. Lastly, raw data was electronically archived in a tamper-proof format at the IT facility of the Department of Consumer and Food Science.

1.8 ORGANISATION OF THE DISSERTATION

Chapter 1 serves as an introduction to the study and provides background to the topic at hand. The chapter highlights the influence of school uniforms' properties-specifically the textile, design, and construction elements, on sensory-sensitive individuals. The chapter,

furthermore, includes the research problem, justification, the research aims and objectives, a summary of the research design and methodology, and concludes with definitions, acronyms and abbreviations mentioned throughout the study.

Chapter 2 encompasses the literature review which serves as a framework for the larger research problem. In this chapter, all issues related to the main research problem are discussed which provides insight into the importance of the study. The literature review furthermore presents previous knowledge as well as a new perspective of existing knowledge. The main topics discussed include sensory integration dysfunction, tactile defensiveness, school uniforms, textiles, design, and construction of garments. Finally, the chapter concludes with the conceptual framework.

Chapter 3 presents the research design and methodology. The chapter firstly highlights the conceptual framework which puts the study in perspective and mentions key ideas surrounding the research problem. The unit of analysis, sampling, measuring instrument, data collection methods and data analysis are all discussed under their individual phases as would be followed in a mixed-method approach research design. Both the quality of the study as well as ethics in research are mentioned.

Chapter 4 provides insight into the research findings and analysis presented by the qualitative phase. In this chapter, various themes were deduced from phase 1 through the use of content analysis, which was categorised according to textile, design, and construction properties of school uniforms. A final summary of the specific chapter is also included.

Chapter 5 presents the research findings and analysis of phase 2, the quantitative phase. The chapter commences with the demographic characteristic of respondents followed by an interpretation of the results by means of descriptive statistics, in accordance with the objectives discussed in Chapter 1, Section 1.4.

Chapter 6, the final chapter of the dissertation, provides a detailed conclusion of the main findings of the study. The most prominent findings per objective are firstly highlighted, followed by the implication and theoretical contributions of the study. Recommendations and limitations of the study are also presented.

1.9 DEFINITIONS, ACRONYMS AND ABBREVIATIONS

Table 1.3 below presents the definitions of the main concepts in the study and Table 1.4 presents the acronyms and abbreviations used within this document.

TABLE 1.3: DEFINITIONS

Adaptive clothing	Clothing products which have been adapted to facilitate independence and accommodate individuals with possible mental and/or physical impairments, including individuals who experience issues with fine motor skills (Kaiser, Freeman & Wingate, 1985; Strickfaden, Johnson & Tullio-Pow, 2013; U.S. Department of Justice, 2005; Vollbrecht, 2018)**.**
Functional clothing	Clothing specifically manufactured to deliver a pre-set performance of functionality- over and above its normal functionality (Gupta, 2011).
Sensory overreactivity	A subtype of SID which may influence individuals to have adverse response to sensory stimuli (A.P.A, 2013; Tavassoli *et al.*, 2018)
Sensory integration	The ability of the brain to filter and organise sensory stimuli to develop specific responses (Asmika *et al.*, 2018; van Jaarsveld *et al.*, 2014).
Sensory Integration Dysfunction	A disorder influencing individuals to display atypical behavioural responses to sensory stimulation, including hypo or hyper responsiveness (Koziol, Budding & Chidekel, 2011)
Tactile defensiveness	A perceptual dysfunction influencing an individual to react negatively towards touch sensations, generally portrayed as non-threatening (Spies & van Rensburg, 2012)

TABLE 1.4: ACRONYMS AND ABBREVIATIONS

ASD	Autism Spectrum Disorder
DBE	Department of Basic Education
OT	Occupational Therapist
SI	Sensory Integration
SID	Sensory Integration Dysfunction
TD	Tactile Defensiveness

1.10 CONCLUSION

This chapter places the study in perspective and serves as a comprehensive introduction to the researchers' explorations. All main concepts within this chapter are briefly explained and are represented thoroughly in the chapters to follow. The subsequent chapter, Chapter 2, places the study in perspective and discusses the subject matter of sensory overreactivity, sensory processing ability, tactile defensiveness, SID in an educational environment and clothing adaptivity. It also highlights the importance surrounding the composition of different textiles and the influence of design and construction properties of school uniforms.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Chapter 2 provides the theoretical background for this study focusing on sensory overreactivity and related areas of interest. These topics include sensory processing ability, tactile defensiveness, SID in an educational environment and clothing adaptivity. The chapter furthermore focuses on the composition of textiles as well as the design and construction of school uniforms.

2.2 SENSORY OVERREACTIVITY

Sensory integration (SI), first defined and explained by Ayres, refers to the ability of the brain to filter and organise sensory stimuli to develop specific responses (Asmika *et al.*, 2018; van Jaarsveld *et al.*, 2014). The brain receives sensory information from the senses (taste, touch, sight, hearing, smell, movement, gravity and position) and organises it unconsciously (Ayres & Robbins, 2005). Ideally, organised information flows in an arranged and integrative manner, whereby it allows a child to respond purposefully (Ayres & Robbins, 2005). When this process becomes disturbed, the information does not flow in a meaningful manner and the brain, therefore, is unable to respond appropriately nor suitably interpret the stimulus. This is known as sensory integration dysfunction or SID (Asmika *et al.*, 2018; Rydeen, 2001). Sensory integration dysfunction is also referred to as sensory processing disorder (SPD) (Buckle, Franzsen & Bester, 2011; Cheng & Boggett-Carsjens, 2005; Koziol *et al.*, 2011).

It is estimated that one in twenty people of the general population may be affected by SID (Miller *et al.*, 2014:249) and even though people of any age may suffer from SID, it may be problematic in typically developing children-specifically children of five to nine years old, and children with diagnosed conditions (Ayres & Robbins, 2005; van Jaarsveld *et al.*, 2014). These conditions include autistic spectrum disorders (ASD) and Rett's disorder (Downs,

Parkinson, Ranelli, Leonard, Diener & Lotan, 2014; Lotan, 2006). Sensory integration dysfunction may also affect children with attention deficit hyperactivity disorder (ADHD) (Buckle *et al.*, 2011). Even though SID in many cases are prevalent in children with these disorders, many children without any of these disorders may still be affected by sensory processing difficulties (Shin, Smith & Gaines, 2015). SID therefore refers to the diagnostic term which includes various subtypes within the diagnosis (Miller *et al.*, 2009; Tavassoli *et al.*, 2018). This study will focus specifically on sensory overreactivity.

2.2.1 Sensory processing ability

A child with poor sensory processing ability will display either a high threshold or low threshold to sensory input (Dunn, 2006). This is more commonly known as sensory under-reactivity, which refers to the former and sensory overreactivity which refers to the latter (Ayres & Tickle, 1980). In cases where a high threshold to sensory stimuli is displayed, an individual does not easily respond to sensory stimulation and the child tends to take longer to respond and/or react to the stimuli. When their threshold is low, the individual experiences stimuli more intensely and are therefore more sensitive to sensory stimulation (Cheng & Boggett-Carsjens, 2005; Dunn, 1997). They may act very quickly and portray the behaviour of hyperreactivity (Dunn, 2006). This study will, however, focus on sensory overreactivity and how clothing influences sensory overstimulation. The concept of overreactivity is also often referred to as sensory overresponsiveness, sensory sensitivity, sensory defensiveness and even hypersensitivity (Bar-Shalita *et al.*, 2009; Dunn, 1997; Koziol *et al.*, 2011; Roy *et al.*, 2018; Shin & Gaines, 2018). When sensory overreactivity occurs, the body experiences sensory overload which is the inability to maintain self-regulation (Karthikeyan, 2017). An individual's nervous system will perceive this as a state of danger and will respond with "fight" or "flight" reactions (Cheng & Boggett-Carsjens, 2005). The state of "fight or flight" is intended for safety and protection, and the capability to react to a supposed dangerous situation. Thus, in the event where a child's sensory input registers its environment as being potentially dangerous and painful (for example, a zipper on school trousers which constantly creates a painful sensation), their nervous system will respond with "fight" (e.g. tantrums) or "flight" (e.g. withdrawal) reactions due to its inability of coping with this challenging situation (Cheng & Boggett-Carsjens, 2005; Karthikeyan, 2017). Cacioppo, Larsen, Smith and Berntson (2004) mentions that negative stimuli command more attention than positive stimuli, therefore, it evokes stronger emotional reactions as well as more intense cognitive and physiological responses (Van Gorp & Adams, 2012:62).

2.2.2 Sensory overreactivity and tactile defensiveness

Clothing is one of the most intimate items which is in contact with the body daily and clothing may reveal a variety of sensory experiences as a textile may evoke a scent, might provide an interesting visual experience, or may have an appealing (or non-appealing) texture (Harris, 2019). The colour of the clothing and the sound that the fabric makes indeed *also* influences sensory stimulation (Shin *et al.*, 2015). It is important to realise that a specific garments' style, fabric choice and construction methods may all influence the consumer's sensory system, affecting hearing (auditory sense), vision (visual sense), taste (gustatory), smell (olfactory sense) and touch (tactile sense) (Zhou, 2018).

Although many senses feature during the use and wear of garments, it is alarming to realise that the tactile sense plays a major role in the process of hypersensitivity and sensory overreactivity when compared to other senses. Hypersensitivity of the senses has already been explored by Hans Asperger in the early 1940's- specifically the hypersensitivity to smell, taste and touch (Asperger, 1944). Blakemore *et al.* (2006) suggest that since the emergence of their research, hypersensitivity of touch has been reported amongst many individuals, especially in people with ASD. Of the five senses, touch is the first to be fully developed in the human body (Spies & van Rensburg, 2012), and its importance has been discussed in various studies. The skin is one of the largest sensory organs of the body and has been described as "the organ of touch" (Jablonski, 2008:7; Yao *et al.*, 2011). It is characterised by its innervated nature, which obtains information from the environment and sends it to the central nervous system (Nordlind & Zalewska-Janowska, 2016). The skin's sensory ability enables the processing of information from both the internal and external environment (Asmika *et al.*, 2018). The human skin is largely exposed to a variety of environmental, biochemical and psychological factors which cause a continuous change in its properties and functions (Dąbrowska *et al.*, 2016; Serup, Jemec & Grove, 2006). These factors highlight the functions and purpose of the skin which are mainly protection (e.g. mechanical and thermal protection), repair and adaptation (e.g. self-healing and compositional change when exposed to stresses), sensation through its receptors and temperature regulation (e.g. sweating) (Dąbrowska *et al.*, 2016).

Saint-Martory, Roguedas-Contios, Sibaud, Degouy, Schmitt and Misery (2008) studied the most sensitive areas of the human body which is related to the touch sensation (see Table 2.1). The study asked a variety of participants to indicate which area on their body they would consider as being most sensitive. Considering all body parts, the most sensitive areas indicated in the study are the face, hands, scalp, feet, neck, torso, and back. Table 2.1 indicates the most sensitive areas on the body from ascending to descending order as

indicated by the participants in the original study. Remarkably, most of these bodily areas are covered with clothing daily. This highlights the importance of the properties of the clothing we wear and the investigation of the properties of school uniforms for children with sensory overreactivity.

TABLE 2.1: AREAS OF SENSITIVE SKIN RATED INDIVIDUALLY ON A SCALE FROM MOST IRRITANT TO LEAST IRRITANT. Self-developed from Saint-Martory *et al.* (2008)

AREA	PERCENTAGE IRRITATION (%)
Face	85.4
Hands	57.7
Scalp	36.2
Feet	34.2
Neck	26.8
Torso	23.0
Back	20.9

People's intolerance for specific material textures and the wearing of certain material garments illustrate their hypersensitivity to touch (Moore, Gajewski, Laughlin, Luck, Larson & Schneider, 2008; Spies & van Rensburg, 2012). This concept is considered tactile defensiveness. Tactile defensiveness, a perceptual dysfunction, is a term that describes a hypersensitivity to "touch" which most individuals find non-threatening and which is generally considered harmless and non-irritating (Ayres, 1972; Kinnealey *et al.*, 1995). It is characterised by behaviours such as rubbing, scratching, negative expressions (e.g. irritability and anxiety), withdrawal or avoidance from touch (Blakemore *et al.*, 2006; Royeen, 1986) and irritability with certain clothing textures or elements (Spies & van Rensburg, 2012). Its most apparent functional implication is the fact that these individuals constantly experience a source of discomfort, distraction and the sensation of irritation is always present (Belluscio *et al.*, 2011). Kinnealey *et al.* (1995) states that in cases of tactile defensiveness in adults, it causes major anxiety and stress, and their lives are centred on finding coping mechanisms to deal with their sensitivity. It is, however, more feasible to attempt to find a solution on how to deal with sensory sensitivity at a young age as it may affect perceptual-motor development and learning (Larson, 1982). Buckle *et al.* (2011) mentions that treatment with an occupational therapist has been highly recommended by various researchers, as they can play an important role in the treatment of sensory sensitivity. In children with sensory overreactivity, it is essential to address the barriers in the child's environment which may cause discomfort, and adaptation of the physical environment has been proven to be an appropriate treatment method. Van Gorp and Adams (2012:62) state that "discomfort" demands great attention from a human being as it hinders productivity

and affects task completion (Karthikeyan, 2017). Therefore, by reducing the demand for attention in a specific environment, one can reduce discomfort at both physical and psychological levels. In addition, another solution might be to implement strategies to regulate a child's sensory systems.

2.2.3 Sensory overreactivity and the school environment

The influence of tactile defensiveness on children has been explored in the schooling environment. Sensory overload is often experienced in the classroom and on the school playground (Cheng & Boggett-Carsjens, 2005). In the classroom, a child who is unable to express their discomfort may express their feelings with anger and frustration. Children will attempt to modulate their behaviour, which in return will often result in what is seen as "disruptive behaviour". Buckle *et al.* (2011) describes this behaviour as, for example, the inability to sit still at their desk and stomping their feet on the ground. Teachers often do not fully understand behaviours related to sensory overreactivity. Their inability to comprehend will cause them to interpret a child's actions as being inappropriate and disrupting, and consequently, they will act according to those perceptions (Spies & van Rensburg, 2012). When a child behaves in this manner, the disruption of in-seat behaviour re-directs their attention away from their academic activities and learning, which could potentially have consequences in the long term (Buckle *et al.*, 2011).

Children with sensory overreactivity, and specifically tactile defensiveness, can be extremely selective in their clothing options whereby they will simply refuse or reject an item of clothing due to their intolerance to specific textures or the properties of the garment (Blakemore *et al.*, 2006). This can be very problematic with the introduction of school uniforms for children and therefore, the only way to combat this problematic occurrence is by addressing issues by employing treatment in the form of adaptation. Adapting the child's environment with specific reference to a classroom setting has been proven to reduce disruptive behaviour and improve attentiveness (Buckle *et al.*, 2011). With the help of an occupational therapist, research has shown that if a child is able to regulate their sensory system, their in-seat behaviour as well as their work speed, will improve (Ayres & Robbins, 1979; Blanche & Schaaf, 2001; Buckle *et al.*, 2011; Dunn, 1999; Dunn, 2006; Yack, Aquilla & Sutton, 2002). Adaptation of the environment also includes the adaptation of garments (as they stimulate the tactile system), which once again emphasises the importance of re-thinking garment design and construction especially for children with sensory overreactivity. This will be discussed in the following section.

2.2.4 Sensory overreactivity and clothing adaptivity

Various researchers have explored the topic of adaptive clothing (Gupta, 2011; Koo, 2014; Roy *et al.*, 2018; Shin & Gaines, 2017). Adaptive clothing, therapeutic clothing, or functional clothing all describe clothing specifically manufactured to deliver a pre-set performance of functionality- over and above its normal functionality (Gupta, 2011). Therapeutic clothing items are amongst the most common garments which have been developed for people with sensory sensitivities- whether hypersensitive or hyposensitive.

"Tell Me" therapeutic clothing is one international clothing line that specifically focused on children with under-responsive sensory processing problems (Koo, 2014). The clothing items can be described as sense-interactive, as they include a variety of sensors (pressure, motion, and light) and actuators (LED's and DC-and-vibration motors) which help encourage a child to express their feelings and emotional state. The idea behind the line was to encourage children to speak up naturally by playing with the interactive electronic parts (Koo, 2014). Furthermore, the garments are manufactured with special choice fabrics and construction methods, which all contribute to increasing positive behaviour such as social interaction and confidence (Powers, 2010). Other forms of therapeutic clothing also exist. Shin and Gaines (2017) suggested that weighted vests are especially helpful for children with problematic sensory sensitivities. Weighted vests are specifically designed to counter sensory overreactivity since it provides deep pressure stimulation that regulates and calms the wearer (Buckle *et al.*, 2011; Roy *et al.*, 2018; Shin & Gaines, 2018). It is said that children who are hyperactive actually seek deep-touch pressure, and with the use of a weighted vest, it changes the purposeless behaviour into increased functional attentiveness (Blanche & Schaaf, 2001; Olson & Moulton, 2004). In a South African study by Buckle *et al.* (2011), SensoryStuff's weighted vests were implemented in a classroom setting while children were seated. Teachers reported findings of calmer students which supports the idea that weighted vests increase functional attentiveness due to the effect it has on the nervous system (Ayres & Robbins, 1979; Ayres *et al.*, 2005; Blanche & Schaaf, 2001; Yack *et al.*, 2002). The effectiveness of weighted vests does however have contradicting findings because limited standard procedures exist for the use of these vests (Buckle *et al.*, 2011; Shin & Gaines, 2018). Although these items of clothing are considered valuable additions in research and help those who need it most, other studies have pointed out the limitations of clothing specifically created to help those with special needs. There is however still a great lack of research on how clothing can effectively help children with SID (Shin *et al.*, 2015) and sensory overreactivity.

American retailers such as Marks and Spencer, Target, JCPenny and Macy's have specific ranges in their product offering that are more "sensory-friendly" (Florida-Autism-Centre, 2018). Marks and Spencer's range named "Easy Dressing" includes printed labels to reduce irritation, riptape (Velcro) behind mock button plackets on collared shirts, stretch cuffs and the elimination of functional zips and buttons on waistbands (Marks-&-Spencer, 2020). Labelled as 'adaptive clothing', this range includes clothing for everyday wear, but most remarkably also includes specific school uniforms items such as white collared school shirts, grey and black school skirts, trousers, shorts and even socks (Marks-&-Spencer, 2020). Another sensory-friendly clothing line, MagnaReady®, offered by retailers JCPenny and Macy's, also offer specific school uniform items for school children (Raleigh, 2018). Instead of conventional buttons, this clothing line makes use of magnetic strip closures in the front buttoned-down areas, cuffs, and plackets on shirts (Amazon.com, 2020). This clothing category has also gained interest from international designers. Designers and retail companies such as Nike and Tommy Hilfiger have turned their attention to providing consumers with special needs with clothing and shoes which meet their requirements. The brand, Tommy Hilfiger, specifically launched a clothing line named 'Tommy Adaptive' which also includes clothing items that are fastened with the use of magnetic fasteners (Watts, 2018). Despite the willingness of *designers* to create inclusivity, adaptive clothing is a huge business opportunity especially for retailers (Watts, 2018).

Thorén (1996) mentions that clothing products have both functional and symbolic values. The first includes protection, comfort and ease of dressing and undressing, and the second includes self-esteem, group membership, decoration, and fashion. Many studies have focused on adapting the properties of clothing which help the end-user have better functionality from their clothing, for instance, creating pockets on top of pants instead of the bottom for consumers in a wheelchair, or changing fasteners and closures to types that are easier to manage, for instance, magnetic buttons versus regular buttons, or Velcro strips on shoes instead of laces. The tendency to work in a person-centred manner is a popular notion in *healthcare* today (Britten, Ekman, Naldemirci, Javinger, Hedman & Wolf, 2020; Leplege, Gzil, Cammelli, Lefeve, Pachoud & Ville, 2007; Öhlén, Reimer-Kirkham, Astle, Håkanson, Lee, Eriksson & Sawatzky, 2017). This suggests that products and services should be designed and manufactured to be usable by all people, regardless of age, potential disability and sensory abilities. This concept is known as universal design (Thunberg, Johnson, Bornman, Öhlén & Nilsson, 2021). Perhaps it would be feasible to implement this idea in the clothing industry, whereby designers and manufacturers view the process of garment-making from the perspective of the consumer, rather than the retailer. One can only assume

that garments would be more accommodating to all individuals regardless of their different abilities (Thunberg *et al.*, 2021).

2.3 SCHOOL UNIFORMS

Wearing uniforms in an educational environment is said to have been established in the sixteenth century by Christ's Hospital in England (Baumann & Krskova, 2016; Davidson, 1990). In South Africa, it is common to wear a school uniform from a very young age. Reasons for this protocol can be linked to economic and social motives. To lessen the economic burden on parents, school uniforms are bought at a once-off occasion per summer or winter season in South Africa. In comparison to ready-to-wear clothing, school uniforms act as an aid to decrease clothing costs as school uniforms do not comprise speciality fabrics or decorative elements (Walmsley, 2011). Besides the financial liability, specific ready-to-wear clothing often displays a stigma of status. This can impact a child's self-esteem and confidence. The intervention of promoting standardised school uniforms has thus been a method to draw the attention away from learner differences related to status, race and ethnicity (Stockton, Gullatt & Parke, 2002). Furthermore, it has helped increase learner discipline, improve classroom behaviour and improve levels of academic performance (Baumann & Krskova, 2016). School uniforms' aid in contributing to better levels of classroom discipline is an existing topic of discussion. This correlation has been proved due to the gesture that uniforms portray in that children are now in a specific role which is characterised by discipline, respect and attentiveness (Baumann & Krskova, 2016). With school uniforms being identified as supportive in assisting learning and enhancing academic achievement, it is important to inspect specific properties of the uniform which might be irritating from a sensory point of view. If the uniform combats a child's ability to learn, it could be seen as largely problematic as this will not only influence their academic achievement but their quality of life and overall well-being (Bertaux, Derler, Rossi, Zeng, Koehl & Ventenat, 2010).

Van Gorp and Adams (2012:71) state in "Design for Emotion", that clothing should make the most of "human strengths" and better "human limitations" rather than worsening a human's current limitations and influencing their strengths negatively. As acknowledged, various studies have identified a wide range of elements that may be the root cause of irritation of a specific garment. There is, however, a lack of research on children's wear, and more specifically, children's school uniforms. This clothing category is especially relevant in South Africa as children wear school uniforms five days per week and anywhere between eight to twelve hours per day.

2.3.1 School uniform in the South African context

Although adaptive school uniforms as an existing product range remain unoffered by South African retailers, one could assume that consumers could simply import the various sensory-friendly school uniform garments. Unfortunately, cost-effective uniforms are an ongoing issue especially in South Africa and, the importation of these items are impossible for most South African consumers due to its associated costs. Many South African families live in poverty and barely have money for the necessities (The-World-Bank, 2018). The various national COVID-19 Lockdown events further worsened the economic situation of many South African citizens (Gcoyi, 2020). Regardless of the cost and need for school uniforms, many families have experienced such a financial burden during this pandemic and have taken decisions to deregister their children from their current schools due to financial implications (Mlamla, 2020). Nevertheless, school uniforms should be accessible and affordable for all children regardless of their financial situation.

The Competition Commission of South Africa (CompComSA) was established to create healthy competition amongst business owners for the benefit of South African consumers (Competition-Commission-South-Africa, 2019). The commission recently released a statement encouraging schools to keep school uniforms as "generic" as possible with minimal exclusive items (such as school ties with the school crest on) to ensure affordability. Schools were furthermore encouraged to make use of suppliers who offer affordable options and easy accessibility to school uniform buyers. This press release occurred after the commission received several complaints about school uniforms simply being unaffordable (Johannes, 2020).

The Department of Education (DBE) has a variety of prescriptions that highlight the notions schools in South Africa *should* follow when designing and manufacturing school uniforms. The fabric choice, construction type and manufacturing of uniforms are said to be "flexible" (Department-of-Basic-Education, 2008). Important protocols in particular are the fact that school uniforms serve an essential role in social and educational spheres. Firstly, it should not hinder access to education and secondly, it should allow learners to participate in various schooling activities with comfort whilst maintaining appropriate social behaviour (South-African-Government, 2005).

Numerous South African clothing retailers have been known to include basic school uniform items in their product offerings. These retailers include Woolworths, Edgars, Jet, Ackermans, and Pep Stores, and all of them rely financially on school uniforms as a subcategory of the larger product offering, especially during the start of a new school year or season. To aid the explanation and to limit the literature review to the specific elements of garments that are of

interest, a thorough recording was made. The recording included a compilation of basic school uniform garments offered by leading South African retailers followed by a basic analysis. In addition, a couple of independent retailers that specifically supply schools with custom-made school uniforms were visited to expand the analysis. Ten basic styles were identified to form part of this study. These styles can be seen in Table 2.2. Table 2.2 indicates variations of each style, fibre content, fabrication, as well as certain elements that might be of value to analyse, for instance, an elasticised waistband.

This study will, however, primarily focus on the tactile properties of school uniforms. For the purpose of this study, clothing properties have been re-categorised in three main classifications namely textiles (e.g., fibre content, fabrication, dyeing and printing), construction (e.g., seam type, seam class and labelling) and design (e.g., necklines and collars, sleeve and sleeve finishes, waistline finishes, closures, wearing ease and decorative elements).

TABLE 2.2: ANALYSIS OF THE BASIC SCHOOL UNIFORM ITEMS WORN IN SOUTH AFRICA

Traditional styles			Informal items	
A: School shirt	**B: Jersey**	**C: School dress**	**D: Golf shirt**	**E: Tracksuit top**
Short sleeve/ long sleeve	Long sleeve/ sleeveless	Pinafore/ Dress with sleeves	Short sleeve/ long sleeve	-
				
Cotton/ Polycotton	Acrylic	Cotton/ Polycotton	Cotton/ Polycotton/ Polyester	Polyester
Woven (basic weave)	Knitwear	Woven	Knit	Woven
Collar; buttons		Zipper	Collar buttons	Collar, zipper
F: School pants	**G: Skirt**	**H: Raincoat (Drimac)**	**I: Short**	**J: Tracksuit pants**
Shorts/ Long pants	Plain/ Plaid	-	-	-
				
Polyester viscose blend	Polyester viscose blend	Nylon outer; Polyester lining	Cotton/ Polyester	Polyester
Woven	Woven	Woven	Woven	Woven
Waistband with zipper	Waistband with zipper	Zipper, elasticised cuffs	Elasticised waist	Elasticised waist and cuffs

2.4 TEXTILES

Various receptors in the skin play an important role in the assessment of comfort in clothing *and* they rely on information about contact forces between the human skin and a fabric. Comfort can relate to various factors including the roughness of the fabric, temperature and pain (prickliness of fabric against the skin) (Basler, Hunzeker, Garcia & Dexter, 2004; Caruso, Nolano, Lullo, Crisci, Nilsson & Massini, 1994; Connor, Hsiao, Phillips & Johnson, 1990; Garnsworthy, Gully, Kandiah, Kenins, Mayfield & Westerman, 1988; Johnson, 2001). Bertaux, Derler, Rossi, Xianyi, Koehl and Ventenat (2010)'s research furthermore mentions that discomfort can also be caused by the sensation of humidity, taking into account skin moisture from perspiration and evaporation. Kadolph (2014:18) states that comfort is based on how a textile product interacts with the human body. Comfort forms part of the serviceability factors which measures a product's ability to meet consumers' needs. It is important to remember that comfort is based on individual perception, however, comfort does depend on characteristics such as absorbency, heat retention, density, and the elongation of textile products (Kadolph, 2014: 41).

If sensory stimulation can be managed with a specific focus on the mentioned characteristics of textiles-which influence how a fabric interacts with the body, and a state of sensory overstimulation can be minimised, it can have a major impact on a child's concentration, learning, development as well as behaviour (Asmika *et al.*, 2018; Cheng & Boggett-Carsjens, 2005).

2.4.1 Unravelling the basics of a textile

Choice of clothing and textiles is highly dependent on consumer preference and highly influenced by seasons, age and type of activity (Anand, 2003; Kamalha, Zeng, Mwasiagi & Kyatuheire, 2013). This statement is especially relevant to this study as it addresses our consumers (i.e., children) and their specific lifestyle-which is considered relatively active. For garments to be comfortable for children, clothing should encompass sensorial comfort which is the feeling of comfort across all the sensations the wearer experiences when the garment touches their skin (Kaplan & Okur, 2009; Liu & Little, 2009). Kamalha *et al.* (2013) state that fabric hand is most commonly used to assess a textiles' sensorial properties as sensations like smoothness, roughness, prickliness, scratchiness and softness are most easily detected by touching the actual fabric (tactile sense). These sensations are however dependent on the properties of textiles which include fibre content, yarns, fabrications, finishes, dyeing and printing (Kadolph, 2014:4). A fibre is considered the most basic unit of any textile and the fabrication of a textile is concerned with the fabric-forming process and the way it is produced.

As mentioned, different fibres have different polymer structures and are thus subjected to different properties. These properties will therefore evoke different sensory stimulation to the wearer. Shin *et al.* (2015) mention that the fibre content of a garment can most definitely stimulate or alleviate the senses and hence, it is important to consider the physical shape of fibres and their cross-sectional views (Kadolph, 2014:33). The physical shape of fibres and the cross-sectional views can be used to not only identify the fibre type but to determine what effect the fibres' characteristics will have when in contact with the skin (Rowe, 2006). Round-shaped fibres (e.g. polyester) have a smooth surface contour exhibiting lustre, compared to irregularly shaped fibres (Shanmugasundaram, 2008). An irregularly shaped cross-section is likely to cause irritation to the skin due to their minute protruding fibres which often have rough edges (e.g., wool). These rough edges cause a prickling sensation to the skin which is highly undesirable to consumers with sensory sensitivity. It is most common with coarse fabrics (especially those from animal sources), and the itchiness and prickliness are said to provide discomfort in the form of pain (Bishop, 1996; Kamalha *et al.*, 2013). See Figure 2.1.

Natural fibres are developed from animal (e.g. wool or silk) or plant materials (e.g. cotton or linen), or even mineral sources and manufactured fibres refers to those developed from chemical compounds (Kadolph, 2014:28). Some man-made fibres do however originate from natural sources but are then chemically modified; these are known as regenerated man-made fibres (Rowe, 2006). The other type of manufactured fibre is known as synthetic fibres.

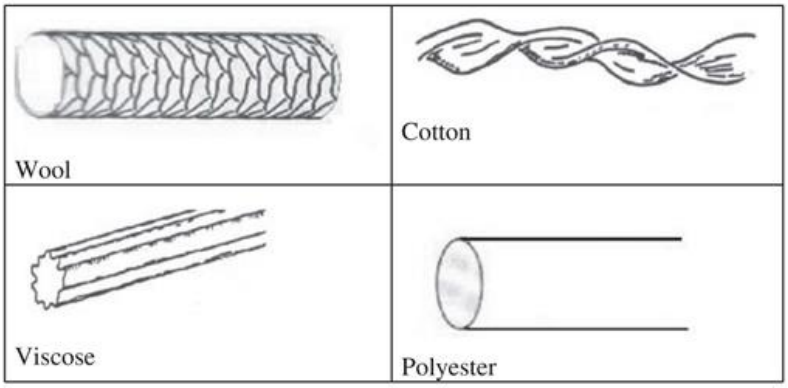


FIGURE 2.1: CROSS-SECTIONAL VIEWS OF NATURAL AND SYNTHETIC FIBRES (Rowe, 2006)

In addition, the specific form in which the fibre is used, namely staple form or filament form, also affects the properties of a textile (Meinander & Varheenmaa, 2002). Staple fibres are also known as short fibres and generally protrude above the surface of a garment when the fabric is viewed closely (Kadolph, 2014:30). In contrast to staple fibres, filaments are indefinite fibre strands that are parallel in nature (Rowe, 2006). Natural fibres occur in staple form, naturally, whereas manufactured fibres are produced in continuous strands, but can be cut into short

fibres (Meinander & Varheenmaa, 2002). The two types of filaments include smooth filaments and textured/ bulk filaments. With the use of smooth filaments, shiny and lustrous fabrics are often manufactured, and the fabric is said to have a crisp aesthetic. On the other hand, when textured/bulked filaments are used for a textile, the hand or feel of the material will not appear as smooth, and visually the fabric will not appear as flat as in the case with smooth filaments (Kadolph, 2014:31). Due to the increased diameter of the fibres when using bulked filaments, it is likely that the prickliness of the fabric will also increase (Shanmugasundaram, 2008). This may cause an uncomfortable sensation to the wearer.

2.4.2 Fabrication

The comfort properties of textiles do not only rely on the textiles' fibre content, but also the way its structure is manufactured. This aspect is known as the fabrication of a textile (Kadolph, 2014:32-33; Shaeffer, 2013:25). During actual manufacturing of a specific textile, different components can be used to form its structure, namely solutions (used to manufacture films and foams), fibres (used to manufacture non-woven fabrics), yarns (used to manufacture knits and wovens) or a combination of solutions, fibres, yarns or fabric. School uniforms are commonly manufactured from fibres such as cotton, polyester and viscose as can be seen in Table 2.3. In addition, woven fabrics are mostly used for knitted fabrics. Even though fabrication options are not limited to woven and knitted textiles, this study will only focus on these two main fabrication types.

Fibres need to be incorporated into yarns before they can be woven or knitted into a textile. Yarns are a collection of staple fibres that are put together by twisting or simply laid together to form a strand which is used in the production of a fabric (Kadolph, 2014:212-213). Since the production of woven and knitted fabrics is of great relevance to this study, the influence of yarn twist on fabric properties is an important point to mention. Yarn twist affects several characteristics of fabrics, but specifically the hand and bending properties. High twist results in a stiff yarn which is susceptible to generating a prickling sensation on the skin (Bishop, 1996; Kamalha *et al.*, 2013). Low twist yarns, however, results in better comfort when in contact with the skin due to the smoothness of the yarns (Kadolph, 2014:235).

The differences in woven and knitted fabrics are due to different fabrication methods. Woven fabrics are produced by crossing yarns parallel and perpendicular to each other to create a weave pattern (Figure 2.2). Knitted fabrics are, however, manufactured by forming loops with the use of a single yarn, creating warp or weft knitted garments (Meinander & Varheenmaa, 2002). This looped structure creates comfort-stretch in a garment, as the garment stretches along with the movement of the wearer (Shaeffer, 2013:434). Woven fabrics on the other hand are stable, with little stretch due to their length-and-crosswise woven yarns (Kadolph,

2014:256). With little stretch and restriction to movement, this quality has been identified to prompt sensory overreactivity in children with SID (Reebye & Stalker, 2008).

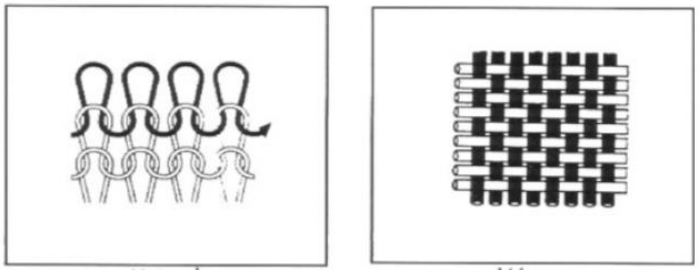


FIGURE 2.2: TECHNICAL FACE OF KNITTED FABRIC (LEFT) AND WOVEN FABRIC (RIGHT) (Kadolph, 2014:255-315)

2.4.3 Comfort properties of textiles

Elements that influence comfort properties in garments are broadly speaking thermal retention, wicking, air permeability and hand properties of a fabric (Meinander & Varheenmaa, 2002). These fibre properties will be discussed in-depth with a specific focus on the following fibre contents: rayon, cotton and polyester.

Thermal retention enables a fabric to remain comfortable during a variety of weather climates and a person's activity levels (Meinander & Varheenmaa, 2002). During hot weather, a low level of thermal retention is preferred as one would dislike a fabric that holds heat during warm conditions (and vice versa). On the opposite side of the spectrum is heat conductivity, which enables a fabric to transfer heat through a fabric's surface. Both rayon and cotton encompass good heat conductivity and low thermal retention, which means that a school garment made of these two fabrics, should be able to release bodily heat quickly to remain comfortable to the wearer- especially in the warm South African climate. In comparison, polyester has high thermal retention which means that it keeps body heat close to the body. Although ideal for cold conditions, polyester's poor absorbency properties actually hinder moisture from escaping between the skin and fabric, causing discomfort for the wearer especially in warm weather. Textiles are manufactured in such a way as to hold the most desirable serviceability characteristics for its end-use, and this could be one of the reasons why cotton and polyester fabrics are often blended (Kadolph, 2014:16). When polyester is blended with a fabric such as cotton, comfort and absorbency properties do increase, which are both favourable characteristics for children with tactile sensitivity (Jaffe & Rosa, 1990:56).

Closely related to thermal retention is **wicking**. This refers to the ability of a fabric to transfer moisture and heat away from the skin to the outer surface of a fabric, enabling evaporation to

occur through a garment. If a garment does not own good wicking properties, it will result in moisture build-up between the garment and the skin creating discomfort for the consumer (Kamalha *et al.*, 2013). Bertaux *et al.* (2010) stated that synthetic fibres, and more specifically polyester and polyamide fibres, transport moisture away from the surface of the skin and keep the skin dry -in contrast to cotton. It is for this reason that sportswear is often made from polyester (Kadolph, 2014:167). Kadolph (2014:168), however, also mentions that 100% polyester fabrics are quite uncomfortable as the fabric traps moisture between the fabric and the skin, creating clamminess for the wearer. Blends of cotton and polyester fabrics have on the other hand been considered as comfortable, as cotton is an absorbent fibre, and polyester thus assists in wicking moisture to the outer surface of its fibres where the moisture *can* evaporate (Kadolph, 2014:168).

Air permeability is directly related to the breathability of a fabric. This property highlights whether a consumer's skin is exposed to unrestricted air or not while wearing a specific garment (Zimniewska, Pawlaczyk, Krucinska, Frydrych, Mikolajczak, Schmidt-Przewozna, Komisarczyk, Herczynska & Romanowska, 2019). Brown and Rice (2014) explain that a fabric that is highly breathable (has high air permeability) and encompasses low thermal retention (poor ability to hold heat), is a good choice for garments that are worn in warm climates. The fabric allows heat from the body to escape and simultaneously cools down the skin of the wearer. This is true for polyester fabrics. Cotton and rayon, however, have rather low air permeability and poor thermal retention as mentioned previously, which could influence the breathability of the garment and cause discomfort for the consumer.

The way a fabric feels when in contact with the skin is due to its **hand properties**. It covers a variety of concepts such as the bending properties of a fabric, its surface properties (smoothness and roughness, as well as friction build-up) and the coolness and warmness of fibres (Meinander & Varheenmaa, 2002), *and* could be considered as one of the most important parameters when considering comfort in clothing. Shakyawar, Kadam, Kumar, Mathuriya and Kumar (2017) states that the smoothness and roughness of a textile is a great determinant when considering comfort in clothing. Kadolph (2014:63) mentions that cotton fabrics have high moisture absorbing ability and, as the fibres swell, the fabric becomes smooth against the wearer's skin. It is not only true for 100% cotton fabrics but also cotton/rayon blended fabrics (Shanmugasundaram, 2008). Rayon holds similar characteristics to cotton as it has a smooth finish and non-irritant properties (Kadolph, 2014:132-133; Shin & Gaines, 2018). Koo (2014) emphasised that using cotton fabrics for children's clothing is ideal, especially if they have sensory sensitivities since it's highly absorbent and thus very comfortable. Shin and Gaines (2018) also found that from a tactile point of view, children preferred the feeling of cotton against their skin due to cotton's soft hand.

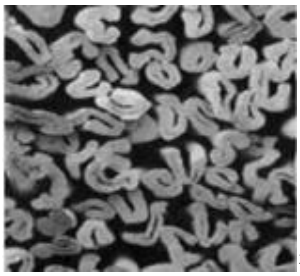
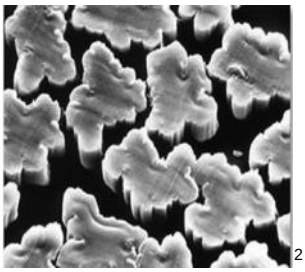
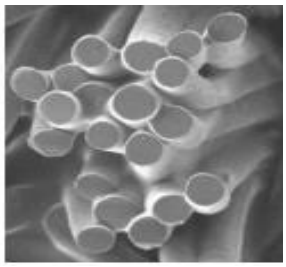
Polyester garments do not always comprise the ideal properties when it comes to clothing. Shin and Gaines (2018) state that 100% polyester garments were not fully accepted by all participants in their specific study- from a sensorial point of view. Polyester encompasses poor absorbency which *does* influence its comfort properties, but its surface is also uneven (although highly organised internally) creating an irritating sensation for some (Rowe, 2006). Bertaux *et al.* (2010) investigated sock fibres and how temperature and friction amongst other elements influenced overall comfort during exercising. Bertaux *et al.* (2010) state that socks made from a blend of polyester and polyamide fibres actually provided greater comfort in comparison to cotton socks, as the fabric regulated the temperature and dampness between the body and the fabric during exercising. Although these findings seem somewhat contrasting to the above-mentioned research, it is important to remember that fabrics are blended for this exact reason. Even though cotton is highly absorbent which creates “wet” conditions, it also easily allows moisture to escape. In the same sense, although polyester comprises poor absorbency properties, it can retain a specific temperature that is favourable in terms of comfort. Blending these two fabrics, thus, generates a fabric that includes the most favourable characteristics of both textiles.

Considering the **bending properties** of the three textiles most commonly used for school uniforms, it is feasible to identify the different fibre types’ cross-sectional shapes (see Table 2.3). The bending properties are classified under the higher category- low-stress mechanical properties, which influences human movement and comfort (Atalie, Gideon, Ferede, Tesinova & Lenfeldova, 2019). In a study by Uren and Okur (2019), denim fabrics’ bending rigidity was measured in an effort to improve the tactile comfort of denim fabrics. The researchers determined that rayon content in polyester/rayon blended yarns improved the bending rigidity of the denim fabric (Uren & Okur, 2019). Behera, Chowdhry and Sobti (1998) and Behery (2005) explains this is due to the fact that fibres with low crystallinity and poor alignment easily slide past one another. This results in little fibre-to-fibre friction which ultimately creates a comfortable fabric. It is also recognised in the cross-sectional structures of cotton/rayon blended fabrics (Behera *et al.*, 1998; Behery, 2005). This type of fibre movement creates a fabric with low bending rigidity (Shanmugasundaram, 2008). The opposite is seen in polyester fabrics as polyester fabrics’ structure is considered as being highly crystalline. Thus, all its fibres are oriented and parallel to each other.

Besides the hand and bending properties of a fabric, school uniforms are made from polyester, cotton and rayon blends for other specific reasons as well. Polyester is the most widely known synthetic fibre due to its versatility in manufacturing as it can be blended with a variety of other fibres to create a desirable fabric. This is also true for cotton and rayon as both fibres are just as versatile. Rayon is mostly used along with woven fabrics in apparel and is often used for school

uniforms as it can easily resemble cotton fibres (Kadolph, 2014:132). Due to the fact that school uniforms need to last for several seasons, cotton is used for its high abrasive resistance qualities, which means it can withstand many destructive effects caused to its surface by children during play (Jaffe & Rosa, 1990:47; Kadolph, 2014:39). Polyester possesses the same abrasive resistance quality, resulting in a fabric that is strong and durable and retains its appearance (Jaffe & Rosa, 1990:56; Kadolph, 2014:4). Due to this, polyester can undergo many washes and wears, which is ideal since children's clothing are prone to undergo many wash cycles. Polyester fabrics are thus easily cared for as they generally do not require any ironing, the textile dries quickly, and due to its low absorbency, it does not retain much dirt (Meinander & Varheenmaa, 2002).

TABLE 2.3: CROSS SECTIONAL SHAPE AND DESCRIPTION OF COTTON, RAYON AND POLYSTER (Kadolph, 2014:33)

CROSS SECTIONAL SHAPE AND DESCRIPTION			
Fibre Type	Cotton	Rayon	Polyester
Drawing	 [1]	 [2]	 [3]
Description	Flat, oval lumen, convolutions.	Circular, serrated, lengthwise striations.	Square with voids *or* trilobal *or* circular, uniform in diameter.

2.5 DESIGN

2.5.1 Children's clothing design

For the average human being, clothing is often worn for its embellishment and status. In other cases, clothing is also worn for protection against the environment as it serves as a physical

[1]Cross-sectional view of cotton fibres (Ouyang, W. 2016. *Evaluating cotton maturity using fiber cross-sectional images.*)
[2]Cross-sectional view of rayon viscose fibres (Rana, S., Pichandi, S., Parveen, S. & Fangueiro, R. 2014. Regenerated cellulosic fibers and their implications on sustainability. *Roadmap to Sustainable Textiles and Clothing*: Springer.)
[3]Cross-sectional view of polyester fibres. Aliaga, C., Castillo, C., Gutierrez, D., Otaduy, M.A., Lopez-Moreno, J. & Jarabo, A. 2017. An Appearance Model for Textile Fibers. *Computer Graphics Forum,* 36(4):35-45, Díaz, A., Katsarava, R. & Puiggalí, J. 2014. Synthesis, properties and applications of biodegradable polymers derived from diols and dicarboxylic acids: from polyesters to poly (ester amide) s. *International journal of molecular sciences,* 15(5):7064-7123.

barrier between the human skin and the external environment. Although its protective qualities are vital when referring to the external environment, some implications might also occur "internally" in terms of the contact between the skin of the wearer and the wearers' clothing (Raccuglia, Heyde, Lloyd, Hodder & Havenith, 2018). Dressing oneself and clothing can be considered as a physiological need and thus as one of the basic needs of human beings. In order to fulfil this need, adequate planning should take place during the product development stages to meet the needs of the user- especially when it comes to designing children's wear (Bezerra *et al.*, 2017). Pereira and Andrade (2018:275) mention in "Textiles, Identity and Innovation: In touch" that the 21st Century children's clothing market has developed into a sector that exposes children to a variety of playful fashion trends which encourages learning and development through visual, tactile, olfactory and auditory components (Montagna & Carvalho Figueiredo, 2020). This is because modern designers are designing and creating in such a way as to not only pay attention to the aesthetics of a garment but actually design garments that protect the body and add usability values (Xavier, de Sousa & de Albuquerque, 2016). Designing beyond the aesthetic factor includes incorporating sensory stimulation elements by means of interactive elements in the clothing (Montagna & Carvalho Figueiredo, 2020:275-279). Successful children's wear designers are said to be limited due to the fact that many designers simply recreate a miniature version of adult's clothing, ignoring important safety and comfort factors, as well as the incorporation of delicate and durable accessories. These special requirements are often overlooked with a focus on only the style, colour, and structure of the garment (Min, 2019). This research study aims to prove that there is more to children's clothing than only aesthetics. As previously mentioned, children who are tactile defensive appear to have great irritability with specific clothing textures (Spies & van Rensburg, 2012) as well as intolerance of particular properties of garments related to design and construction (Blakemore *et al.*, 2006 Thomas, Catmur, Frith & Haggard, 2006). When considering children's clothing, close attention should be paid to meet a child's comfort requirements (Bezerra *et al.*, 2017). Bezerra *et al.* (2017) emphasises this concept and states that it is not only comfort properties that are a fundamental design quality of children's clothing, but also safety and efficiency. The importance of comfort is however accentuated as this is one of the main features that respond directly to a child's bodily movements and active lifestyle (Barbosa & Walkiria, 2008; Bezerra *et al.*, 2017). The importance of clothing design based on the needs of humans cannot be stressed enough (Bezerra *et al.*, 2017).

Several different properties may be identified when looking at the design of a garment, including the neckline and collar, sleeve type and sleeve finishes, waistlines and waistbands, closures, wearing ease, and decorative elements (Bubonia, Kontzias, Gioello & Berke, 2012:235-273). Although one can imagine that some of these design elements may be irritating to a child, the

sensory influence of this specific category of clothing properties on people with tactile defensiveness, specifically children, is still underexplored.

2.5.2 Neckline and collars

It has been indicated that necklines and collars can affect sensory integration. Shin and Gaines (2017) found this to be true in their study and Biel and Peske (2009) states that if a garment is too tight around the neckline, it may cause major irritation and anxiety for the child, especially if they experience difficulty putting on, or taking the garment off. Irritation may also stem from wearing a tie around the neck (Kabel, McBee-Black & Dimka, 2016; Koo, 2014) which is not an uncommon sighting in some South African winter school uniforms. Koo (2014) also identified the neckline as a problematic area, and actually produced an adaptive wear clothing line for children whereby the necklines of the garments were stretchable for comfort purposes. Roy *et al.* (2018) state that intolerances to garments with specific necklines and collars are common and that certain children are unable to withstand the feeling of a garment with a high neck. Children with sensory overreactivity tend to dislike garments with certain collars and in particular turtleneck tops (Biel & Peske, 2009; Roy *et al.*, 2018). As can be seen in Table 2.2, most of the school uniforms have collars which may be overwhelming to children with tactile defensiveness. Another factor closely related to necklines are tags or labels placed on the inside back neckline of garments. This will however be discussed in Section 2.6.2 (Labelling).

2.5.3 Sleeve types and sleeve finishes

The most common sleeve type used in school uniforms is the shirt sleeve which classifies as sleeves that are sewn to the armhole before the side seams of the garment as well as the sleeve seams have been joined (Reader's Digest & Reader's Digest, 2011:345). The shirt sleeve is a form of set-in sleeve and is attached by what is known as the shirt-sleeve method (Reader's Digest & Reader's Digest, 2011:345) or the flat application (Shaeffer, 2013:303). Although easily manufactured due to its inexpensive quality (Shaeffer, 2013:303) which is almost certainly the reason why they are designed and used in school uniforms, this sleeve armhole is generally less rounded in comparison to a set-in sleeve on a tailored garment (Reader's Digest & Reader's Digest, 2011:345). If the garment presents itself with a shallow cap and little wearing ease, it could be a problematic design factor for children with TD as it may cause restriction to a child's movement. This has been proven to trigger sensory overreactivity in children with SID (Reebye & Stalker, 2008).

The sleeve finish is also a perplexing factor and differs for long and short-sleeved shirts. Long sleeve shirts are subject to buttoned cuffs and a placket which could add to the feeling of restriction of movement. Some of the school tracksuit tops and rain jackets have closed band

cuffs that can either be elasticised or made from ribbing (Shaeffer, 2013:285;303). Both finishes may cause irritation and sensory overload.

2.5.4 Waistlines and waistbands

South African school uniforms include a variety of waistbands and waistline finishes. Waistbands keep garments in the correct position on the body (Bubonia *et al.*, 2012:250) and, although various waistlines exist, only those applicable to school uniforms will be discussed. Girls' school dresses have a seamed waistline that joins the upper and lower parts of the garment at the natural waistline. Skirts and trousers/shorts are usually subjected to straight, elastic-backed, or fully elasticised waistbands which are all similar in nature. Straight waistbands are the most common type to be used as they can be used on various garments and may provide openings at the centre back, front, or side seams. Elastic-backed waistbands are thought to be ideal for school uniforms for younger children as they adjust to a child's growth and active lifestyle, especially on the school playground. From a sensorial point of view, however, a child who is always aware of the clothes on their body is extremely sensitive to fabric textures. A garment with an elastic waistband will thus cause major discomfort and overwhelm a child (Roy *et al.*, 2018). Information with regards to waistline finishes and waistbands on clothing, and its specific influence on children with sensory overreactivity is extremely limited. It, therefore, emphasises the need for this study once again.

2.5.5 Closures

Attention should be paid to the selection of closures used for children's garments as it could potentially hold a variety of limitations. Closures on school garments are generally limited to zippers and buttons (Table 2.2). Zippers are often found on formal pants and skirts, as well as some school dresses and outerwear garments as they are easily manageable by children (Jaffe & Rosa, 1990:73-76). Buttons are used for functional and decorative purposes on school shirts, pants, skirts, and dresses. The type of buttons found on these items is usually flat sewed—through buttons most probably due to their low cost and ease of sewing (Shaeffer, 2013:324). Jaffe and Rosa (1990:74) suggest that flat sew through buttons are ideal for children's wear and that buttons such as shank buttons, should rather be avoided. Although a common sighting on school uniforms, it has surfaced in a discussion that children with SID do not appreciate the feeling of zippers or buttons on their garments (O'Sullivan, 2014) and in adaptive clothing, buttons are often one of the first elements which are replaced with Velcro (Ahsan, Anwar, Tanveer & Khushbakhat, 2018; Poonia, 2020; Rodriguez, 2020; Suri, 2016)

2.5.6 Wearing ease

Wearing ease in garments relates to the difference between the body measurements and the measurements of the clothing item (Shaeffer, 2013:5). This topic often surfaces in sensory sensitivity studies. Standardisation of clothing measurements or sizing came apparent during the shift from home dress-making to mass-production. A standard body measurement table is drawn up in accordance with the child's age, taking into account a range of body sizes and shapes per nation. The sizing system thus aims to accommodate the maximum percentage of population per age group (Zakaria, 2010). Based on current research, great inconsistency with regards to sizing exist and is responsible for about 40% of returns on clothing, as the garments do not conform to the human body (Bezerra, 2015). Based on a study by Bezerra *et al.* (2017) which looked at the anthropometry of children's clothing, it was determined that the neckline of children's t-shirts and sweaters were too small to accommodate the circumference of an average Portuguese child's head. Furthermore, the legs of trousers were not the adequate width which caused great restriction to movement, going as far as blocking proper blood circulation. Sizing inconsistencies can cause great discomfort, especially for children as they are unable to communicate these observations.

It is important to distinguish between the wearing ease of a garment and the actual tightness or looseness of a garment's fabric. Research suggests that some children with sensory overreactivity prefer tight clothing and even prefer wearing tight underwear or ski pants underneath their clothes. Others cannot bear–the feeling of tight clothes on their body (Biel & Peske, 2009). One could assume that there is a direct relationship with the seeking of deep pressure and aversion for light touch which are well-known tendencies of children with TD (Kinnealey *et al.*, 1995). As mentioned in a study by Haar (1998), children who are sensory sensitive prefer wearing undergarments such as long johns underneath their everyday clothing as it conforms to their body. Dunn, Saiter and Rinner (2002) also mention a case whereby a child with sensory sensitivity preferred wearing long-sleeved garments during all seasons of the year as it created constant pressure on her skin. Haar (1998) stated that 'garment-hugging' was a particular characteristic of a child who longs for continuous tactile stimulation. It thus confirms the relationship between deep pressure seeking and aversion for light touch, which is a well-known tendency from an occupational therapy viewpoint. In contrast, Reebye and Stalker (2008) mention a child who was extremely sensitive to the feeling of, particularly new clothing. He experienced a sense of overreactivity when he felt restricted by his clothing and in return preferred wearing loose garments. Roy *et al.* (2018) also mentioned that up to 53% of children with tactile defensiveness experience overreactivity when wearing stiff clothing. Wearing ease, in particular, is, therefore, a specific property that needs further investigation.

2.5.7 Decorative elements

Trimmings such as embroidery is one of the few decorative elements often used in school uniforms. Used in creating a school's logo, it is a practical and economical "branding" option for many schools in South Africa. On the other hand, it is potentially one of the big sensory overreactivity culprits. In most cases, a stabiliser is used on the inside of the garment to enhance the embroidery (Nabil, Jones & Girouard, 2021). This stabiliser is attached with thread and often shows signs of bobbin thread underneath. This lies on the inside of the garment next to a child's skin. The feeling of the stabiliser, together with the bobbin thread, together with the warm South African climate, may be rough next to a child's skin and cause some form of irritation. A study by Royeen (1985) identified that embroidery on clothing was indeed an element that irritated specifically tactile defensive elementary school children (foundation phase). An alternative would be to employ screen printing which transfers a specific design onto a garment by means of pressure. This method is, however, not ideal in terms of economic viability (Bubonia *et al.*, 2012:175).

2.6 CONSTRUCTION

The discussion of the construction of a garment relates to the manufacturing of school uniforms. This study will look at the specific seam and labelling types that could potentially be sensory irritant for school-going children.

2.6.1 Seams

Kinnealey *et al.* (1995) investigated sensory defensiveness in adults and described the tactile sensitivities experienced by participants in the specific study. Amongst the greatest contributors of discomfort in clothing was the specific clothing property of seams of pants. Seams are widely known to be problematic in sensory integration (Biel & Peske, 2009; Roy *et al.*, 2018), however, only a small number of studies indicate the specific seam type that causes the most irritation. Some studies indicate that seams in clothing cause such discomfort for certain children with tactile defensiveness, that particular garments are worn inside out in order to avoid the feeling of the seam (Beaney, 2020:48; Dunn, 1997). In cases where children are unable to regulate their emotions, seams may cause sensory overload and encourage problematic behaviour (Kabel *et al.*, 2016). The magnitude of the irritation caused by seams is so severe that some ranges of adaptive clothing offer garments with outside seams (Sensory-Smart-Clothing-Co., 2020).

The problem is that although many studies identified seams as being a big trigger of sensory overload, it is often written from an occupational therapy viewpoint and either does not specify the seam type that is problematic or make use of incorrect terminology. In order to construct a

garment, seams are indeed necessary (Shaeffer, 2013:113), and even though the seams of underwear can be eliminated to a certain extent, they can unfortunately not be eliminated from garments such as school uniforms.

Globally, the American Society for Testing and Materials (ASTM) classification of seam classes and seam types are used during clothing production (Shaeffer, 2013:13, 114). The six main seam classes are superimposed seams (SS), lapped seams (LS), bound seams (BS), flat seams (FS), ornamental seams (OS), and edge finishes (EF) (Shaeffer, 2013:513). In Section 2.3.1, it was explained that a selection of school uniform garments was analysed (Table 2.2). During this analysis, special attention was paid to the type of seam classes and seam types used in the construction of these items. Table 2.4 indicates the seam classes, seam types and stitch types apparent in five of the items that were analysed. From this table it is evident that only a small number of seam types are used to construct school uniforms namely- SSa, SSd, LSb, LSc, LSd, LSe, LSr, EFa, EFb, and EFd. The discussion will therefore only focus on superimposed seams, lapped seams, and edge finishes. In addition, it will also shortly explain flat seams, since it is indeed the least bulky, and most sensory-friendly option (Biel & Peske, 2009; Brown & Rice, 2014:374).

TABLE 2.4: OVERLOOK OF SEAM TYPES, CLASSES AND STITCH TYPES USED IN THE CONSTRUCTION OF BASIC SCHOOL GARMENTS (Self-developed)

Garment	Assembly point/ Location	Seam Class & Type	Code	Stitch Type
A. School shirt	Side seams	LSc	401	Twin needle multithread chain stitch
	Hem and edge finish	EFb	301	Lockstitch
	Yoke	LSe	306	Lockstitch blindstitch
	Pocket	LSd	301	Lockstitch
	Collar	SSd	301	Lockstitch
	Sleeve	LSr	401	2 Thread chain stitch
		LSc	301	Lockstitch
C. Dress	Style line (princess)	SSa	516	Safety stitch
	Side seams	SSa	301	Lockstitch
		EFd	406	Cover seaming stitch, open seam
	Hem and edge finish	EFd	406	Cover seaming stitch, 4 thread overlock
		EFa	306	Lockstitch blindstitch
D. Golf shirt	Side seams	SSa	514	Seaming stitch, 4 thread overlock
	Hem and edge finish	EFa	406	Cover seaming stitch
I. Shorts	Side seams	SSa	301	Lockstitch
		EFd	406	Cover seaming stitch, 3 thread overlock
	Hem and edge finish	EFd	406	Cover seaming stitch, 3 thread overlock
		EFa	301	Lockstitch
	Crotch	SSa	301	Lockstitch
		LSb	301	Lockstitch
		EFd	406	Cover seaming stitch, 3 thread overlock
J. Tracksuit pants	Side seams (lining)	SSa	301	Lockstitch

	Side seams (shell)	EFd	504	Overedge stitch
	Hem and edge finish	EFd	406	Cover seaming stitch, 3 thread overlock
		EFa	301	Lockstitch
	Crotch	SSa	301	Lockstitch
		EFd	406	Cover seaming stitch, 3 thread overlock
		LSb	301	Lockstitch

2.6.1.1 Superimposed seams (SS)

Of the six main seam classes, it is anticipated that the “irritant seams” which sensory integrative studies refer to are in actual fact the most common superimposed seam (seam class SS). As indicated in Figure 2.3, the superimposed seam is created by placing fabrics on top of one another with their edges even and sewing the fabrics together. An SS seam that is flattened with a bottom-cover stitch also adds to the idea of non-bulkiness; topstitching is merely for decoration (Brown & Rice, 2014:367-370). Bulk due to incomplete pressing could thus be one of the main problems.

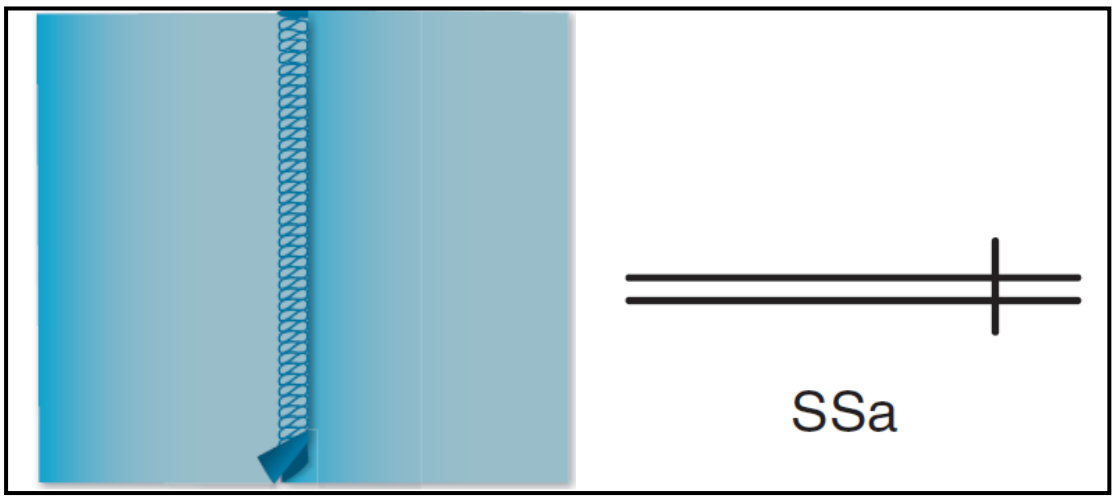


FIGURE 2.3: SUPERIMPOSED SEAM (SSa) (Shaeffer, 2013:116; 514)

2.6.1.2 Lapped seams (LS)

An alternative to SS-seams whereby two sections of fabric need to be stitched together is the lapped seam (LS). Generally used for intimate garments and activewear seams (Shaeffer, 2013:119), one can thus understand why the LS-seam is a good option from a sensory-friendly viewpoint. As can be seen in Figure 2.4, lapped seams are created by overlapping fabric seam allowances that extend from opposite directions. It is sewn together and finished with topstitching in order to keep the seam in place. LSb-seams involve folding the top fabric seam allowance underneath itself and then introducing the other piece of fabric, by lapping it and then stitching it together. In flat-felled seams (LSc), both fabric pieces may be folded underneath before being lapped and stitched together (Figure 2.4). As seen in Table 2.4**,** LSc seams are among the most frequently used lapped seams for constructing garments. Although no raw

edges are visible and in the position to cause discomfort, as one can imagine, this form of lapping does still create some rigidness and bulkiness in a garment (Brown & Rice, 2014:371). Glock and Kunz (2005:442) state that lapped seams are very durable if lapping does form part of the construction, however, without the extra fold ''unders'', lapped seams actually reduce the amount of bulk in seams - in most cases.

FIGURE 2.4: LAPPED SEAM: FLAT FELLED SEAM (LSc) (Shaeffer, 2013:116; 516)

2.6.1.3 Flat seam (FS)

Biel and Peske (2009) mention that an alternative seam that is less irritating is the flat seam, seam class FS- which is illustrated in Figure 2.5. Brown and Rice (2014) state that flat seams are the least bulky of all seam types, meaning it has a smaller surface area to possibly create an irritating sensation. The flat seam, however, is unfortunately not used in the construction of woven fabric garments (such as school garments), as woven fabrics are prone to fraying. Flat seams would thus not be a practical option as the ravelling will eventually cause the garment to slip apart at its seams (Brown & Rice, 2014:374).

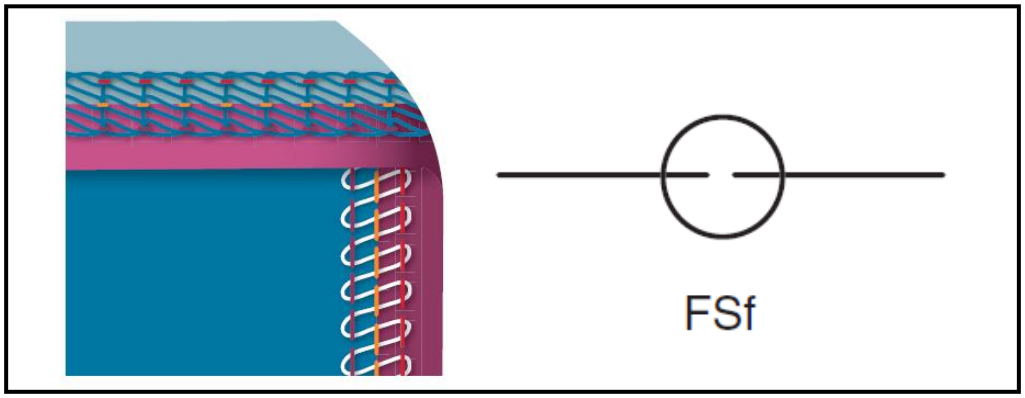


FIGURE 2.5: FLAT SEAM (FSf) (Shaeffer, 2013:119; 521)

2.6.1.4 Edge finish (EF)

Edge finishes include hems and seam finishes that are used to conceal raw edges of the fabric, without adding additional fabric (Brown & Rice, 2014). Most school garments are finished with an edge finish (EF) due to the neat appearance it portrays and because of the fact that it

contributes to the strength and abrasion resistance of the garment (Brown & Rice, 2014; Glock & Kunz, 2005). As can be seen in Table 2.4, EFa is a seam type that is often used to hem school uniforms. It is also used to finish the edges of different garment sections (Figure 2.6). Hems are very dependent on the type of fabric, use of garment, finish and hand of the fabric (Bubonia *et al.*, 2012:268). Glock and Kunz (2005) mention that from a quality standpoint, hems should be flat and stitched wide enough, as rolling may occur during the use of the garment. From a sensorial standpoint, any form of bulk, whether a rolled hem or bulkiness due to the hem not being flat, may cause irritation to the wearer as the texture of the hem and edge finish can trigger over sensitivity. Roy *et al.* (2018) mention that textured fabrics can be intolerable for sensory sensitive individuals.

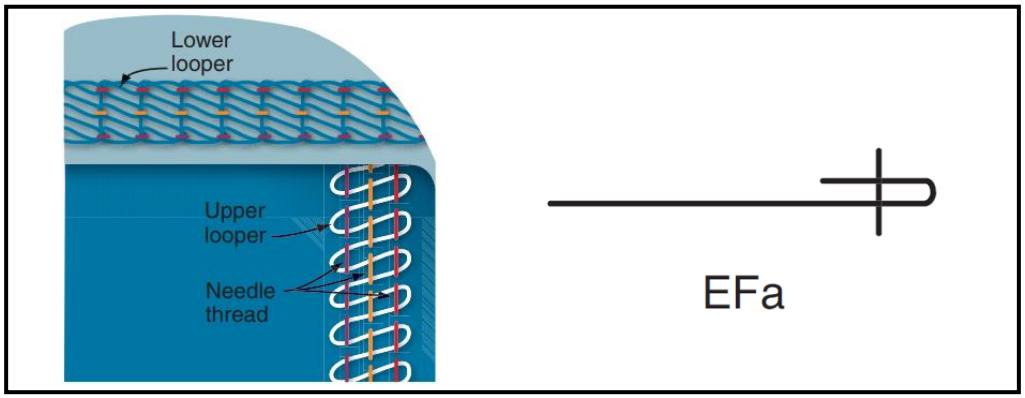


FIGURE 2.6: EDGE FINISH (EFa) (Shaeffer, 2013:171;522)

2.6.2 Labelling

Nederkoorn, Jansen and Havermans (2015) specifically mention that from a sensory point of view, labels in clothing causes major irritation. In sensory literature, it is often indicated that "tags" cause irritation (Cheng & Boggett-Carsjens, 2005; Roy *et al.*, 2018). Technically, the "tag" that is referred to is a ***label*** inside the garment. In clothing, "tags" refer to the swing ticket that is temporarily attached to the garment for purposes such as indicating the price. In this study, the type of labels considered is those found on the inside of garments rather than swing-tags or related tags attached to garments. Labels are generally attached in a permanent yet removable manner. They should be legible to last the useful garment lifetime because the information serves as an important guideline in the maintenance of a textile garment -especially for consumers (Bubonia *et al.*, 2012:155). Labels may be subjected to mandatory labelling which refers to information provided under the law, or voluntary labelling which includes additional information provided by a stakeholder during production (e.g. size indicator) (Bubonia *et al.*, 2012:165). Manufacturers are required to display specific information regarding the garment on the label such as country of origin, fibre content, care instructions, and the importers' code

(Bubonia *et al.*, 2012:160-165). This mandatory information needs to be included on clothing labels, and it is for this reason that clothing labels exist in the first place. In South Africa, these regulations are controlled by the South African Bureau of Standards (SABS), which base their dictations on those of the International Organisation of Standards (ISO). As briefly stated, a label does contain important information especially for the user in terms of care instructions, but due to the labels' irritation-causing properties, some consumers simply remove them.

Consumers added that despite labels being an informative piece of fabric, consumers rather regarded them as an "object of irritation". Other studies have indicated that some consumers have a total intolerance towards labels as they create an unbearable sensation (Haar, 1998; Maqalika-Mokobori, 2005). Haar (1998) mentions that children with tactile defensiveness have identified that labels actually feel like sandpaper against their skin. Non-surprisingly, consumers also mentioned that the irritation was of such extent that it influenced their self-esteem and offered a continuous and ongoing form of discomfort (Maqalika-Mokobori, 2005). The two main problems associated with labels is the label *type* as well as the specific label *placement* on the garment.

The three most common type of labels used in clothing construction is woven labels, printed labels, and heat transferred labels (Bubonia *et al.*, 2012:157). Woven labels are produced as a section of material, utilising a loom. The information which appears on the label itself is woven into the fabric. Once ready for attachment, labels are cut into individual pieces and attached to the interior of the garment (Bubonia *et al.*, 2012:156). Printed labels originally exist in a continuous roll, whereby the information is simply printed on using a screen-or-rotary printing technique and finally cut into individual labels. Heat transfer labels are also known as tagless labels, as the information is transferred by a thermal printing technique, printing directly onto the fabric surface (Bubonia *et al.*, 2012:157). Although a variety of label types exist, the most recognisable labels on school uniforms are woven or printed labels as well as heat transferred labels. A heat transfer label that lies flat and softly against the skin (Bubonia *et al.*, 2012:157) as opposed to a physical woven label that is sewn inside of the garment could be a good "sensory-friendly" option.

Actual label placement is also a concern. As can be seen in Figure 2.7, labels are usually placed on the inside of the back necklines and in the side seams of garments (Bubonia *et al.*, 2012:166). Although it would seem that these labels are attached strategically, for children TD, this "strategic placement" may cause irritation. In a study by Maqalika-Mokobori (2005), consumers raised their concerns regarding the placement of labels. Consumers believed that labels in shirts should be placed in the side seams rather than centre back seams as the latter provided the greatest form of irritation.

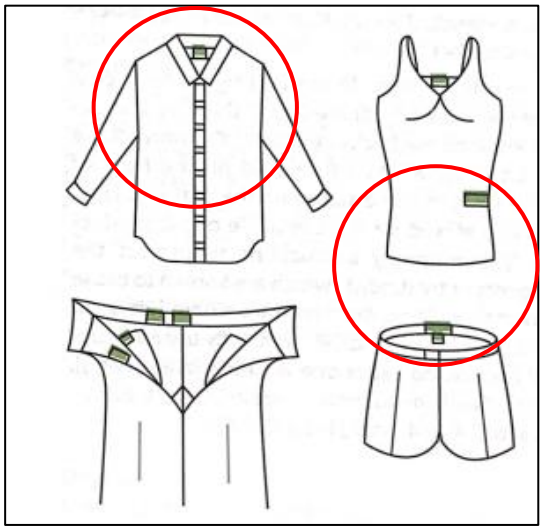


FIGURE 2.7: LABEL PLACEMENT IN APPAREL (Bubonia *et al.*, 2012:166)

2.7 CONCEPTUAL FRAMEWORK

The conceptual framework presented in Figure 2.8, places the topic of the study in perspective and focuses on the indicators which were measured. This framework identifies the key aspects as discussed in the literature review (Chapter 2) and serves as a core consideration in the study which helps build evidence from both quantitative and qualitative data and conceptualises the researchers' research process. The conceptual framework presented indicates a child with sensory overreactivity– illustrating the relationship between the disorder, the wear of a school uniform (as part of the environment) and the occupations the disorder may influence. As mentioned, sensory overreactivity occurs when a child exhibits a low threshold to sensory stimuli and is then exposed to an element in their environment which their nervous system regards as potentially dangerous and painful (Cheng & Boggett-Carsjens, 2005; Dunn, 1997). This study will explore sensory overreactivity in apparel and more specifically, school uniforms.

Apparel is subject to various textiles, design, and construction elements. It has been reported that certain clothing elements may cause sensory overreactivity (Beaney, 2020; Biel & Peske, 2009; Dunn, 1997; Dunn *et al.*, 2002; Koo, 2014; Reebye & Stalker, 2008; Roy *et al.*, 2018; Royeen, 1985; Shin & Gaines, 2017) and it was important to explore all possibilities of the phenomena in school uniforms. Looking at a school uniform, the textile may be characterised by its fibre content, fabrication, dyeing, and printing used/applied during production processes. The uniform's design elements consist of the neckline and collar, the sleeves and sleeve finishes, the waistline finish, the type of closure used on both top and bottom garments, wearing ease of the garment and any other decorative elements. Lastly, the construction of the garment refers to the type of seams used in the garments, the seam finishes applied, the hem and the type of

labelling seen in the garments. The framework further indicates how sensory overreactivity may impact a child's participation in daily occupations and thus influence their occupational performance. These occupations as identified in the conceptual framework are education, social participation, play and daily activities. This was, however, not explored, as this subject matter leant more towards an occupational therapy study. The reason for the inclusion into this framework is only to indicate *how* a school uniform may influence a child's occupations.

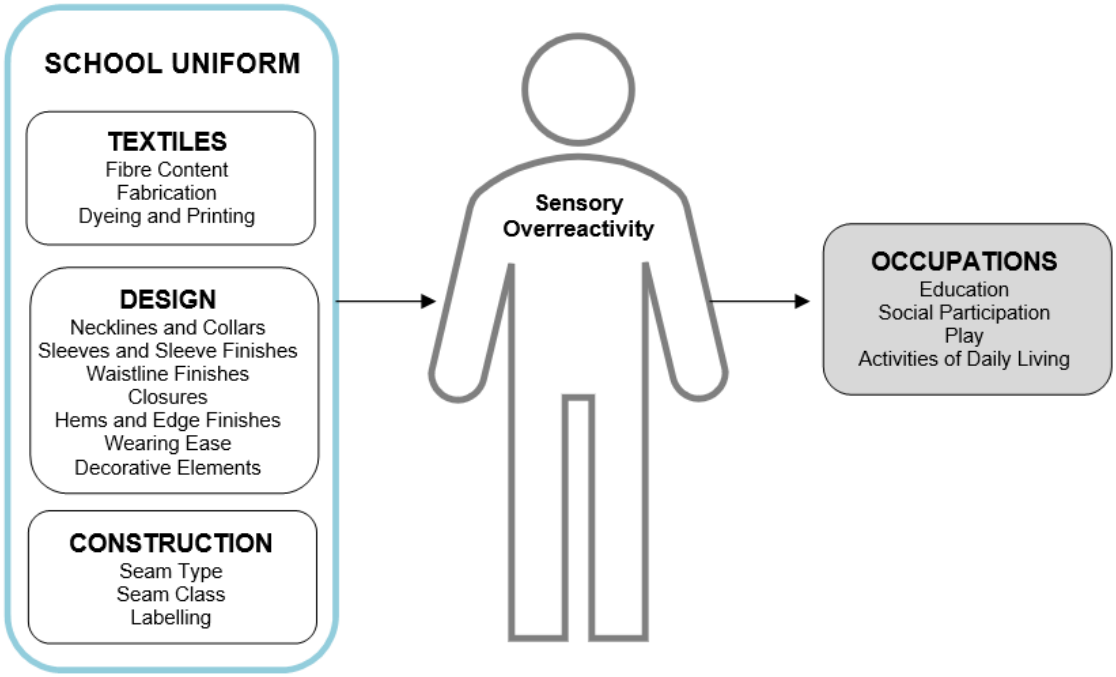


FIGURE 2.8: CONCEPTUAL FRAMEWORK

2.8 CONCLUSION

This chapter highlights the theoretical background of the study and explores sensory overreactivity, as well as related areas of interest, in-depth. It furthermore features comprehensive research on the composition of textiles as well as the elements of design and construction featured in school uniforms. Chapter 3, the following chapter, focuses on the research design and methodology used during this mixed-method study. The methodological techniques used in both qualitative and quantitative phases are also discussed.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

The topic at hand is rather unexplored locally and internationally and therefore necessitates exploratory research. This empirical study aims to understand the influence of school uniforms' properties on children with sensory overreactivity. This chapter starts with an explanation of the research design of this exploratory mixed-method study and thereafter focusses on the methodological techniques used during each individual phase of the research.

3.2 RESEARCH DESIGN

The relatively unexplored nature of the study lent itself to an exploratory mixed-method approach. Although the title makes use of vocabulary which is directly linked with quantitative studies (e.g., ‘’influence”) (Creswell & Creswell, 2018:27), the research design combined elements from both qualitative and quantitative approaches in a single study whereby the data built on one another (Creswell & Plano Clark, 2018:148; Johnson, Onwuegbuzie & Turner, 2007). An exploratory mixed-method approach occurs in sequence, by first exploring the subject in the qualitative phase, followed by the integration of the findings from the qualitative phase in the quantitative phase (Figure 1.1) (Creswell & Creswell, 2018:8). Its purpose is to build a comprehensive understanding of the topic during the qualitative phase before exploring the views of respondents in the quantitative phase. This reduced the occurrences of posing questions from the researchers' own standpoint in the quantitative phase (Creswell & Creswell, 2018:57)

The advantage associated with this specific research design is that it enhances the reliability and validity of the research study's conclusions (Abowitz & Toole, 2010). It enables answering variable questions and has the function of being applied to a variety of research fields such as psychological studies, healthcare, education, and human behaviour (Brause, 2000; Calabrese, 2006; Finn, 2005; Phillips & Pugh, 2005). Hence, it is certainly fit for this interdisciplinary study.

The first phase of this study was purely explorative and consisted of two qualitative focus group discussions. This phase aimed to elicit school uniform properties that may be a sensory irritant (with regards to their textiles, design, or construction methods). The focus group interviews conducted were relatively unstructured and included purely open-ended questions to gain insight into the participants' viewpoints and experiences (Creswell & Creswell, 2018:308). The views of the participants were used to develop the measuring instrument for the second phase that consisted of a survey using an online questionnaire, providing that phase 2 was more descriptive in nature. In the second phase, a survey design was used since it assisted the researcher in answering descriptive questions as well as questions about the relationships between various variables (Creswell & Creswell, 2018:245).

The study was cross-sectional in nature, as it only collected information once from any given sample (Malhotra *et al.*, 2017:911). Additionally, this research design was used to obtain detailed information in the qualitative phase (phase 1) from a small sample group. The qualitative data collected in phase 1 ultimately helped develop the survey design used in phase 2.

3.3 METHODOLOGY

The following section serves as an explanation of the unit of analysis (i.e., the participants of the study), the sampling methods, measuring instruments, data collection, and data analysis used in both phases. In addition, the quality of the study is also discussed as well as how ethical conduct has been addressed.

3.3.1 Unit of analysis

The focus of this study is on children with sensory overreactivity and similarly to the study of Oetojo (2019) both parents and occupational therapists of these children were approached to find out which elements of school uniforms increased sensory irritation. Consequently, the unit of analysis of this study was parents of children with sensory overreactivity and occupational therapists that work with children with sensory overreactivity.

There were specific criteria that had to be met for parents to qualify as the unit of analysis. The first criteria were that the parent has a child that has been formally diagnosed with sensory overreactivity (or TD) by an occupational therapist or healthcare professional. Secondly, the child must wear a school uniform when attending school. Initially, children between the ages of five and nine years old were recruited since children are mostly affected by SID between the stipulated age requirement (van Jaarsveld *et al.*, 2014). However, during the data gathering, it became very difficult to reach such a specific unit of analysis and therefore the age requirement

was increased. The final age requirement ranged between 6-13 years. All occupational therapists who took part in the study were registered with the Health Professions Council of South Africa and have had experience in the past with children with sensory overreactivity and tactile defensiveness.

3.3.2 Sampling

Leedy *et al.* (2021:199) as well as Kumar (2018:176), describe the concept of sampling as a technique used to select or help identify a sample from a population (a subset of a population), to get a better understanding of certain unknown outcomes concerning the larger population. For the purpose of this study, non-probability sampling methods were used across all phases which involved the selection of samples based on their accessibility and personal judgment of the researcher (Malhotra *et al.*, 2017:149). Malhotra *et al.* (2017:433) state that in exploratory research specifically, it is ideal to pursue a non-probability sampling method, as the results obtained from participants will yield much more effective results compared to probability sampling. In contrast to probability sampling, findings drawn from the population in non-random sampling may not be generalised, however, the samples still portray good estimates of the population (Kumar, 2018:182). The concept of sampling comprises certain advantages and disadvantages. Although it has proven to be beneficial for the researcher who has limited time and resources, as in the case of this specific study, sampling is also a method which only estimates the information gained from the population which has the possibility of lacking accuracy (Kumar, 2018:177). It is, however, important to note that the population under question in the current study was homogeneous concerning the elements under exploration, resulting in a good estimate and level of accuracy (Kumar, 2018:180). The forms of non-probability sampling methods prevalent in this study were convenience sampling, purposive sampling, snowball sampling, and quota sampling.

Malhotra *et al.* (2017:421) suggested the use of convenience sampling in exploratory research since one can easily generate various insights towards a study. This is due to the fact that convenience sampling enables the researcher to obtain a sample of a convenient population (Malhotra *et al.*, 2017:420). Convenience sampling thus proved to be featured in both the qualitative and quantitative phases. In addition, due to financial and time constraints convenience sampling was implemented as it is regarded as the least expensive and least time-consuming of all sampling techniques (Malhotra *et al.,* 2017:421). Purposive sampling was also prevalent in the study. This sampling method was used to identify individuals who possessed the most information regarding a specific topic. It was important to the researcher to identify occupational therapists that were able to provide specific information to attain the objectives of the study. Therefore, this sampling technique allowed individuals to be selected and form part of

a sample set based on their expertise (Leedy *et al.*, 2021:206). Because purposive sampling was used, specific inclusion criteria were set.

The use of snowball sampling in the study allowed participants to be recruited by respondents who already formed part of the sample and who all fit into the same category (Gliner *et al.*, 2017:151). An initial group of individuals was contacted via Facebook, email, and, Whatsapp who possessed desired characteristics which in return helped obtain sufficient referrals (Malhotra *et al.*, 2017:424). These individuals "forwarded" the link to the questionnaire to other potential respondents via the same social network channels. Furthermore, during phase 1, contact details were obtained from participants for possible respondents in phase 2. Lastly, employing quota sampling allowed the researcher to control the sample set by identifying the sample's characteristics beforehand. In doing so, the researcher was able to recruit the needed respondents to gain knowledge of the specific topic (Leedy *et al.*, 2021:206). Malhotra *et al.* (2017:424) mention that quota sampling often attempts to obtain a sample that is representative of the population. However, in phase 1 of the current study, quota sampling was implemented to ensure that an adequate number of occupational therapists, as well as parents of children with sensory overreactivity, were recruited.

3.3.2.1 Sampling: Phase 1 (Qualitative phase)

Snowball sampling was of great assistance in identifying an adequate sample for the qualitative phase. This phase was conducted with the use of two focus groups which consisted of at least two occupational therapists per group. These occupational therapists were recruited based on their expertise (purposive sampling). Each therapist was furthermore asked to recruit at least two parents of children with sensory overreactivity (snowball sampling). Some occupational therapists had children with sensory overreactivity of their own, totalling two occupational therapists and five parents per group, even though only six participants formed part of group A. Group B included two occupational therapists and three parents of children with sensory overreactivity, even though only four participants took part in the discussion (see Table 1.1). As mentioned, quota sampling was used to attempt to obtain a sample with a good representation of occupational therapists and parents. Malhotra *et al.* (2017:184) advise that focus groups should consist of at least six to ten participants. Over-recruitment was recommended, and even though this was pursued, due to the lack of participants over-recruitment did not realise.

3.3.2.2 Sampling: Phase 2 (Quantitative phase)

During Phase 2 of the study, the quantitative phase, sensory integration qualified occupational therapists assisted in the recruitment process of parents of children with sensory overreactivity (snowball sampling). The researcher was positive that since the occupational therapists already

formed part of the sample set, the process of referring parents to the study would be easily achieved. This was, however, not the case. The researcher contacted the Western Cape Paediatric Practitioners Group and obtained the contact details of all registered Sensory integration OTs in the province. All occupational therapists on this database were contacted and requested to assist in the research study by filling out the online questionnaire. The researcher also joined 11 Facebook support groups related to Sensory Processing Disorder and Autism, all with members who work within this field or who had children with SID and autism. The link to the questionnaire, along with a post motivating potential respondents on the valuable contribution their input may provide, was posted throughout the timeframe of the 30th of July 2021 to the 4th of October 2021. Furthermore, the researcher contacted Autism South Africa in optimism that the questionnaire would be distributed to various stakeholders. Lastly, the researcher personally also contacted all 154 Sensory Integrative certified occupational therapists who appeared on the SAISI (The South African Institute for Sensory Integration) database. Participants from phase 1 also assisted with contact details of possible respondents. At the end, a final sample of 106 workable questionnaires was achieved.

3.3.3 Measuring instrument

This section highlights and discusses the measuring instruments used to obtain data in both phases of this study. During phase 1, a topic guide assisted the researcher with the focus group discussions. Phase 2 consisted of an online survey which was mainly self-developed based on the findings of phase 1.

3.3.3.1 Measuring instrument: Phase 1 (Qualitative phase)

As described, the first phase of the study was conducted by implementing two online (virtual) focus group discussions. Kumar (2018:124) mentions that focus groups allow one to obtain individual perceptions in qualitative research. It is also a perfect strategy in gaining feedback upon a subject matter as the researcher raises questions to stimulate discussion amongst the group. To encourage the discussion surrounding sensory sensitivity and children's school uniforms, a topic guide (Table 3.1) was developed prior to the data gathering (Malhotra *et al.*, 2017:188).

TABLE 3.1: TOPIC GUIDE USED IN PHASE 1

Topic	Question	Swatches
General	Please tell us about typical sensory related issues that children may experience when wearing their school uniform.	
	Do you know of anything that can be done to a garment to make it less irritating/more comfortable? (Home adaptations).	
Fabrics	Do you think that the different types of fabrics used in garments has an influence on the level of irritation?	029, 032, 037, 043, 050, 052
Closures	Which type of closure would you consider as most irritating to the sensory child and why?	
Seams	Do you think the manner in which the pieces of fabric have been sewn together has an influence?	038, 059, 060
Neckline	Are there specific types of collars or necklines that are more irritating than others?	033, 039, 051
Sleeve & sleeve finishes	Is there anything related to a sleeve that you have found to cause irritation?	055, 056
Waistline	On girl's skirts, pants, and shorts, as well as boys' pants and shorts, have you picked up that the sensory child experiences any irritation with the waistband of the garment?	041, 042
Labels	Tell us about the labels in your child's school uniform. Are there any particular labels as well as specific placement locations that your child regards as irritating?	
Decorative elements	Are there any particular decorative elements or school branding techniques that might cause irritation?	

Creswell and Creswell (2018:48) mentions that the primary objective of the research is to rely as much as possible on the participants' viewpoint of the situation under study. Therefore, representative of a qualitative research study, the researcher commenced the focus group discussions with an open-ended question (Creswell & Creswell, 2018:43) asking participants what they have noticed irritate children specifically while wearing their school uniforms. Initially, no reference was made to the literature to allow participants the opportunity to provide their personal views as freely as possible and exclude potential interviewer bias (Kumar, 2018:145). Due to the exploratory nature, a flexible approach was taken throughout the focus group discussions in order to acquire as much data as possible and to build a comprehensive understanding of the topic (Creswell & Creswell, 2018:308; Kumar, 2018:34;326). Once the topic no longer prompted new discussions and no other information surfaced, the researcher assumed data saturation transpired (Creswell & Creswell, 2018:464). Hence, the researcher continued to the following questions in the topic guide.

The topic guide contained a variety of questions and broadly stated issues, which served as a consistent set of discussion points presented to both groups. This topic guide was compiled after a careful review of the literature. Following the first open-ended question, the researcher

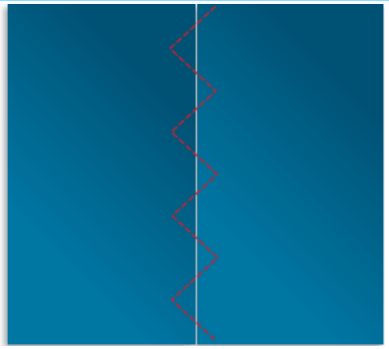
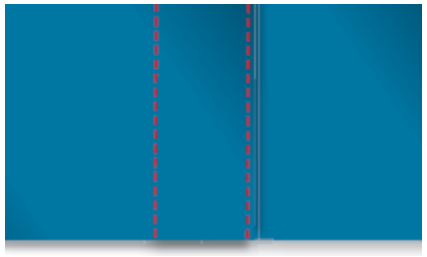
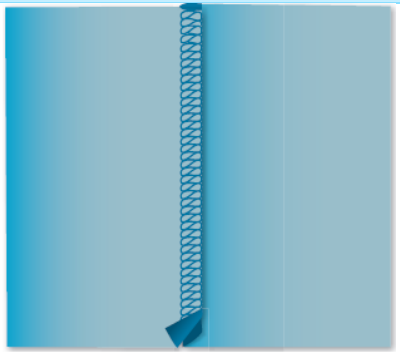
initiated the discussion with at-home adaptations that could be made to school uniforms to prevent irritation, as it was assumed that many participants have implemented adaptations. Following this discussion, the researcher probed questions related to school uniforms which may cause irritation but have not received a lot of attention in the literature as yet. It was assumed that most participants were not familiar with the technical fabric names or swatch types (for instance, flat-felled seam), and therefore, to add to the interactivity of the focus group discussion, the researcher sent a set of swatches of several different types of school uniform fabrics, seams, collars, and wrist finishes to the focus group participants before the focus group sessions (See Section 3.3.3.1, Table 3.1, Table 3.2 and Table 3.3).

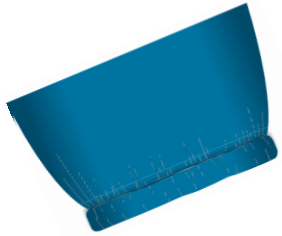
Specific questions regarding the following components of a school uniform were asked: fabrication (fibre content, hand of the fabric), closures (buttons, Velcro, hooks and eyes, zippers, press-studs), seams (seam type, position on the body), collars and necklines (collar and neckline type preference), sleeves and sleeve finishes (sleeves and sleeve finish type preference), waistbands (waistband type preference), labels (label type preference, position on the body) and decorative elements. The researcher also obtained feedback from the participants regarding the acceptance of the school uniform and its components, general feedback of the different school uniforms and their elements, and suggestions on how it may be improved in future

TABLE 3.2: TEXTILE SWATCHES

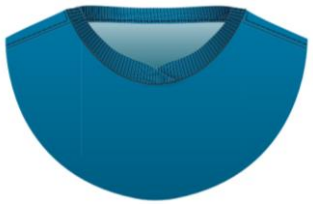
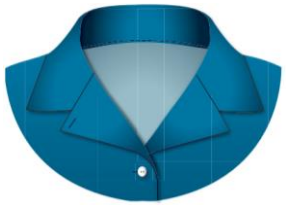
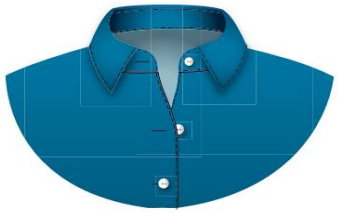
Classification	Swatch Number	Use/Garment	Fibre content
Textiles	029	Lining of jackets, tracksuit tops, bottoms, and sportswear	Polyester
	032	School jerseys	Acrylic
	037	School trousers, skirts, and dresses.	Polyester viscose blend
	043	Golf-shirts	Polycotton
	050	Buttoned down shirts	Polycotton
	052	Tracksuit tops and bottoms.	Nylon (outer shell) Polyester (lining)

TABLE 3.3: CONSTRUCTION SWATCHES

SEAM TYPES			
Seam type	Flat seam (FSa)	Lapped seam/Flat felled seam (LSc)	Superimposed seam (SSa)
Swatch number	038	059	060
Typical use in commercial clothing	Sweatshirts, underwear, interlinings of garments (Shaeffer, 2013:115)	Shirts, trousers, tracksuits, setting pockets and collars, trims (Shaeffer, 2013:119)	Underwear, stretch knits, tracksuits (Shaeffer, 2013:121)
Picture	 **(Shaeffer, 2013:115)**	 **(Shaeffer, 2013:116; 516)**	 **(Shaeffer, 2013:116; 514)**

WAISTLINES		
Design type	Straight waistband	Elasticised waistband
Swatch number	041	042
Uses	Waistband on school trousers, school skirts	Waistband on school trousers, tracksuit trousers and shorts
Picture	 (Shaeffer, 2013:299)	 (Shaeffer, 2013:299)
SLEEVE FINISHES		
Design type	Elasticised wrist-finish	One-piece cuff
Swatch number	055	056
Uses	Wrist-finish on long sleeved Nylon jackets, tracksuit tops	Cuff on long-sleeved buttoned-down shirts
Picture	 (Shaeffer, 2013:300)	 (Shaeffer, 2013:291)

COLLARS			
Design type	V-neckline with ribbing	Convertible shirt collar	Two-piece shirt collar with a stand
Swatch number	033	039	051
Uses	Neckline on school jersey, jersey pull-over	Collar on casual school golf shirts	Collar on school buttoned-down shirts

Picture	 (Shaeffer, 2013:471)	 (Shaeffer, 2013:360)	 (Shaeffer, 2013:355)

3.3.3.2 Measuring Instrument: Phase 2 (Quantitative Phase)

The exploratory sequential design facilitated the prioritisation of phase 1-the qualitative phase, which also includes the data collection and data analysis stages. Once concluded, the researcher was able to build on the data gathered in the first phase and commence with the development of the measuring instrument for phase 2, the quantitative phase which was drawn from the exploratory results obtained in the qualitative phase (Clark & Creswell, 2014:123).

The questionnaire consisted of three sections; Section A, Section B, and Section C (see Addendum C). **Section A** consisted of a consent form that highlighted the purpose of the Master students' research and its intention being strictly for academic use (see Addendum B). First and foremost, the approximate duration of the questionnaire was stated. To encourage participation, respondents were assured that no prior preparation was needed to answer the questionnaire. Respondents were guaranteed of their anonymity and an assurance of confidentiality was provided (Creswell & Creswell, 2018:172; Sarantakos, 2012). Respondents were reassured that it was possible to opt out at any time they felt the need to do so and that their withdrawal would not be held against them in any way (Babbie 2016:62). Possible research benefits were also mentioned and that potential respondents' contribution would be highly valuable. Additionally, the form included the contact details of the supervisor of the research study.

Respondents' consent was required for them to partake in the research. A dichotomous question was imposed whereby respondents had to indicate their willingness to participate by selecting "Yes, I agree" or "No, I do not agree" (Kumar, 2018:80). By selecting the "Yes, I agree" option, respondents were granted access to complete the questionnaire. Upon agreement, respondents acknowledged that they were adequately aware of the type of information researchers were interested in and how the research would be applied. In the case where a respondent declined their consent, the respondent was not permitted to complete the questionnaire and was thanked for their time.

Section B included information relevant to the child and focused on questions related to their demographic data. The respondent was first required to identify whether they have a child with mild to severe overreactive responses towards light touch input. The second screening question asked respondents to indicate whether the child wears a school uniform to school. These screening questions served as a verification method to determine the participants' eligibility to partake in the study. As mentioned in Chapter 1 Section 1.5.3.2, since these demographic questions serve as screening questions, they were included in the beginning of the questionnaire, although it is good practice to rather include demographic questions at the end of

a questionnaire (Malhotra *et al.*, 2017:384; 394). In the event where both questions were answered negatively, the questionnaire ended.

When a respondent had two or more children who had sensory sensitivities, respondents were prompted to answer the questions based on the child with the most severe sensory overreactive responses in mind. Respondents were asked to indicate their child's year of birth through an open-ended question. Questions related to gender and province of residence in the form of a multiple-choice question followed. Respondents were asked to indicate *their* experience of the child's overreactive responses' severity in using a slider on a scale ranging from "not severe'' to ''extremely severe''. Lastly, a question related to a child's frequency of distress by wearing specific garments were posed. This was presented on a 5-point Likert-type scale with ''1'' being "never" and ''5'' being "very often''. Specific questions related to the components of a school uniform followed after the respondents' personal information had been obtained. The Sensory Profile tool originally developed by Dunn (1994), is a method of determining sensory system responses using a questionnaire. The instrument consists of 99 items divided into six different categories related to sensorial parameters (tactile, audio, visual, taste, smell, movement, and body position) and two categories related to behavioural parameters (emotional/social and activity levels) (Dunn, 1994). McIntosh, Miller, Shyu and Hagerman (1999) have however created an adapted version of the original questionnaire, The Short Sensory Profile (SSP), which is used to explore children's sensory experiences and explain differences in sensory integration using a shortened questionnaire (Asmika *et al.*, 2018; Tomchek & Dunn, 2007). Initially, the researcher aimed to develop questions based on sensory sensitivity using the Sensory Profile tool as well as the SSP, however, since both aids leant more towards an occupational therapy study, the researcher excluded it from the final study.

Section C related to the properties of school uniforms that are sensory-irritant. In this section, the questionnaire presented the respondent with a variety of questions related to the fabrication (fibre content, hand of the fabric, and pilling), collars (collar type preference), closures, wearing ease (long-sleeved versus short-sleeved garments, garment preference type), sleeve and sleeve finishes (cuff preference), decorative elements (embroidery), waistbands (waistband preference type, body position, sizing), labelling (label removal, label type preference), at-home adaptations (purchasing second-hand garments) and seams (seam type and class preference). The specific set of properties that were under investigation was determined in the first phase- the focus group discussions. Since most respondents were not familiar with the technical terms associated with clothing production, examples in the form of pictures were provided in the questionnaire.

Question 10 asked respondents to indicate how frequently a school uniform affects their children in four different scenarios. This question was included to determine the effect that school uniforms have of the chid with sensory overreactivity. Respondents were requested to rate the items using a five-point itemised rating scale (a Likert-type scale) ranging from “never” to “very often”. The reason for using an odd number of categories was to allow the respondents to choose a “neutral” option in the event where the question was not applicable (In other words, respondents chose the middle scale position) (Malhotra *et al.*, 2017:354). The scenarios included unhappiness while getting ready for school, meltdowns while getting ready for school, ability to concentrate at school, and meltdowns at school.

Following this question, Question 11 focused on fabrication. Five items were included and respondents had to rate these items using a five-point itemised rating scale ranging from “strongly disagree”’ to “strongly agree”. Two items focused on fibre content, one item on fabric hand (soft/hard), one item on pilling, and one that focused on the sound the fabric makes. Even though the sound is not related to touch, but related to hearing, it was decided to include it, since it was very prominent in the focus group discussion and also in the literature.

Question 12 related to the collar and neckline preference and included three pictures of a crewneck, shirt collar and collar with a stand. Respondents were requested to indicate which of the three necklines/collars would cause the most irritation to their child.

Question 13 requested respondents to indicate their level of agreement with various statements related to shirt buttons, sleeve length preference, cuffs, and embroidery on clothing. Similar to Question 11, the question was presented in the form of a five-point Likert-type scale ranging from “strongly disagree”’ to “strongly agree”.

Questions 14, 15 and 16 was related to at-home adaptations to alleviate sensory irritants presented by school uniforms. Each respondent had to indicate their frequency in engaging in different adaptations associated with waistbands (Question 14, 3 items) and labelling (Question 15, 3 items). Both Question 14 and Question 15 were presented as a five-point itemised rating scale ranging from “Never” to “Always’’. Respondents were finally asked to present any other adaptations they might engage in which were not presented in the questionnaire, by means of an open-ended question (Question 16).

Similarly, questions related to the irritability of seams (flat-felled and overlocked) and labels (woven, printed, satin) were also included. Respondents were asked to indicate which of the options irritated their child the most by means of a multiple-choice and multiple answer option (Question 17 and 18).

Question 19 concluded the questionnaire and presented the respondent with three garment options. The respondent was required to indicate the garment which their child would prefer wearing to protect them from the cold. The options included a school jersey, a tracksuit jacket with a lining and a fleece top. On completion of the questionnaire, the respondent was thanked for their time and their valuable contribution to the research study.

3.3.4 Data Collection

3.3.4.1 Data collection: Phase 1

The process of data gathering in the first phase commenced virtually via Blackboard Collaborate once ethical clearance had been obtained from the Faculty of Natural and Agricultural Sciences at the University of Pretoria. Consumer behaviour research as well as social science topics have the potential of being sensitive in the sense that it may evoke emotional responses among participants (Kumar, 2018:148). In this study, it was of utmost importance to make respondents feel comfortable and at ease to ensure accurate data collection could be accomplished. An effort was made to accommodate both parents and occupational therapists at a convenient day and time when actual data collection took place. Four possible dates and times were identified and incorporated into a Google form. A link to the Google form was sent to the potential participants whereby they had to indicate specific dates and times which were most suitable. Two final dates and times were then chosen. Participants were formally invited by an electronic invitation which included the date, time, online platform, link to the event, and a consent form they had to complete. Sessions were recorded using the recording function of Blackboard Collaborate with permission from the participants. The researcher served as the moderator during the focus group discussion, and lead discussions with the aid of the topic guide developed prior to the commencement of the focus group. Data collection for the qualitative phase took place on the 10th and 13th of July 2021. As a gesture of appreciation, participants were informed that researcher would send them the results of the study in the form of an infographic.

3.3.4.2 Data collection: Phase 2

With the use of the questionnaire in the second phase, it was essential to pre-test the research instrument to ensure all questions were understood and interpreted correctly by respondents in the study. The purpose of pre-testing the questionnaire was not to collect data but rather to establish the appropriateness of language and wording used in the questionnaire, to ensure it communicated the correct ideas as it was intended by the researchers (Kumar, 2018:150). The pre-test for the questionnaire occurred in July 2021 whereby the final data collection commenced afterwards, in July 2021. During the pre-test validation problems with the

questionnaire set-up were elicited and rectified. In addition, some wording and question layouts were changed.

Recruitment for the main quantitative data collection occurred through digital communication. An invitation with a link to the online questionnaire was sent to possible respondents via WhatsApp, e-mail, and Facebook Messenger. The researcher was mindful that this data collection method may produce a low return rate (Creswell & Creswell, 2018:172), and therefore, all messages and emails were accompanied by a cover letter encouraging possible respondents to complete the questionnaire, by stating the valuable contribution their responses will provide to the world of research.

The online questionnaire was hosted with the use of Qualtrics software ensuring data was captured in real-time. Despite the regular advantages associated with conducting online questionnaires (rapidity in conducting the questionnaire and obtaining results, cost-saving, automatic validity which enhances the quality of data, and non-existence of bias), this survey method seemed most appropriate due to the Covid-19 pandemic. Physical contact with respondents was completely avoided (i.e., social distancing) and respondents were able to complete the questionnaires swiftly.

3.3.5 Data analysis

Qualitative and quantitative research requires different data analysis strategies (Leedy & Ormrod, 2015:24). The recordings in the qualitative phase (phase 1) were transcribed using Otter-ai, an automated audio transcription application. Once the transcription was completed, the researcher listened to the recordings while reading through the transcription to ensure accuracy. The coding of the transcriptions was aided by the use of Atlas.ti software. The researcher coded the transcriptions. Thereafter, the supervisor read through the coded transcriptions. Where the supervisor detected any disagreement, the sections were highlighted and discussed with the researcher to ensure agreement of the coding. Finally, content analysis followed- which is one of the main methods in analysing qualitative data (Kumar, 2018:332). Content analysis was used to determine common themes that emerged during the focus group discussions, while simultaneously assisting in structuring and summarising the data (Malhotra *et al.*, 2017:254).

The data for phase 2 was captured and coded automatically with the use of Qualtrics software, which occurred as the respondents completed the questionnaire. The dataset was exported to Microsoft Excel for data cleaning (e.g., removal of unfinished questionnaires). Descriptive statistics were implemented in the study as its purpose is to describe data by utilising ranges of

scores in order to report on qualitative data (Creswell & Creswell, 2018:296). Only frequencies, percentages, and means were utilised in the descriptive statistical analysis (Leedy *et al.*, 2019:387). This type of statistical analysis was implemented since the research study is explorative in nature. This type of analysis was also regarded as suitable as mixed-method research uses descriptive statistics to determine various relationships among variables (Creswell & Creswell, 2018:296). Lastly, due to the nature of the research paper, a master's dissertation, only descriptive statistics was applicable.

3.3.6. Operationalisation

The operationalisation table (Table 3.4) below represents the objectives of this study together with each objectives' dimensions, measurement, and data analysis.

TABLE 3.4 OPERATIONALISATION TABLE

Objective	Dimension	Questions in questionnaire	Measurement	Data analysis
Objective 1: To explore and describe the influence of the properties of school uniforms on children with sensory overreactivity.				
1.1. The influence of different **textile** properties.	Fibre content	**Section C: Q11**	**Phase 1**: Focus group discussions. **Phase 2**: Online questionnaire. Self-developed questions obtained from Phase 1.	**Phase 1**: Content analysis. **Phase 2**: Frequencies, percentages, means, standard deviation.
	Fabrication	**Section C: Q11**		
1.2. The influence of different garment **design** properties.	Necklines and collars	**Section C: Q12**		
	Sleeves and sleeve finishes	**Section C: Q13**		
	Waistline finishes	**Section C: Q14**		
	Closures	**Section C: Q13**		
	Decorative elements	**Section C: Q13**		
1.3. The influence of different **construction** properties.	Seams type and class	**Section C: Q17**		
	Labelling	**Section C: Q15**		
Objective 2: To write a guideline that indicates easy and affordable changes that can be made to school uniforms that will reduce adverse sensory responses.				
The results obtained for Objective 1 are discussed in both Chapters 4 and 5. Objective 2 represents a summary of the qualitative and quantitative phases and are, therefore, discussed in Chapter 6.				

3.3.7 Quality of the Study

A mixed-method approach is responsive to both qualitative and quantitative criteria, and quality assessments for these two criteria are subject to their own measures. While qualitative research is measured in terms of trustworthiness, quantitative research is based on validity and reliability.

3.3.7.1 Quality of the study: Phase 1

The quality of a qualitative research study is measured in terms of trustworthiness (Kumar, 2018:171). Trustworthiness is enhanced by four specific factors which affect the validity and reliability of the research. The four factors are credibility, transferability, dependability, and confirmability (Guba & Lincoln, 1994:114; Kumar, 2018:172). **Credibility** refers to a circumstance whereby the results obtained in the study are agreeable to the participants of the specific research study (Kumar, 2018:333). As perceptions, attitudes, and feelings are explored during qualitative research, it is in the researcher's best interest to convey the beliefs of respondents accurately. Furthermore, other individuals need to understand the information as valuable and reputable (Leedy *et al.*, 2019:73). Kumar (2018:172) states that it is only participants themselves who can judge whether the findings are portrayed accurately, and hence, whether the study can be regarded as credible. Credibility was enhanced with the implementation of multiple methodologies (i.e., focus groups and a self-administered questionnaire) as it added complexity to the current research study. Creswell and Plano Clark (2018:588) also suggested a debriefing session, which was implemented and involved the supervisor of the study whereby the coding of the study was thoroughly inspected. This process of debriefing decreased bias results (Malhotra *et al.*, 2017:895).

Transferability in qualitative research describes the ability of the results of a specific study to be generalised to a larger population, and more specifically, in other contexts and settings (Kumar, 2018:172). To enhance the transferability of the results, Pratt and Yezierski (2018) suggest recruiting participants with different demographic characteristics and Nieuwenhuis (2016:124) suggests using quota sampling. Both approaches were pursued in this study.

Compared to reliability in quantitative research, **dependability** in qualitative research highlights the idea of whether one would be able to acquire the same results if the data was collected a second time around. Although difficult to achieve in qualitative research due to the flexibility in obtaining the data, it may be achieved using detailed record-keeping by using a variety of data recording strategies (Kumar, 2018:172; Leedy *et al.*, 2019:282). To enhance the dependability of the study, previous researchers have collected data until data saturation occurred (Asmaningrum & Tsai, 2018), hence, a similar approach was implemented. Gibbs (2007) states that from a researcher's point of view, it is important to

approach a study in a consistent manner (Creswell & Creswell, 2018:323) and, it was for this specific reason that the researcher conducted all qualitative data collection methods personally. Using this approach, the researcher was able to deduce the same conclusions and similarly interpret the results across the entire phase. The second focus group elicited similar results to the first. If the results were different, additional focus group discussions would have been conducted until data saturation occurred.

The degree to which the results of a study may be substantiated and confirmed by other researchers displays the **confirmability** of a study (Kumar, 2018:172). Objectivity in quantitative research parallels this concept and is often discussed in topics related to bias. As one of the leading downfalls in the trustworthiness of a study (Kumar, 2018:219), researchers must ensure that personal bias gets eliminated to the furthest extent and objective research reports are written. The questions in the topic guide were formulated in a manner to reduce bias as far as possible.

Lastly, reflexivity- a qualitative approach that allows researchers to reflect on their background knowledge and help shape their interpretations in a specific study, was not necessarily incorporated in the study itself- but followed while conducting data collection. This occurred through note-taking throughout the different focus group discussions which helped shape the development of the study (Creswell & Creswell, 2018:305,455).

3.3.7.2 Quality of the study: Phase 2

Validity is concerned with the accuracy and truthfulness of the findings and indicates the extent to which the research measures what it intends to measure (LeCompte & Goetz, 1982:32; Malhotra *et al.*, 2017:361). Different types of validity exist, namely content validity, face validity, concurrent validity, predictive validity, criterion validity, and construct validity (Babbie, 2016:191; Malhotra *et al.*, 2017:362). Kumar (2018:167) states that both content and face validity moderate whether questions in the measuring instrument reflect the objective of the study. Not only should the questions be representative of the objectives but be well-balanced in the sense that all questions should have equal representation in, for the purpose of this study, the questionnaire. The literature review as well as the findings from the two focus groups enhanced the content validity of the measuring instrument.

Criterion validity indicates whether a specific scale performs as anticipated concerning identified variables (Malhotra *et al.*, 2017:362). For example, a scale measuring typical school uniform elements which may irritate the wearer. Criterion validity may, therefore, be determined by comparing the results obtained by this scale with the type of school uniform garments purchased by consumers and whether these garments are subjected to the irritant elements identified. Depending on the period subjected to, criterion validity may take on two

other forms- concurrent and predictive validity. Concurrent and predictive validity is discussed under the same main idea. Both validity indicators are measured in terms of how the study compares to a second measurement simultaneously done and to which degree the outcome of the study may be predicted (Kumar, 2018:168). Concurrent validity may be assessed when data measured using a scale (e.g. irritant elements in school garments) and criterion variables (the type of school uniform garments purchased) are collected at the same time (Malhotra *et al.*, 2017:362). Predictive validity however collects scale data at one point in time and predicts criterion variables at a future stage. For example, one may determine the irritant elements of garments and proceed by forecasting consumers' future purchasing decisions when buying school uniforms.

Construct validity on the other hand is more concerned with whether the items in the questionnaire measure supposed constructs as highlighted in the research study by Creswell and Creswell (2018:254). Leedy *et al.* (2021:129) explain that these specific constructs are often assumed and, thought patterns are developed by observing people's behaviour, presenting specific tasks, or by asking specific questions.

For a measuring instrument to be valid, it also needs to be reliable (Malhotra *et al.*, 2017:363). The concept of reliability is focused on the ability of the measuring instrument to yield consistent results when one collects the same type of information, under the same or similar conditions, on different occasions (Kumar, 2018:169). Hence, if the measuring instrument produces scores across various measurements whereby the association between the scores is high, one could regard the results as consistent and thus reliable (Malhotra *et al.*, 2017:359).

Different approaches exist in assessing the reliability of a study and it includes test-retest reliability, alternative-forms reliability as well as internal consistency reliability (Malhotra *et al.,* 2017:358). As mentioned, the study was firstly explored utilising a qualitative scale. The data obtained elicited relevant content which was used in the questionnaire in the quantitative phase (Creswell & Plano Clark, 2018:544). Therefore, the development and subsequently, quantitative phase (phase 2), was dependent on the initial qualitative phase (phase 1). To validate the findings, the data obtained in the qualitative phase was used to enhance the quantitative measuring instrument (Creswell & Plano Clark, 2018:155). To assess reliability, a pre-test questionnaire was implemented and tested using a pilot sample of respondents.

3.3.8 Ethics

Ethics is concerned with the morality of human behaviour and practices and is an important code of conduct in qualitative, quantitative, and mixed-method research (Creswell, 2014:92; Miller *et al.*, 2012). Ethics may be regarded as the golden thread throughout the study, as it is prominent in obtaining information prior to conducting the study, plays a role at the beginning of the study, features in the data collection phase, is important during data analysis, and is extremely fundamental during reporting and storing of the data (Creswell & Creswell, 2018:95). From an academic institution's point of view, it is in the researcher's best interest to follow the institution's professional standards and be granted the necessary approval to conduct the study (Creswell, 2014:93). Therefore, data collection only commenced once ethical clearance had been obtained from the Faculty of Natural and Agricultural Science Research Ethics Committee at the University of Pretoria (see Addendum A).

The researcher had an ethical responsibility towards all participants (phase 1) and respondents (phase 2) of the study in ensuring that none was exposed to any form of harm. It was important to approach all participants sensitively and respect their vulnerability in participating in the research study (Leedy *et al.*, 2019:120; Sieber, 2000). Furthermore, it was vital to ensure that all had a clear understanding of the requirements of the study, ensuring they were aware that their participation was entirely voluntary and that they had the right to withdraw at any time (Leedy *et al.*, 2019:121; Malhotra *et al.*, 2017:892). The researcher was aware that children are a vulnerable group and that they would be unable to provide their informed consent based on their emotional and cognitive capacity (Babbie, 2016:40; Leedy & Ormrod, 2015:120). However, participants (parents and occupational therapists) were informed that the questions asked were *about* their children or the children they worked with but did ***not*** require the children's involvement in any way. In protecting the privacy of participants and respondents, the researcher engaged in the necessary measures per the different phases of the study. During the qualitative phase, all participants were informed that audio recordings would be used during the focus group discussion and their consent was required prior to the start of any recording, as suggested by Malhotra *et al.* (2017:894). All contributions by participants were kept confidential, and codes were assigned in the place of their personal names to ensure anonymity. During the quantitative phase, respondents were presented with a consent form outlining the purpose of the study, the reason for and type of information sought after, and what purpose the research in the field of consumer science would signify (Kumar, 2018:338; Malhotra *et al.,* 2017:892). No questions of personal nature which could reveal their identity were asked and the questionnaire was completely anonymous.

From the researcher's point of view, the emphasis was placed on ethical interpretation of the data, which included unbiased reporting and continual reflection of analysis. Furthermore, an effort was made to ensure no misrepresentation of data occurred and emphasis was placed on truthful and honest reporting (Leedy *et al.*, 2021:139; Malhotra *et al.*, 2017:897-898). The researcher aimed to avoid plagiarism and gave credit to the resources consulted as per the guidelines of the Department of Consumer and Food Science. Lastly, the researcher ensured that the raw data was electronically archived in a tamper-proof format at the IT facility of the Department of Consumer and Food Science.

3.4 CONCLUSION

Chapter 3 explores the research design and methodological techniques used in this exploratory study. The quality of the study and the ethical responsibility of the researcher is also emphasised throughout his chapter. The following chapter focuses on the research findings and analysis of the data in phase 1 and is discussed and interpreted in accordance with three main categories, namely, textile, design and construction properties of school uniforms.

CHAPTER 4

RESEARCH FINDINGS AND ANALYSIS: PHASE 1

4.1 INTRODUCTION

The main objective of phase 1, the qualitative phase, was to determine which properties of a school uniform (textile, design, and construction properties) children with sensory overreactivity find most irritating during use and wear. The two focus group discussions included parents of children with sensory overreactivity and Sensory Integration qualified occupational therapists. The comprehensive data collection and data analysis methodology are described in Chapter 3. P

Each participant in the focus group discussion was coded with a specified number between 1-10. In using this form of coding, none of the participants' identities was disclosed and was simply referred to as P1, P2 up to P10. The researcher led the various focus group discussions and is referred to as "R" in the transcriptions. With the use of Atlas.ti, specific line numbers were assigned to the different lines in the transcribed dialogue. The line numbers served as a reference point to specific lines in the focus group discussions for example, when referring to line 15 in the transcribed discussions with participant P2, it is referred to as P2:15. When referring to the dialogue of the researcher, it is identified by "R" followed by a line number

To assist the reader, the specific swatch elements under discussion was typed in brackets in the quoted verbatim. The researcher also included screenshots of the comments posted by participants which appeared in the "chatbox" of the online meeting tool.

Since a variety of topics emerged throughout the first question in the discussion, it is to be noted that the results are not necessarily discussed in accordance to the questions asked in the topic guide but are rather presented per theme-namely textiles, design and construction. These themes were identified prior to the qualitative data collection process and were extracted from the literature.

4.2 THEMES DEDUCED FROM THE QUALITATIVE PHASE

Content analysis aided the researcher in identifying prominent themes in the transcriptions. This enabled the researcher to identify and categorise various clothing factors which are possibly irritating to children with sensory overreactivity. These factors were categorised according to the three main clothing properties namely textile, construction, and design properties. Textile properties included fibre content, fabrication, and dyeing and printing. Construction properties included the seam type, seam class as well as labelling. The design properties included necklines and collars, sleeve and sleeve finishes, waistline finishes, closures, wearing ease and decorative elements. The discussion and interpretation to follow will be classified according to these themes presented in Table 4.1.

TABLE 4.1: CLASSIFICATION OF CLOTHING PROPERTIES

Textile	Design	Construction
Fibre content	Necklines and collars	Seam type
Fabrication	Sleeves and sleeve finishes	Seam class
Dyeing and printing	Waistline finishes	Labelling
	Closures	
	Wearing ease	
	Decorative elements	

4.2.1 Textile properties

The significance of the influence of fibre content, as well as fabrication of garments, were prominent. These properties were discussed comprehensively, and participants were able to elaborate on how and why these properties were regarded as being the most irritant. The discussion surrounding dyeing and printing influences were, however, less significant and did not appear in any of the discussions. It could possibly indicate that dyeing does not have a significant influence in eliciting sensory overreactive responses. In addition, it might be that printing methods are not frequently used in school uniforms.

One of the dominant themes which emerged during the focus group discussion was the influence of fibre content. The irritation children experience from synthetic fabrics was repeatedly mentioned (Figure 4.1). Simultaneously, a fabric with a high cotton content was preferred. Similarly, the study done by Shin and Gaines (2017) that explored the textiles of therapeutic clothing, found that cotton textiles were favoured. This suggests that children with sensory overreactivity prefer wearing clothing with a high cotton content.

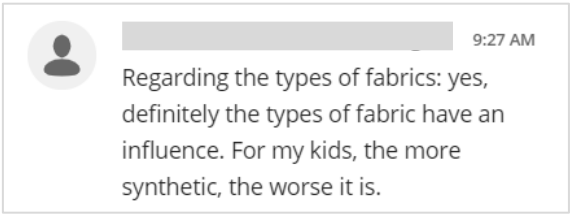


FIGURE 4.1: CHAT-LINE: P2 FOCUS GROUP 1

".. they prefer cotton over any other fabric" **(P7:20).**

"I've just noticed with my own children that anything more natural and less synthetic is much better. So, my one daughter, does not like polar fleece pyjamas and that kind of thing, she gets very irritated and takes them off within 10 minutes of putting them on. But something more sort of cotton, like a cotton t-shirt is more tolerable'' **(P8:28).**

The specific synthetic fabric referred to in the former statement was Dri-mac, a textile often used in the construction of the outer shell of school jackets and tracksuits. Participants indicated that with these types of fabrics the root of irritation was firstly due to its hard hand and secondly the noise the fabric made (Figure 4.2).

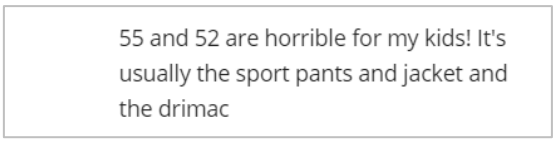


FIGURE 4.2: CHAT-LINE: P2 FOCUS GROUP 1

[Referring to swatch 55- elasticised wrist finish] "…even if you washed it, it just doesn't go soft. It is very synthetic" **(P2:31).**

"If you think about that synthetic kind of school jersey, just the look of it can even set off an emotional reaction..." **(P5:66).**

During the discussion related to fibre content, participants spontaneously explained what adaptations they make to alleviate the discomfort caused by textiles. One participant (an occupational therapist) mentioned that some children folded the cuff of Dri-mac jackets over towards the outside of the garment, to prevent the specific fabric (Dri-mac) shell, from touching the skin.

"...so that little part at the wrist where the Dri-mac fabric touches the skin, they tend to fold that over, so that it's only the white [cotton] lining that touches the skin" **(P7:140).**

Another participant (an occupational therapist) explained how severely affected one of her clients was by the fibre content of his school jersey, that they had to get a specific jersey knitted from an alternative yarn. The mother ultimately had to look for an alternative yarn in the same colour as his school uniform and locate someone to knit a new jersey that closely resembled his school jersey.

"[It] has happened in the past with one of my clients that, especially with the jersey, they actually take the jersey from the school, and they get someone or a grandmother to actually knit the same jersey but in different fabric that they can tolerate. Now, I don't really know, you know, this specific kind of fabric, but it's, you know… it's something that's more soft and less scratchy for them" **(P9:37).**

Participants also mentioned that children preferred wearing garments with a softer hand and that fabrics with a hard texture tend to bother them. Congruently with the study by Shin and Gaines (2017), fabrics with a soft hand were preferred over fabrics with a rough texture. Some parents mentioned that they would often result to buying second-hand school uniforms due to its softer hand, which would ultimately ensure the least irritation (Figure 4.3). This was recommended by Biel and Peske (2009:161) as well.

"Our kids' school had changed the material that they used for the tracksuit. [The] older material was quite hard. And that also bothered her. So, in the end, you know, I would rummage through those boxes at the second-hand shop to try and find the material that was the least noisy and the softest…" **(P2:25).**

"They will come to me and say they are itching. So, you will see that the fabric rubs against them. And the harder the fabric that I use, the hotter the fabric is, the more irritation they get on their skin, then it would look like a carpet burn or a rash or whatever it is for this skin type" **(P7:46).**

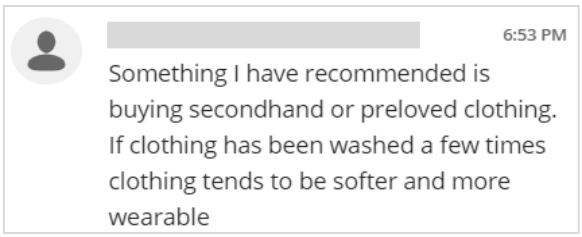


FIGURE 4.3: CHAT-LINE: P8 FOCUS GROUP 2

Although washing results in a softer hand, it came to the fore in both focus groups that washing in some cases can also increase irritation. It was specifically mentioned that the emergence of pilling of specific fabrics, especially in fleece tops- due to repeated washing and wearing of the garment can indeed cause irritation. This finding is congruent with the research presented by Biel and Peske (2009:161) which mentioned that especially clothing

made from polyester blends tend to pill and create an uncomfortable rough texture against a child's skin.

"...the pilling of the fleecy tops, seems to pose the biggest problems with the children that have difficulty with the school uniforms'' **(P4:46).**
"And the fibre content must be a high-quality soft content, something that won't pull apart or make little like … little fabric fibres. They want something that will have a clean cut, but it's also soft enough for the children to not feel it on the skin" **(P7:20).**

During the discussion of pilling's effect, one participant, an occupational therapist, described why pilling may cause irritation. She explained that pilling touches into the light touch receptors that immediately elicits a stress response due to its high sensitivity (Davies, 2021).

"But for kids who have that immediate reaction to the pilling of the fleece tops, the response is so strong. I think it's obviously because it touches into the light touch receptors. So, a lot of my kids go to an immediate stress response, which we cannot work through" **(P4:46).**

4.2.2 Construction properties

The two main aspects that came to the fore with regards to construction were seams (seam types and seam classes) and labelling. The focus group discussions surrounding these two clothing properties were highly comprehensive as participants felt that seams and labels played a significant role in the irritation their children experience from their school uniforms. The discussion surrounding the irritation of seams and labels surfaces regularly in literature, but, as mentioned previously, the concept is often only stated and not discussed.

4.2.2.1 Seams: Seam type and seam class

Research suggests that seams in clothing influences garment choice to a great extent (Kabel *et al.*, 2016; Kinnealey *et al.*, 1995) and presents itself as a significant irritant to children with tactile hypersensitivity (Dunn, 1999; Nederkoorn *et al.*, 2015; Roy *et al.*, 2018). Only a small number of studies indicate the specific seam type that causes the most irritation. Brown and Rice (2014:374) mention that bulkiness in seams causes a large amount of irritation during wear. As anticipated, during the focus group discussions a superimposed seam (see Chapter 2 Section 2.6.1.1 and Figure 2.3) was least favourable due to its prominent "flap'' and supposed bulkiness. The other problem presented by the superimposed seam, that if ironed incorrectly, the "flap'' would manoeuvre itself and fold over in some areas of the garment and lay flat in other areas of the garment. In areas where the flap folded over, it would result in different fabric layers touching the skin causing children to experience immense irritation. On the other hand, with the help of the swatches

provided, participants indicated that the flat felled seam (see Chapter 2 Section 2.6.1.2 and Figure 2.4) deemed to be a superior option as it did not include a "flap" and would lie flush with the skin.

***"59* [flat felled seam] *would be the best seam and 60* [superimposed seam] *would be the worst of them... that is very, it's very harsh"* (P2:155).**

***"I think the seams that have the flap, it can be really influenced by the cleaning method that you use. So, if you don't iron your shirt, or what have you, that could influence how that flap lies. And that can also cause irritation. And sometimes it might not be on correctly and it might be ironed with like a bit of a kink in it"* (P8:76).**

[Referring to seams in socks] *"We literally cut off the toes. So, she went to school in winter with toes sticking out of her stockings in her shoes, because she couldn't bear those seams"* (P2:25).

***"We often wear the socks inside out so that the seam that goes along the toes is on the outside instead of [the foot], [instead of] on the inside. It's a little bit less irritating"* (P8:34.)**

***"My son is very sensitive to clothing and clothing that scratches. So, he doesn't like seams at all. I think number 59* [flat felled seam] *is a good seam. I don't think that will bother him because it's not open or scratchy feeling. He genuinely doesn't like clothing at all. So, if I'm… if you look at number 60* [superimposed seam] *I would have to make sure that the overlocking is to one side (by ironing it) and make sure it stays like that"* (P10:82).**

Participants also discussed the fact that parts of the human body - specifically the feet, inside of the legs, sides of the abdomen, waist, arms, and neck tend to be more sensitive than others and, coincidentally, seams often lie on these highly sensitive areas (Figure 4.4). Children often experience great irritation from seams due to seams chafing on the body (Roy *et al.*, 2018). Some findings were congruent with the research done by Biel and Peske (2009:164) and Saint-Martory *et al.* (2008). Their findings indicated that the feet, neck, and torso (including the abdomen and waist) were amongst the most sensitive parts of the body.

***"… kids struggle with the seams on the sides of the body and the abdomen and then also the arms. Especially the forearm"* (P9:97).**

***"Where the seams usually are, are in* [at] *the most sensitive parts of the body. So, on the inside of the arms, the armpits, the inside of the legs, for example, the stockings, and those are the parts of the body that don't get that much exposure to tactile input"* (P5:161).**

***"So, I do think there are specific areas that are where they tolerated less than other areas. So, I would say feet, neck, waist"* (P2:155).**

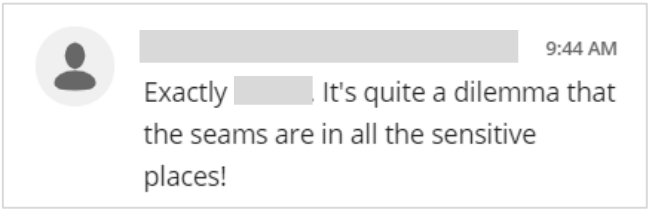


FIGURE 4.4: CHAT-LINE: P2 FOCUS GROUP 1

4.2.2.2 Labelling

It was expected that labelling would identify as one of the biggest culprits in causing irritation in school uniforms as presented by various researchers (Cheng & Boggett-Carsjens, 2005; Nederkoorn *et al.*, 2015; Roy *et al.*, 2018). Through the data analysis, it was evident that two aspects play an important role in the degree of irritation caused by the label. The first aspect is the specific *type* of label. Woven labels were regarded as most irritating. Participants expressed that woven labels were often manufactured from very rough, hard fabrics which caused itchiness. Other parents and occupational therapists mentioned that heat-transferred labels are the best alternative (Figure 4.5).

***"The label in the neck. So immediately when I put a shirt on him and there's a label in the neck and I forgot to cut it off immediately, his whole body would like scrunch up and its's like it's affecting his neck in a way. Then he would like, he won't be able to handle it. It's as if it's off-putting. Then I cut it off, and after a while he still tells me his neck has this tingling feeling after a while. We never have to cut the labels of the pants. That doesn't bother him, but any labels by his neck, that is the worst for him. He doesn't want that feeling by his neck, because he immediately he, he scrunches up and he pulls his head back. And he just he freaks out. He doesn't like it at all"* (P1:189).**

"***...a label printed into a soft, shiny fabric…Those are less irritating for the children I work with than a flapping label in the neck that's embroidered and it's all the threads and all the different textures on one label at once… "The [labels] that are embroidered…Those are the most irritating for the kids I work with." (P7:173).***

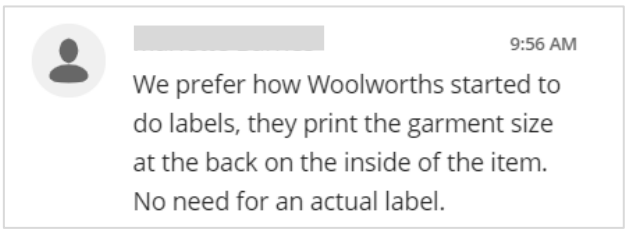


FIGURE 4.5: CHAT-LINE: P3 FOCUS GROUP 1

Secondly, the specific *placement* of the label in the garment was also mentioned in both focus groups. Labels at the back of the neck were repeatedly mentioned as intolerable.

[Referring to tags in the neck area] "…especially with the tag [in the neck] and the seams of collars. If a child has a retained spinal reflex, it can sometimes elicit that spinal reflex when the movement of the clothing goes over [this] region of the back [and neck]…" **(P10:114).**

The "Spinal Galant Reflex" assists with the development of the sensory processing system, as well as balance and coordination specifically in newborn babies. In the event that this reflex does not integrate into mature responses and movement (as typically happens in children), the child's functioning may be negatively affected (Carter, 2020). When the child experiences tactile stimulation from seams, tags and collars in their neck, the unintegrated Spinal Galant Reflex may elicit a specific response, in this case, hypersensitivity to the tactile input in the neck and back.

"...the labels at the back of his shirt are very itchy. He says it bothers him a lot" **(P1:17).**

"…but you know that sometimes you have this tag also attached to your collar that scratches them, and they always pull at it" **(P7:8).**

Some parents would simply cut the label out of the garment, but unfortunately, a piece of fabric would still remain. This would often cause even more irritation than the full label being present. It came to the fore that the best option to deal with sewn-in labels is to physically unpick the entire label as opposed to merely cutting it off.

"[Some retailers] tend to have quite lengthy labels... The idea is for you to cut them off. But if you cut them off, then there's actually a little bit left because you can't cut it right off in the seam. Because then you make a hole in the garment. And that [small piece within the seam] can be quite irritating..." **(P8:167).**

"... [If not totally cut away] it's actually even worse than when the tag was on" **(P9:185).**

4.2.3 Design properties

Interesting findings related to the design properties of school uniforms were obtained. Some aspects, such as necklines and collars, were indicated as very troublesome and other aspects, such as closures, were regarded as less problematic from a sensory point of view.

4.2.3.1 Neckline and collars

It became apparent that winter school uniforms posed more challenges in comparison to summer uniforms. This could be due to the fact that winter uniforms are more formal, with children expected to wear, for example, collared shirts often with accompanying ties. Roy *et al.* (2018) mention that 47% of children with tactile hypersensitivity dislike wearing garments

with collars and, 53% of children experienced great discomfort from wearing stiff clothing. This is consistent with the findings from the focus group discussions since six out of ten participants indicated that a collar with a stand, which is characterised by its stiff appearance, caused a significant amount of discomfort for children. Fastening the top button created even more restriction and even more discomfort.

"It's the winter clothing because then it's layers, and the stiff collar as well. It actually feels like there's a carton in the actual collar. So, it's very uncomfortable" **(P3:37).**

"…they [are] expected to wear the white shirt with a stiff collar and tie. So as soon as one has to tie that top button, it becomes unbearable, and so we always ended up not tying the top button and trying to get the [tie] just kind of covering it'' **(P2:25).**

It became evident that the degree of sensory overreactivity influences the tolerability of a collar. Some participants indicated that their children could tolerate a collar if it is not close to the top, for instance, an open collar of a short-sleeve shirt. Other participants indicated that their children cannot tolerate a collar at all and that their children would rather wear regular round neck t-shirts without a collar.

"I don't buy the winter uniforms, the winter shirts, because the stiff collar is incredibly irritating, so I just let him wear the normal summer shirts'' **(P1:58).**

"I don't buy him winter shirts. Because he doesn't like the texture of the collar" **(P1:167).**

"55 [the shirt collar] would immediately elicit that meltdown in my daughter so the minute it starts being around her neck she would go…Oh, I hate this I hate this…and then it would just trigger this meltdown and it was really quite extreme" **(P2:170).**

"I had to speak to the school to change [his uniform] to a T-shirt in summer" **(P10:116).**

4.2.3.2 Sleeve and sleeve finishes

Long-sleeved garments also presented a variety of issues. Many participants mentioned the irritation caused by long-sleeved garments and the subsequent fabric layering when worn with a jacket. Wrist discomfort and irritation resulted from elastic wrist finishes as well as shirt cuffs. Findings related to the irritation caused by elastic wrist finishes and shirt cuffs were also presented by Biel and Peske (2009:160,184).

"The long sleeve shirt for winter has got a cuff on the end, which he absolutely hates" **(P10:110).**

"And she gets irritated with the feeling of the two different garments over each other" **(P8:58).**

"And then also the long sleeves with the layers tucked in with a jacket. It's just uncomfortable, [it is a] mess" **(P3:37).**

"The one little girl that we treat, she gets really irritated. So, their school uniform is either short or long sleeve white shirt with a tunic dress over the top. And she gets irritated with the feeling of the two different garments over each other. So, her mum has got special permission to increase the size of the armhole even though she's upsized the clothes a lot" **(P5:58).**

"So, what I've seen in class is that the students in my class from the mid on to the wrist gets annoyed by the stitching. And normally your stitching would be on the inside of your arm, on your radius bone side. So, they will pull it up until above the elbows, and then they will be fine. It won't irritate them. It's as if the skin on the inside of your arm is more sensitive than the skin on top of your arm with his hair for them because they, they get so irritated with the seams on the inside of their arms" **(P7:106).**

4.2.3.3 Waistline finishes

Similarly to long-sleeved garments, waistline finishes on school pants, shorts and skirts raised a significant amount of concern. Roy *et al.* (2018) mention that children with tactile defensiveness dislike the feeling of elasticised waistbands on trousers. Participants expressed similar feelings and conveyed that it was due to the elasticised waistbands' ruffled and subsequent bulky texture. A regular waistband, however, also did not seem fit as its overlapping nature resulted in layering. Other participants indicated that discomfort did not necessarily occur due to the design of the waistband but its position on the body.

"I don't think it's really the waistline [design], it's about where she wants it to be. Like she says -I don't like it over my belly. So, she wants it to below. And so that's always a challenge around the uniform" **(P2:183).**

"Something that I've done personally is to size up for my daughters… they don't like it **[waistband]** ***in their stomach or in the waist or such. So, they wear it on the hips. Because that's more comfortable for them" (P8:155).***

One of the participants who identified herself as an occupational therapist explained that it makes perfect sense since the abdomen is highly sensitive to touch. Brush protocols, which are popular in occupational therapy are for instance not applied to the child's stomach due to its high sensitivity.

"When we do the brushing protocol, for example, that's where you don't brush, you don't brush on the inside of the tummy or the inside of the legs, because that's the most sensitive part" **(P5:161).**

Similar to some of the other challenges, participants naturally started discussing ways in which they deal with the problems surrounding sensitivity around the waistline. Underwear is specifically used as a barrier between the garment and the child's skin, preventing the

garment from touching the child's body and as a result causing irritation. In addition, some participants explained that they would often purchase garments in bigger sizes, for the garment to fit around the child's hips instead of their abdomen.

"The school pants that my son wears, the elastic at the back… he says that that bothers quite a lot...I get him some soft underwear that is quite big, so that it can go over [the elastic of the waistband]. And then the elastic doesn't touch his back" **(P1:17).**

"…with regards to my son, we get softer and bigger underwear for him to wear, so the elastic won't lie against his back and touch his skin, because he hates the ruffle effect" **(P1:58).**

"I think that the winter uniform in this case is almost easier in terms of, you can dress clothes underneath that that the skin can tolerate. So, one of my therapy kiddies… she wears boys vests underneath a school shirt, and that makes that for her, I think it's also inside out. But then that makes wearing her school shirt and uniform more bearable" **(P5:72).**

4.2.3.4 Closures

Participants did not express any real concern with regards to closures. It was apparent that children were more irritated by the fact that they were unable to fasten buttons or zippers themselves rather than the closures causing discomfort against their skin. Similarly, Velcro on school shoes was preferred over laces due to laces' intricacy. These problems are not related to sensory overreactivity, but rather due to other difficulties related to each child's special needs.

"…[with] both of my kids, as well as while practicing as an OT, [I] have never really seen any difficulty with regards to tactile sensitivities when it comes to buttons or zips" **(P4:132).**

"I just want to say my son doesn't really mind any of this. He doesn't prefer Velcro, but if Velcro is on his clothes, he will bear it. But he doesn't mind any. He doesn't mind the buttons, the zippers, the hook on his pants, he doesn't mind that at all" **(P6:110).**

"She doesn't like buttons but it's not because of her sensory profile, it's more because of the fact that it's a challenge for her to actually do buttons- it takes longer than what it should" **(P2:121).**

4.2.3.5 Wearing ease

Participants indicated that some children preferred wearing looser garments which allowed more room to move, which resulted in parents purchasing up-sized school uniforms. Other children preferred their uniforms to be tight against their bodies. This is congruent with the research presented by Biel and Peske (2009:24,161). Lopez and Swinth (2008) explain that some children seek proprioceptive sensory input (i.e., tight clothing) to calm and organise

their sensory systems when they are overstimulated. Additionally, the proprioceptive input may help modulate their emotional state and decrease over responsiveness to touch (Spira & Kupietzky, 2005). On the other hand, some children may prefer looser garments so that tactile stimulation is avoided. If tactile stimulation is avoided, its influence on their overreactive tactile sensory system is reduced. Within this specific section, both the concepts of sensory overreactivity and sensory underreactivity is noted (Ayres & Tickle, 1980; Dunn, 2006).

"With regards to the tight clothing, I'm in a very big pickle with regards to his pants. Because he has to have his he wants everything to be tight, because he doesn't like the loose clothing" **(P1:180).**

"And then we buy bigger sizes to leave a bit more room for, you know, just moving the sleeves around, and tucking it in" **(P3:60).**

"'And then a lot of my kiddies prefer tighter clothing again, because I think the tighter the school shoe, the tighter the leggings or stockings, [it] almost gives them that proprioceptive feeling that counters the light touch'' **(P5:72).** ***"So, it's a deep pressure. Because it's a tight fitting so, it's a more longer deep pressure that's calming for the skin instead of a light pressure touch"*** **(P5:76).**

"It's very different with every child, for example, if they have some tactile kids that have a problem with very tight-fitting garments, and then, you know, it's irrelevant of the fabric and then other kids. If it's too loose, that's also a problem" **(P9:43).**

4.2.3.6 Decorative elements

As mentioned by Royeen (1985), embroidery on clothing is regarded as an irritant. An example of this may be decorative trimming on school uniforms. Many participants expressed that embroidery- usually present in the school crest on a school uniform, its specific backing, and its location (usually on the chest), cause immense discomfort (Figure 4.6). Hard and rough textures against the skin have been proven to cause irritation (Roy *et al.*, 2018; Shin & Gaines, 2017). Participants mentioned that in the case where the school crest was embroidered on the pocket of the garment, thereby preventing the embroidery from touching the skin, no irritation was present.

"I found with my son he had an embroidery on his shirt, and the inside they had that backing and it is itchy. That was a huge irritation, I had to put on a softer backing. Just so he could wear that" **(P6:204).**

"…the thick embroidery of the crest on the golf shirt. And it's backing, I agree with the previous person. It's very irritating. And it's very hard [against the skin] in that area where the actual logo [is embroidered]" **(P3:207).**

"[Our school] put the crest on the pocket and then sewed the pocket to the shirt. So that has definitely helped that the back of the embroidery [of the school crest] doesn't touch the skin" **(P2:210).**

"So, um, before I made my school jackets last month for the kids, I actually did a lot of research on how to make it less sensitive for them… So, what I asked the embroiders to do, we embroider it on a piece of fabric, then we cut out the school emblem and then we embroider it with one stitch… around the emblem onto the jacket. So, there's no fabric inside that scratches you or anything" **(P7:212).**

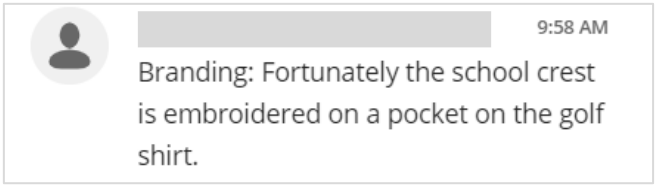


FIGURE 4.6: CHAT-LINE: P2 FOCUS GROUP 1

4.3 CONCLUSION

During the focus group discussions, revision of the transcriptions, the coding as well as the content analysis, it became clear which properties of a typical school uniform may manifest in sensory tactile overreactivity. As explained, these properties have been categorised into three main themes with sub-themes (Figure 4.7). Apart from the three main themes and sub-themes, it came to the fore that other variables of the uniform also have an influence such as the different garment options (e.g., a jacket versus a jersey) and whether the wearing of shoes is mandatory. This was also incorporated into the questionnaire (utilised in the quantitative phase) together with the properties of a school uniform as indicated in Figure 4.7.

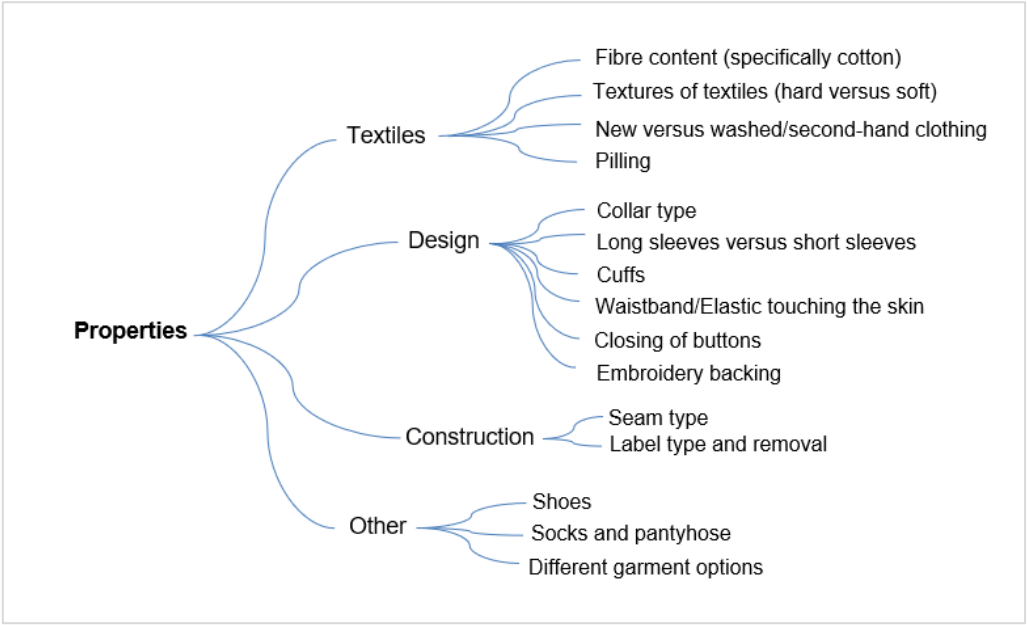


FIGURE 4.7: SCHOOL UNIFORM PROPERTIES INCORPORATED INTO QUESTIONNAIRE

CHAPTER 5

RESEARCH FINDINGS AND ANALYSIS: PHASE 2

5.1 INTRODUCTION

This chapter provides an overview of the results of the data obtained in phase 2, the quantitative phase, and includes demographic characteristics as well as descriptive statistics. In terms of the criteria for this phase of the research study, respondents had to have a child (i.e. parents) that has mild to serve overreactive responses towards light touch input (especially clothing). Furthermore, the child must wear a school uniform to school. Based on the screening criteria, 173 respondents started the questionnaire, only 113 respondents passed the screening questions and only 106 respondents completed the majority of the questionnaire (up to Question 9). Therefore, the final sample size is 106 parents of children with sensory overreacitivty.

It is to be noted that the sample size was determined by the inclusion criteria and the limited number of respondents available.

5.2 DEMOGRAPHIC CHARACTERISTICS

The questionnaire included three demographic questions based on age, gender and geographic location. Despite the data pertaining to the geographic location, the data obtained was not based on the actual respondents' demographics, but rather on the demographics of the children. Demographic data served as a useful tool in describing the sample as well as the characteristics of the population that formed part of this study. This also assisted the researcher in comparing the current research to prior literature (Babbie, 2016:132, 176). As mentioned in Chapter 3 Section 3.3.3.2, when a parent had two or more children with overreactive responses towards clothing, they were required to base their answers on the child who experienced the most severe sensory issues. The following section provides an overview of the demographic characteristics of the sample. It also

serves as an appropriate background for the results presented in the remainder of the chapter.

5.2.1 Age

Respondents completed this question based on the age of their child. Age was not a specified prerequisite for participation in the study and respondents indicated the children's age in an open-ended question by submitting the child's year of birth. A summary of the age distribution is presented in Figure 5.1 that presents a bar chart skewed to the right. The majority of the children were thus born between 2012-2015 (n = 66 /62.26%) i.e. between 6-9 years old. The findings suggest that sensory overreactivity is more prevalent in younger children rather than older children born before 2011 (n = 12/11.32%). This reiterates the findings by van Jaarsveld (2014) and Ayres *et al.* (2005) that stated that sensory overreactivity is indeed more problematic in typically developing children-specifically children of four to nine years of age.

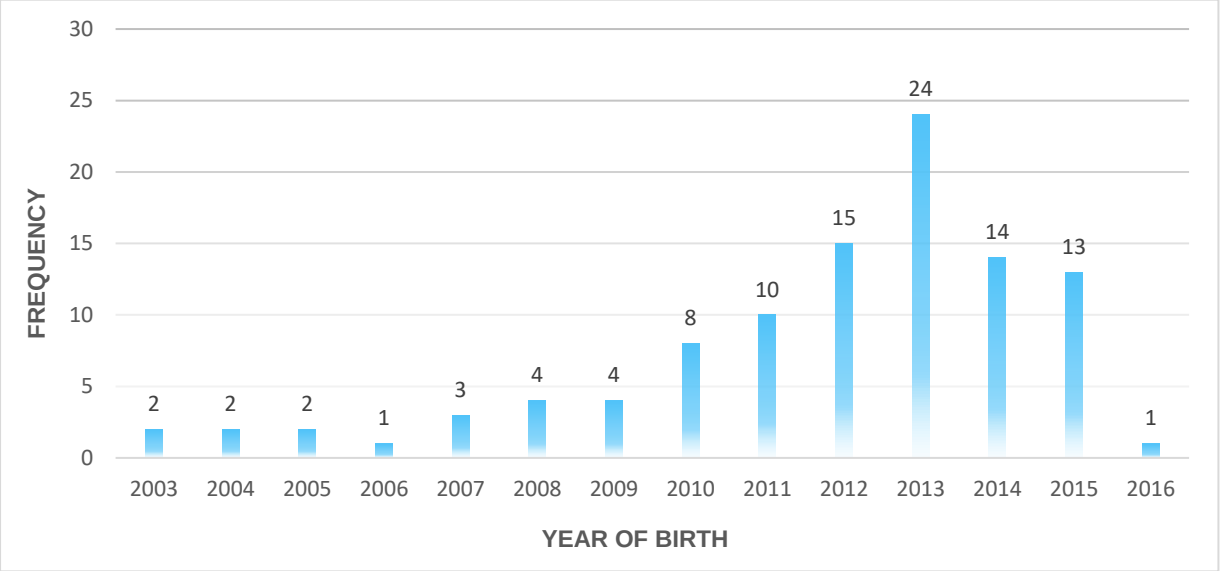


FIGURE 5.1: AGE DISTRIBUTION OF CHILDREN (N = 103; MISSING: n = 3)

Other sensory studies have indicated age distribution according to a three-year educational system or "years in education'' in the United Kingdom and Ghana respectively (Blakemore *et al.*, 2006; Opoku, Nketsia, Fianyi & Laryea, 2020). Due to the South African nature of the study, Figure 5.2 represents the age categories of children grouped according to the South African schooling system. The categories include the Foundation Phase (ages 5-9) (n = 67/65.04%) Intermediate Phase (ages 10-12) (n = 12/21.35%), Senior Phase (ages 13-15) (n = 8/7.76%), Further Education and Training (ages 16-18) (n = 6/5.82%) and totaled to a sample set of n = 103 (Department-of-Higher-Education-and-Training, 2021). This figure suggests that children in the Foundation Phase (n = 67) are more prone to experience

sensory overreactive responses as mentioned by van Jaarsveld (2014) and Ayres *et al.* (2005).

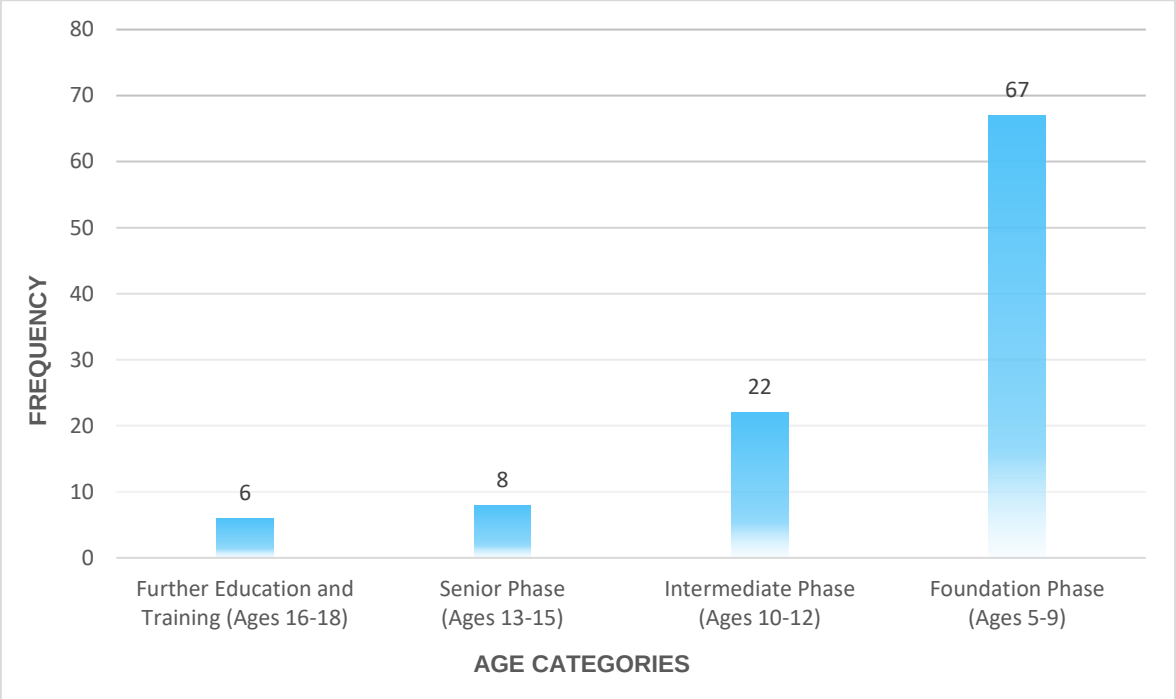


FIGURE 5.2: AGE CATEGORIES OF CHILDREN ACCORDING TO THE SOUTH AFRICAN SCHOOLING SYSTEM (N = 103; MISSING: n = 3)

5.2.2 Gender

The chart represented by Figure 5.3 reflects the number of female (n = 52/49.06%) and male (n = 54/50.9%) children as indicated by respondents. The researcher did not employ quota sampling to control population characteristics such as the age or gender of the children. Therefore, it was purely by chance that the proportion of the sample is similar to the proportion of the population.

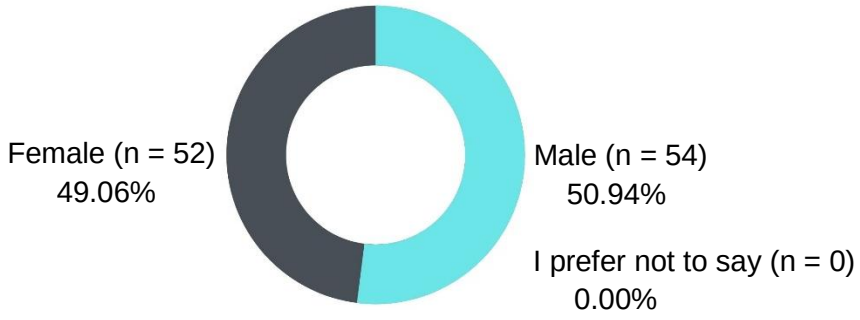


FIGURE 5.3: GENDER DISTRIBUTION (N = 106)

5.2.3 Geographic location

Respondents were recruited nationally across South Africa since an online questionnaire was employed. The questionnaire required respondents to indicate their geographic location through a multiple-choice question whereby they were presented with the option of choosing one of the nine provinces (Eastern Cape, Free State, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape, North West and Western Cape). This also served as a screening question to ensure that all the respondents reside in South Africa. As indicated in Figure 5.4, the majority of respondents resided in Gauteng (n = 54/50.94%) and the Western Cape (n = 21/19.81%) respectively. This could be partly attributed to the fact that the majority of SI certified occupational therapists practice within these two provinces (SAISI, 2021). Electronic links to the questionnaire were distributed via Whatsapp, Facebook, and email to various occupational therapists within South Africa who had potential access to Sensory Integration certified OT's. These occupational therapists distributed it further to parents by means of snowball sampling.

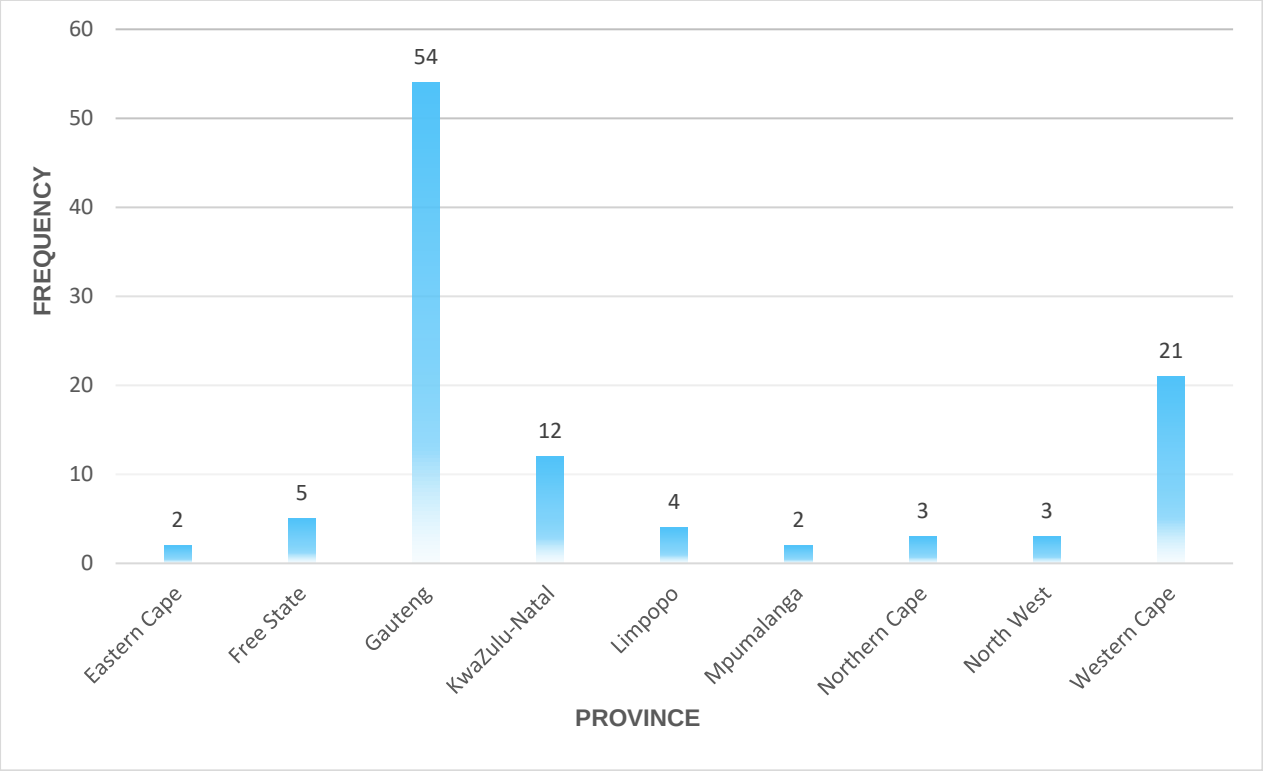


FIGURE 5.4: GEOGRAPHIC LOCATION DISTRIBUTION (N = 106)

In summary, the demographic profile of the sample consists of children mainly between five and nine years of age (n = 67), being equally male and female (n = 106) and residing in Gauteng (n = 54). Non-probability sampling and snowball sampling allowed for an estimated profile of characteristics of this rare population (Malhotra *et al.*, 2017:424).

5.3 RESULTS

In the following section, the results are discussed in accordance with the format of the research study. Therefore, the interpretation will not necessarily follow the chronological order of the questionnaire but rather the objectives as discussed in Chapter 1, Section 1.4.2. The findings of the open-ended question (Question 16) will be discussed with the related topic. The questionnaire included introductory questions leading up to the main objectives of the study. Therefore, the introduction questions' discussion occurs first.

5.3.1 Introductory questions

To place the study in context, respondents were required to answer questions that required minimal effort as recommended by Malhotra *et al.* (2017:384). The initial question asked parents to indicate their experience of the severity of their child's sensory issues on a continuous rating scale by using a slider (see Question 8 in the questionnaire in Addendum) on a scale of ''1'' (not severe) to ''5'' (extremely severe). As presented in Table 5.1 below, 24.53% (n = 26) of respondents placed the slider at the halfway mark. These respondents probably experience their child's sensory issues as severe but manageable. In addition, most parents rated their child's sensory issues a ''4'' on the scale (n = 42/39.62%), and a quarter of the respondents (n = 27/25.47%) indicated a ''5'' on the scale which refers to "extremely severe". The remainder of respondents indicated their child's sensory issues were not as severe. van Jaarsveld (2014) mentions that sensory issues are more extreme in children between the ages of five and nine years old. The majority of respondents' children were categorised into the foundation phase age group, and therefore, this could be a potential reason why the majority of answers were concentrated around scale items "4" and "5".

TABLE 5.1: INDICATE THE LEVEL OF SEVERITY OF YOUR CHILD'S SENSORY ISSUES (N = 106)

Scale	Answer	%	Frequency	Mean	Standard deviation
Not severe	**1**	0.94	1	3.79	0.96
	2	9.43	10		
	3	24.53	26		
	4	39.62	42		
Extremely severe	**5**	25.47	27		

Prior research indicated that children with sensory overreactivity often become distressed by the feeling of new clothes, socks, shoes, textures of certain textiles and wearing long-sleeved garments (Cheng & Boggett-Carsjens, 2005; Christopher, 2019; Kyriacou *et al.*, 2021). It was important to determine whether the respondents' children indeed struggled with

sensory overreactivity, specifically related to touch. In Question 9 the respondents indicated how frequently their child becomes distressed by the aforementioned occurrences (Table 5.2). When looking at the combined data of “often” and “very often”, it was evident that specific fabric textures (n = 81/76.42%) most frequently causes distress, followed by new clothes (n 79/74.53%) and socks (n = 75/70.76%). Although less frequent yet still noteworthy was the feeling of shoes (n = 66/62.26%) and long-sleeved garments (n = 59/55.66%).

TABLE 5.2: INDICATE HOW FREQUENTLY YOUR CHILD BECOMES DISTRESSED BY THE FOLLOWING (N = 106)

Question	Never		Rarely		Sometimes		Often		Very often		Mean	Standard deviation
	%	n	%	N	%	n	%	n	%	N		
The feeling of new clothes	0.94	1	1.89	2	22.64	24	45.28	48	29.25	31	4.00	0.82
Wearing of socks	4.72	5	7.55	8	16.98	18	37.74	40	33.02	35	3.87	1.10
Wearing of shoes	4.72	5	5.66	6	27.36	29	31.13	33	31.13	33	3.78	1.09
Textures of certain textiles	0.00	0	2.83	3	20.75	22	34.91	37	41.51	44	4.15	0.84
Long sleeve garments	0.00	0	16.0	17	28.30	30	27.36	29	28.30	30	3.68	1.05

It is important to remember that this study primarily focused on the properties of clothing from a textile and consumer science field, and not necessarily occupational therapy viewpoint, therefore, the results of the following questions were not be explored in depth. Finally, the questionnaire asked respondents to think about their child’s emotional state while putting on and wearing their school uniform. With this question, the researcher was able to gather the extent to which school uniforms really affect the child’s emotional well-being and quality of life. Employing a 5-point scale ranging from “never” to “very often”, the first question asked whether a school uniform causes irritation and unhappiness in the morning while getting ready for school. Widely, the response was “often” (n = 37/35.92%) and “very often” (n = 35/33.98%). Whether a school uniform encouraged meltdowns in the morning before school, similarly, 31.07% (n = 32) and 27.18% (n = 28) indicated that it occurs “often” and “very often”, respectively. In addition, the school uniform only contributes to meltdowns at school itself, “rarely” (n = 29/28.16%) and “sometimes” (n = 25/24.27%). As expected, most respondents (n = 81/78.64%) indicated that school uniforms affect their child’s concentration at school. 34.95% (n = 36) Stated that it influences their concentration levels “often”, 25.24% (n = 26) indicated that it does affect concentration “sometimes”, and finally, 18.45% (n = 19) indicated it influences their child “very often”. Table 5.3 highlights the results.

TABLE 5.3: INDICATE HOW FREQUENTLY YOUR CHILD BECOMES DISTRESSED BY THE FOLLOWING SCENARIOUS (N = 103; MISSING: n = 3)

Question	Never		Rarely		Sometimes		Often		Very Often		Mean	Std Deviation
	%	n	%	n	%	n	%	n	%	N		
The school uniform causes irritation and unhappiness in the morning while getting ready for school.	0.00	0	5.83	6	24.27	25	35.92	37	33.98	35	3.98	0.90
The school uniform causes meltdowns in the morning while getting ready for school.	4.85	5	12.62	13	24.27	25	31.07	32	27.18	28	3.63	1.15
The school uniform influences my child's ability to concentrate on his school work.	2.91	3	18.45	19	25.24	26	34.95	36	18.45	19	3.48	1.08
The school uniform contributes to meltdowns at school.	20.39	21	28.16	29	24.27	25	18.45	19	8.74	9	2.67	1.23

5.4 TEXTILES

Objective 1.1 aimed to understand the influence of textile properties on children who experience sensory overreactive responses. As fully explained in Chapter 1, Section 1.1, the textile properties of garments include various components though only fibre content and fabrication of school uniforms came to the fore in phase 1 and subsequently formed part of phase 2.

Question 11, related to the fabrication and fibre contents of garments, required respondents to indicate their level of agreement to a variety of statements (Table 5.4). The response options for this question included “strongly disagree”, “disagree”, “neutral”, “agree” and “strongly agree”. The first statement asked respondents whether the fibre content of the fabric used to manufacture school clothing had a direct influence on the level of irritation the child experiences from the garment. The majority of respondents not only “agreed” (n = 47/46.08%) but “strongly agreed” (n = 36/35.29%) that fibre content does indeed have a direct influence on garment irritation, as previously mentioned by Shin *et al.* (2015). The minority of respondents “disagreed” with this statement (n = 7/6.60%) and, only 11.32% (n = 12) answered neutrally to this question. These results are also supported by the mean and standard deviation measures. The mean, which represents the central tendency of the 5-point scale items (Malhotra *et al.*, 2017:562), equals to $\bar{x}$ = 4.06. The figure indicates that most of the responses were distributed around the 4th scale option, in other words, “agree”'. The standard deviation (s) indicates the dispersion of measures around the mean. The

smaller the standard deviation, the more concentrated the responses, opposed to a larger standard deviation where the responses are more scattered (Babbie, 2016:425). As revealed by Table 5.4, s = 0.97, which indicates the responses were clustered around the mean value ($\overline{x}$ = 4.06), in other words, the majority of respondents chose the "agree" option.

TABLE 5.4: LEVEL OF AGREEMENT TO THE FABRICATION AND FIBRE CONTENT OF GARMENTS (N = 102; MISSING: n = 3)

Question	Strongly disagree		Disagree		Neutral		Agree		Strongly Agree		Mean	Standard deviation
	%	N	%	n	%	N	%	n	%	n		
The fibre content of the fabric used has a direct influence on the level of irritation of the clothing item.	3.92	4	2.94	3	11.76	12	46.08	47	35.29	36	4.06	0.97
	6.86%; n = 7				**11.76%; n = 12**		**81.37%; n = 83**					
My child prefers clothing with a high cotton fibre content.	3.92	4	6.86	7	24.51	25	42.16	43	22.55	23	3.73	1.01
	10.78%; n = 11				**24.51%; n = 25**		**64.71%; n = 66**					
My child prefers a softer fabric opposed to a harder fabric.	1.96	2	1.96	2	2.94	3	35.29	36	57.84	59	4.45	0.81
	3.92%; n = 4				**2.94%; n = 3**		**93.13%; n = 95**					
If pilling (little balls of fluff) forms on the surface of clothing due to wearing and laundering, it causes irritation to my child.	3.92	4	13.73	14	32.35	33	28.43	29	21.57	22	3.50	1.09
	17.65%; n = 18				**32.35%, n = 33**		**50.00%; n = 51**					
If the fabric makes a sound during wear, my child gets irritated by it.	4.90	5	9.80	10	24.51	25	33.33	34	27.45	28	3.69	1.12
	14.70%; n = 15				**24.51%; n = 25**		**60.78%; n = 62**					

Previous research studies, although limited, have explored the fibre content of ready-to-wear (Uren & Okur, 2019) and therapeutic garments (Shin & Gaines, 2017). However, to the best of the researcher's knowledge, no current research identifies the specific fibre content that contributes to irritation in school uniforms. Therefore, based on the answers obtained during the focus group discussions whereby respondents discussed their preference of cotton fabrics over synthetic fabrics, the statement in Question 11 asked respondents to indicate whether their children preferred wearing garments with a high cotton content. As can be seen in Table 5.4, by combining the "strongly disagree" and "disagree" data and also the "agree" and "strongly agree" data, it was clear that the majority of respondents (n = 66/64.71%) agreed to this statement. However, just under a quarter of respondents (n = 25/24.51%) answered neutrally, which indicates no definite preference for cotton fabrics. The remainder of respondents disagreed (n = 11/10.78%) that their children preferred wearing garments with a high cotton content.

As illustrated by Table 5.4, 93.13% (n = 95) of the respondents indicated that their children prefer wearing a garment manufactured from a softer fabric as opposed to a harder fabric. Of the remaining 6.86% of respondents, only 2.94% (n = 3) indicated that their children had no actual preference, and only 3.92% (n = 4) disagreed with this statement. These findings are in line with the research presented by Shin and Gaines (2017) that identified that children preferred wearing garments with a soft hand as opposed to garments with a hard

hand (such as denim). During the focus group discussions in phase 1, many participants also mentioned their children's preference for soft materials-specifically soft tracksuit jackets, garments that have been washed and ultimately have a softer hand, and soft satin labels in clothing (Chapter 4, Section 4.2.1). The question related to secondhand school uniforms also addressed children's preference for softer garments. Table 5.10 in Section 5.3.3.2 demonstrates the findings of this question. Interestingly 18.81% (n = 19) and 9.90% (n = 10) buys secondhand garments not only "most of the time" but "always", however 16.83% (n = 17) of respondents purchase these garments sometimes. Lastly, less than 20% (19.80%/n = 20) and less than 35% (n = 35/34.65%) bought second garments "rarely" and "never". Although the results appeared to be mixed, the purpose of this question was not necessarily to tally the frequency of respondents who buy secondhand garments regularly. It was posed to determine the extent to which fabric texture and hand may influence children with sensory sensitivities. By gathering that more than 45% (n = 46/45.54%) of the individuals having to make adaptations to purchase clothes that have been worn previously to alleviate the rough texture of new uniforms is alarming. These results indicate that specific changes need to be made to the fabrication of children's school uniforms.

The open question (Question 16) presented in the questionnaire, asked parents to mention any other adaptations they made to alleviate the discomfort that child's school uniform causes. Previously, it was identified that some of the most sensitive parts of the human body include the feet, insides of the leg and abdomen, waist, arms and neck (See Section 2.2.2 and Table 2.1).This study did not necessarily focus on exploring shoes or socks as a topic of discussion, and purely focused on the actual prescribed uniform children are supposed to wear. A specific parent mentioned that their child longed for soft leather school shoes such as those from Froggie- a South African shoe retailer that specialises in manufacturing soft leather shoes for natural foot development (in kids) and comfort (Froggie, 2021). The specific responses are displayed in Figure 5.5. Crocs shoes also seemed to be a popular option amongst kids due to Crocs' flexible and comfortable nature (Crocs, 2021). One can assume that their children's feet are hypersensitive to hard footwear materials (used in average school shoes to increase its durability) and, therefore, only soft, flexible shoes alleviated their discomfort. In light of the topic related to the hypersensitivity of feet, other parents indicated that their children would wear their socks inside out with the seams on the outside (Figure 5.6), result in wearing seamless socks (which are often geographically difficult to obtain), or even wear pairs of seamless socks under their prescribed school uniform socks to alleviate the irritation from the seams (Figure 5.7). One particular parent mentioned that if socks' fabric weren't as thick their child would probably tolerate its overall feeling.

FIGURE 5.5: ANSWER (#1) TO QUESTION 16: OPEN-ENDED QUESTION

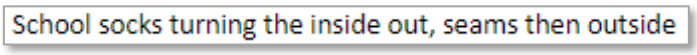


FIGURE 5.6: ANSWER (#4) TO QUESTION 16: OPEN-ENDED QUESTION

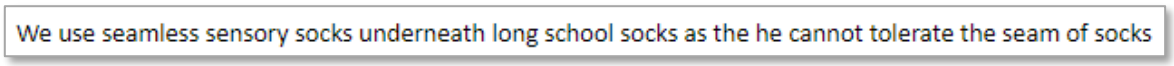


FIGURE 5.7: ANSWER (#17) TO QUESTION 16: OPEN-ENDED QUESTION

As mentioned before, it was assumed that many respondents would not be familiar with the technical terms associated with textiles and clothing. Therefore, the subsequent question included a definition of the term "pilling", ensuring all respondents understood what the question entailed. It was known from previous research that children with a low threshold to sensory input experience hypersensitivity to certain material textures (Christopher, 2019; Dunn, 1997; Roy *et al.*, 2018). However, to the best of the researcher's knowledge, no research specifically identifies pilling as a troublesome texture in clothing. Hence, the issues surrounding pilling only emerged during the focus group discussions and was subsequently included in the questionnaire. The questionnaire asked parents to identify whether pilling caused any form of irritation to their children. In conjunction to the focus group discussion, 50.00% (n = 51) of respondents agreed that pilling is an irritant factor however, 32.35% (n = 33) answered neutrally, and 17.65% (n = 18) disagreed to this statement (Table 5.4). It is possible that many have not come across pillings' occurrence in school uniforms, as the nature of the majority of fabrics used for school uniforms (identified in Table 2.2) are not prone to pilling as easily as some other fabrics used in ready-to-wear children's wear.

Shin *et al.* (2015) and Kyriacou *et al.* (2021) previously identified that the sound fabrics made did indeed influence sensory stimulation even if the garments' fabric did not seem visibly discomforting. It suggests that respondents experienced other forms of sensory stimulation such as auditory sensory stimulation whilst just looking at the material texture. Based on this finding, along with the information presented in the focus group discussions, the questionnaire asked respondents whether their children experienced irritation from the sound a garment's fabric made during use and wear (Table 5.4). A total of 60.78% of respondents (n = 62) agreed to this question, confirming the findings of both research studies. Just under a quarter of respondents (n = 25/24.51%) did not express any actual

concern towards the auditory stimulation their children may experience and, 14.70% (n = 15) disagreed with this statement. It may be possible that the 39.21% (n = 40) of respondents' whose children did not express concern to the statement, do not wear garments that make any definite sound and, therefore, do not experience any sensory overreactivity issues related to the sound.

Finally, the temperature of garments' textiles seemed to influence children with sensory issues and, some parents mentioned the use of a tumble drier, heater, hair drier or simply placing garments in the sun, to warm up the clothing prior to their children wearing it. One parent mentioned that the "drier" the clothing, the better comfort their child experienced, however, the majority of parents mentioned that their children just prefer clothing that is slightly warmed-up.

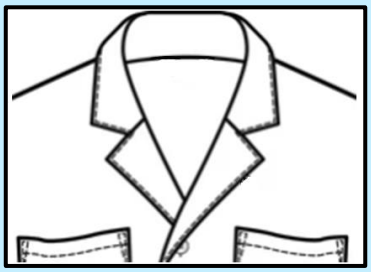
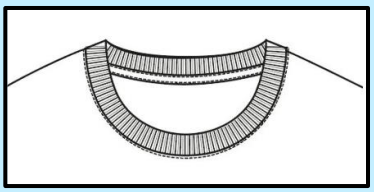
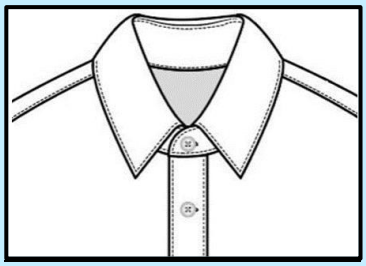
5.5 DESIGN

The design properties of clothing is a considerable determining factor of irritability that children with sensory overreactivity may experience (Spies & van Rensburg, 2012). Therefore, as identified in Chapter 3, Table 3.4, Objective 1.2 aimed to understand which design properties specifically irritate and cause discomfort for the wearer. The design properties of school uniforms under study included necklines and collars, sleeve and sleeve finishes, waistline finishes, closures, wearing ease, and decorative elements.

5.5.1 Necklines and collars

The first multiple-choice question related to the design properties of uniforms was based on collar preference. Respondents were given three options of collars accompanied by a picture of each for explanation purposes, depicting a shirt collar, crew neck, and collar with a stand (Table 5.5). These three collars are most popular on school uniform garments based on the findings of phase 1. Respondents were asked to indicate which collar they thought would irritate their child the most. As seen in Table 5.5, more than three-quarters of respondents (n = 82/81.19%) indicated that a collar with a stand is the most problematic as opposed to a shirt collar which causes minimal issues (n = 6/5.94%). The findings are clear since the collar with a stand is the tightest around the neck and most restrictive of the three options given. This data coincides with previous research. Roy *et al.* (2018) explain that some children are hypersensitive to any tactile sensation in their neck and will express discomfort, especially to clothing with a restrictive collar. The problem is that many South African schools prescribe a shirt with a standing collar often worn with a tie-specifically during winter.

TABLE 5.5: COLLAR PREFERENCE (N = 101; MISSING: n = 5)

Collar type			
	Shirt collar	Crew neck	Collar with a stand
%	5.94	12.87	81.19
n	6	13	82

Although ties are not discussed as a separate topic in the research study necessarily, it has surfaced that ties cause some form of discomfort when the shirt with a standing collar needs to be buttoned up all the way to the top. One respondent mentioned in the open-ended question that their child feels like he is being strangled by the collar and tie during wear. Similarly, others have indicated that their children would loosen their ties secretively to avoid discomfort, just to be scolded by school staff for looking unneat. One parent opted to remove the elastic from the school tie and added magnetic press studs to reduce the feeling of the tie around the child's neck. To alleviate the collars' feeling, other parents mentioned that their children would often wear a t-shirt underneath their uniform. Closures and more specifically buttons' discomfort are discussed in Section 5.5.6

5.5.2 Sleeve and sleeve finishes

In phase 2 of this study, garment elements related to sleeve and sleeve finishes only included the sleeve length (i.e., short versus long sleeves) and cuffs on long-sleeved garments, as these were the only issues that came to the fore during phase 1, the qualitative phase. The answering options for the questions related to sleeves and their finishes also included five options similar to prior questions in the questionnaire, ranging from "strongly disagree" to "strongly agree", as seen in Table 5.6. It was alleged that children with sensory overreactivity prefer wearing long-sleeved garments as opposed to short-sleeves due to the constant pressure a longer sleeve may create on a child's skin (Dunn *et al.*, 2002). This information, however, does not correspond to the data obtained in the current study as 79.20% (n = 80) of respondents indicated that their children actually prefer wearing short-sleeved garments and, only 8.91% (n = 9) agreed to prior research in their preference for long-sleeved clothing. Reebye and Stalker (2008) mention that some children prefer looser garments (i.e., short sleeves) as long-sleeved garments may contribute to clothing's restrictive nature. Haar (1998), on the other hand, mentioned that some children do long for

continuous tactile stimulation (known as ''garment-hugging'') which, could explain why some children prefer wearing only long-sleeved garments. Although these findings are related to wearing ease (Section 5.3.2.5), it does serve as an explanation as to why children could prefer specific sleeve lengths.

TABLE 5.6: QUESTIONS ON SLEEVES AND CUFFS (N = 101; MISSING: n = 5)

Question	Strongly disagree		Disagree		Neutral		Agree		Strongly agree		Mean	Standard deviation
	%	N	%	n	%	n	%	N	%	N		
My child prefers short sleeve clothing opposed to long sleeve clothing.	1.98	2	6.93	7	11.88	12	40.59	41	38.61	39	4.07	0.98
	8.91%; N = 9				11.88%; N = 12		79.20%; N = 80					
The cuff of the school shirt/ school jacket irritates my child.	2.97	3	4.95	5	17.82	18	42.57	43	31.618	32	3.95	0.98
	7.92%; N = 8				17.82%; N = 18		74.25%; N = 75					

Deduced from the open-ended question regarding at-home adaptations, many children still prefer wearing short-sleeved garments even during cold winter months when the weather permits long-sleeved garments. As can be seen in the responses of the open-ended question (Figure 5.8 and Figure 5.9), some children would rather "freeze" by wearing a summer dress and pull-over together with long socks, instead of wearing a long-sleeved shirt and having to tuck the garment into the waistband of the school trousers.

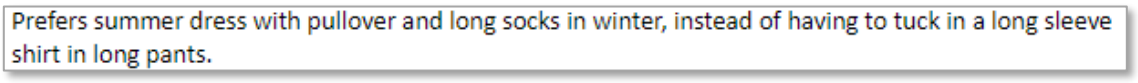


FIGURE 5.8: ANSWER (#19) TO QUESTION 16: OPEN-ENDED QUESTION

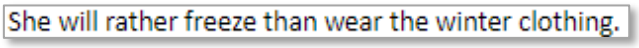


FIGURE 5.9: ANSWER (#53) TO QUESTION 16: OPEN-ENDED QUESTION

As previously mentioned in Chapter 2, Section 2.5.3, it was anticipated that long-sleeved shirts with buttoned cuffs could potentially hold some sensory issues as cuffs may also result in restriction of movement. Elasticised wrist finishes often found on tracksuit jackets also seemed to pose a variety of problems similar to the elasticised waistbands mentioned in Section 5.3.2.3, whereby children disliked the texture of the gathered fabric (elastic). As indicated in Table 5.6 above, almost 75% of respondents (n = 75/74.25%) agreed that any form of cuffs on long-sleeved garments irritated their children, 17.82% (n = 18) did not articulate any actual concern about cuffs and 7.92% (n = 8) disagreed that cuffs result in any form of irritation. Although the results do not present the exact explanation behind the irritation, the message regarding discomfort surrounding cuffs is quite clear, and, their effect on sensory overreacitivity is prominent. This data also coincides with the clothing properties

of the sensory-friendly ranges offered by American clothing lines MagnaReady® and Marks and Spencer's range named "Easy Dressing", which uses magnetic strip closures on cuffs, as well as stretch cuffs, which ultimately suggests that cuffs present sensory issues.

5.5.3 Waistline finishes

Research surrounding the irritation of the waistlines of garments were extremely limited. Roy *et al.* (2018) identified that elasticised waistlines held sensory issues and created great discomfort for the sensory-sensitive child due to their undesirable texture. Table 5.7 presents respondents' answers of engagement in various adaptations surrounding waistlines- these were mentioned during the focus group discussions. The possible answers for these adaptations included "never", "rarely", "sometimes'', "most of the time", and "always''. In line with the research presented by Roy *et al.* (2018), some respondents mentioned that the elastic's texture caused sensory issues, however, as indicated in Table 5.7, mixed results were obtained. The initial question asked respondents whether they turn the waistband/elastic over to refrain the waistband from touching their child's body to alleviate discomfort. The majority of respondents (n = 37/36.63%) stated that they sometimes turn the waistband over, followed by 20.79% (n = 21) who stated that they rarely engage in this adaptation. Still, 14.85% (n = 15) fold the waistband over "most of the time" and 10.89% (n = 11) "always" does it. Based on the results, in conclusion, a sample population of 62.37% (n = 63) employ this adaptation based on their answers of "sometimes", "most of the time" and "always". This can either indicate that waistlines do not necessarily present such a common issue or/and it can indicate that the parents have not thought of this specific adaptation regarding waistlines. In addition, it might be possible that other adaptations are used instead of these adaptations under question. It, therefore, does not undermine the serious issues that some children do still experience and the findings obtained remains valuable.

TABLE 5.7: ENGAGEMENT IN ADAPTATIONS RELATED TO WAISTLINES (N = 101; MISSING: n = 5)

Question	Never		Rarely		Sometimes		Most of the time		Always		Mean	Standard deviation
	%	n	%	N	%	n	%	n	%	N		
We have to turn the waistband/elastic over that it does not touch my child's body.	16.83	17	20.79	21	36.63	37	14.85	15	10.89	11	2.82	1.20
My child wears underwear that covers the skin specifically to prevent the waistband/elastic from touching his/her skin.	15.84	16	22.77	23	18.81	19	25.74	26	16.83	17	3.05	1.34
We have to buy pants/skirts in bigger sizes to avoid the positioning of the waistband/elastic around the naval (abdomen), but rather on the hips.	13.86	14	17.82	18	15.84	16	28.71	29	23.76	24	3.31	1.37

In alleviating the discomfort caused by the waistband of school trousers, shorts or skirts, some parents mentioned during phase 1, that they resulted in buying larger sized underwear which ultimately creates a barrier between the waistband of the school uniform and the child's skin. This "barrier" obviously assists in preventing the waistband/elastic from touching the child's skin, which relieves the discomfort caused by this design feature. As can be seen in Table 5.7, a total of 25.74% of the respondents (n = 26) indicated that they use this adaptation "most of the time". On the other hand, 22.77% (n = 23) revealed that they rarely buy bigger underwear to prevent the waistband from touching the child's skin and, 18.81% (n = 19) stated that they "sometimes" opt for this option. Similarly to the aforementioned adaptation, this "modification" did not present itself as a common adaptation and that parents regularly engage in it. Interestingly, one of the parents who also identified as an occupational therapist in one of the focus group discussions, mentioned that the sensory problems associated with waistbands do not necessarily stem from the properties of the waistband itself, but more from the waistbands' *position* on the child's body. Likewise, Bubonia *et al.* (2012:250) mentioned that a waistlines' most important purpose is to keep a garment in the correct position on the body. This does seem ironic as the initial fit of the garment should therefore already be in the correct comfortable position on the body, however, as clearly indicated by Table 5.7, respondents would buy bigger sized garments ''most of the time'' (n = 29/28.71%) to change the position of the garment from the naval to the hips. In fact, 23.76% (n = 24) stated that they ''always'' employ this adaptation. As seen in Figure 5.10, some high-waisted garments tend to be preferred as they do not irritate the naval area. The limited information surrounding this topic could be due to the fact that many parents are simply not aware of the irritation their children may experience from the *position* of the waistband. Parents may believe that the discomfort stems from the texture or "visual discomfort" (as referred to in Section 5.3.1) of the waistband, when in fact, the waistband surrounds an extremely sensitive area of the body and discomfort is from the actual *fit* and *position* on the child's body (Biel & Peske, 2009:164; Saint-Martory *et al.*, 2008).

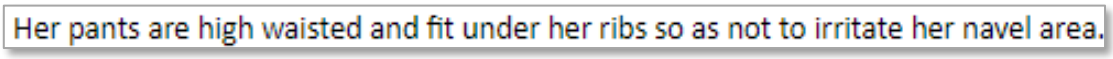


FIGURE 5.10: ANSWER (#30) TO QUESTION 16: OPEN-ENDED QUESTION

5.5.4 Closures

Prior studies related to closures in garments mentioned that elasticised pants specifically gave rise to sensory overstimulation (Roy *et al.*, 2018), as did buttons. Poonia (2020), Rodriguez (2020), Ahsan *et al.* (2018) and Suri (2016) even mentioned that buttons are usually the first to be replaced with Velcro when possible. As explained in Chapter 4, Section

4.2.3.4, no specific problems related to closures were elicited in phase 1. The questionnaire, therefore, only included one item related to closures. The findings are presented in Table 5.8 and, as assumed, the majority of respondents (n = 85/84.15%) ''agreed'' that their children refrain from buttoning up their school shirts all the way to the top. Only 7.92% (n = 8) chose the "neutral" option indicating no real concern towards buttoned-up garments, less than 3% 1(2.98%/n = 3) ''disagreed'' to this statement and less than 5.00% (n = 5/4.95%) ''strongly disagreed''. The results presented by the frequencies and percentages are supported by the mean value of $\overline{x}$ = 4.12 and standard deviation of 1.02 which indicates that responses were rather concentrated (Table 5.8). This is congruent with previous research that established that hypersensitivity of the neck area contributed to the irritation children experienced from buttoned-up garments (Roy *et al.*, 2018).

TABLE 5.8: BUTTONS (N = 101; MISSING: n = 5)

Question	Strongly disagree		Disagree		Neutral		Agree		Strongly Agree		Mean	Standard deviation
	%	N	%	n	%	n	%	n	%	n		
If a shirt (formal school shirt/ golf shirt) has buttons, my child prefers not to close the top button(s).	4.95	5	2.97	3	7.92	8	43.56	44	40.59	41	4.12	1.02
	7.92%; n = 8				**7.92%; n = 8**		**84.15%; n = 85**					

From the open-ended question in the questionnaire, it was even mentioned that the buttons (assumably the thread on the inside of the garment) irritate when touching the skin. As can be seen in Figure 5.11, one respondent mentioned that their child wears a vest underneath his uniform to prevent the buttons from touching his skin. Although many children indicated that wearing a shirt underneath their uniform alleviated sensory issues (Question 16), many did not indicate the *reason* for doing this. Many knew that a shirt would assist in increasing the comfort of the uniform and prevent the uniform from touching the child's body, but the *origin* of the irritation is not often mentioned. It can thus be assumed that many children resort to wearing other garments under their daily uniform as they dislike the hand of certain textiles and the feeling of the buttons on their bodies.

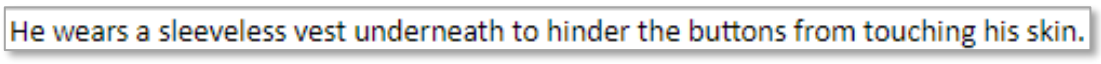


FIGURE 5.11: ANSWER (#42) TO QUESTION 16: OPEN-ENDED QUESTION

Furthermore, the open question revealed that some parents removed buttons from school uniforms and often replaced them with Velcro or other fastening mechanisms (Figure 5.12 and 5.13). These adaptations feature in prior research on therapeutic garments, as it has been revealed that buttons and zippers would often be replaced with magnetic buttons or magnetic strip-closures (Amazon.com, 2020; Marks-&-Spencer, 2020).

FIGURE 5.12: ANSWER (#51) TO QUESTION 16: OPEN-ENDED QUESTION

FIGURE 5.13: ANSWER (#48) TO QUESTION 16: OPEN-ENDED QUESTION

5.5.5 Wearing Ease

Wearing ease relates to the tightness and looseness of garments and, as previously established, some children do prefer tight clothing and choose to wear tight underwear underneath their clothes (Haar, 1998). Others cannot stand the feeling of tight clothes on their body (Biel & Peske, 2009). Interestingly, most respondents indicated that their children would wear oversized and very loose clothing rather than slim-fitting garments. In the open-ended question, one respondent described the opposite of loose garments as “restrictive” garments - which is also mentioned by Kyriacou *et al.* (2021), whereas another explained that her child often wears his older brothers’ clothes as these garments are bigger and more comfortable (Figure 5.14 and Figure 5.15). Typical of school sportswear and tracksuits, these garments are generally more comfortable and have a slightly baggier fit than the average school uniform. Likewise, many respondents indicated that their children had special exceptions to wear sportswear or tracksuits on more days of the week than stipulated. It could be assumed that their preference for “sportswear” over the usual school uniforms is indeed due to its comfortable and looser fit.

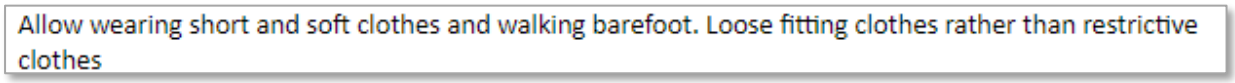


FIGURE 5.14: ANSWER (#49) TO QUESTION 16: OPEN-ENDED QUESTION

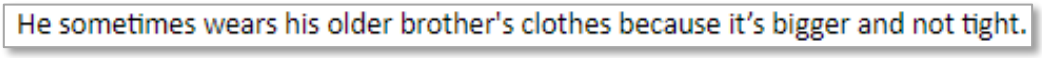
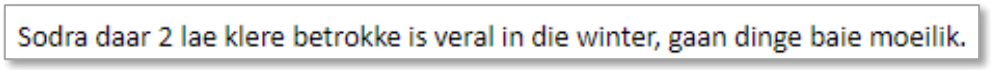


FIGURE 5.15: ANSWER (#59) TO QUESTION 16: OPEN-ENDED QUESTION

Another aspect that affects the tightness or looseness of garments against the body is layering. The layering of garments also presented various issues and mainly featured where formal shirts had to be tucked into the waistband of the pants, creating at least two layers of fabric on top of each other, touching the child’s skin. In this case, parents would resort to shortening the school shirt so that it cannot be tucked in and subsequently prevent irritation presented by “layering”. Although the exact cause behind this irritation is not fully known,

one parent mentioned that their child disliked the “in-between” feeling and slight movement of the garments over one another. Figure 5.16 presents one respondents’ response regarding her child’s outlook on “layering’’. The English-translated version is presented below.



“Once there are two layers of clothing involved, especially during winter, things are very difficult.”

FIGURE 5.16: ANSWER (#56) TO QUESTION 16: OPEN-ENDED QUESTION

5.5.6 Decorative elements

Trimmings in the form of embroidery is one of the only decorative elements that appear in school uniforms. Although it features mostly in the school crest, many participants have expressed sensory issues associated with embroidery during phase 1. It was predicted that embroidery’s irritation is due to the stabilizer on the inside of the garment as well as the various layers of bobbin thread used to create a specific embroidered logo. This was confirmed by the results presented in Table 5.9. Apart from 3.96% (n = 4) of respondents who ‘’disagreed’’ and 9.90% (n = 10) that answered ‘’neutrally’’ to the question when asked whether the backing (stabilizer) of embroidery causes irritation to their child, more than 85% (n = 87/86.14%) of respondents agreed that this served as a definite irritation. This indicates the large problem and irritation associated with embroidery on school uniforms. Some parents mentioned that they would sew a soft piece of fabric over the stabilizer and bobbin thread to prevent it from scratching the body. When possible, parents would purchase the iron-on badge rather than the embroidered badge as the iron-on badge did not provide any discomfort (Figure 5.17 and Figure 5.18).

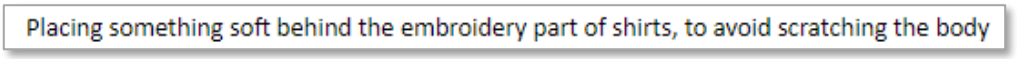


FIGURE 5.17: ANSWER (#2) TO QUESTION 16: OPEN-ENDED QUESTION

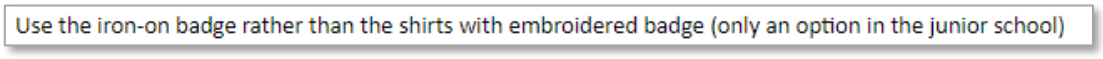


FIGURE 5.18: ANSWER (#8) TO QUESTION 16: OPEN-ENDED QUESTION

TABLE 5.9: EMBROIDERY (N = 101; MISSING: n = 5)

Question	Strongly disagree		Disagree		Neutral		Agree		Strongly Agree		Mean	Standard deviation
	%	n	%	N	%	n	%	n	%	N		
The backing of embroidery on a shirt causes irritation to my child (e.g., the embroidery of the school’s crest/name).	0.00	0	3.96	4	9.90	10	30.69	31	55.45	56	4.38	0.82

5.6 CONSTRUCTION

Objective 1.3 looked at the influence of different construction properties of garments on children with sensory issues, and as formerly mentioned, included the seam type, seam class and labelling of garments. Although it is widely recognised that seams and labels irritate, Roy et al. (2018) and Kyriacou et al. (2021) mentioned that these two elements are in fact the biggest contributors to discomfort in clothing. Extremely limited research identifies and describes the *specific* seam and label type that causes the most irritation (Biel & Peske, 2009).

5.6.1 Seam type and seam class

Initially, the research study explored three different seam types namely a superimposed seam (SSa), a lapped seam (LSa) and a flat seam (FSf) as mentioned in Chapter 2, Section 2.6.1. After the focus group discussions, it came to the fore that an overlocked superimposed seam actually caused associate problems and therefore, respondents were presented with a multiple-choice question accompanied by images of different seam types. Respondents were required to identify the seam type that causes the most irritation by selecting only one of the options, and as clearly presented by Figure 5.19, a superimposed overlocked seam caused the majority (n = 75/75%) of the irritation in garments. On the contrary, 25% (n = 25) of respondents indicated that a flat felled seam (which classifies as a lapped seam) caused the most irritation. Due to the limited research presented in the literature, the presumed reasons for the results are explained in conjunction with the answers provided by participants in phase 1 of the research study. Many participants identified that an overlocked seam consisted of a “flap” and not only does this extra piece of fabric irritate, but if ironed incorrectly, the fabric would be folded in some areas that create extra tactile stimulation. Additionally, these seams also tend to be quite bulky due to the various layers of thread used to create the actual overlocked seam.

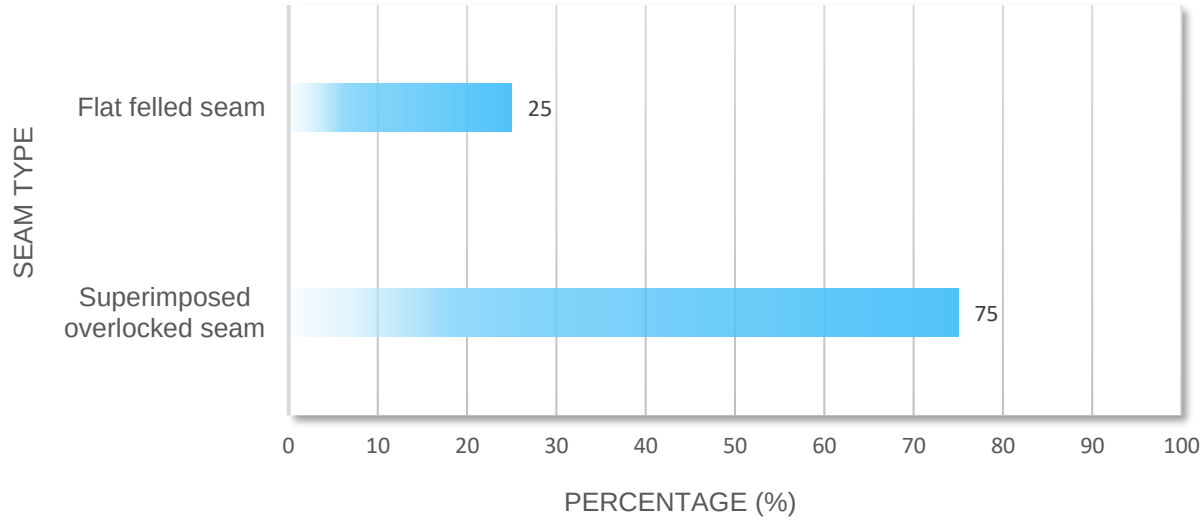


FIGURE 5.19: MOST IRRITANT SEAM TYPE

In the open-ended question, many respondents mentioned various adaptations they implemented to alleviate the irritation created by seams. It was indicated that some children would wear seamless garments underneath their school uniforms to avoid the seams from their school garments from touching their bodies (Figure 5.20). One parent mentioned creating fine stitches all along the seams of the school dress to flatten the seams (Figure 5.21), while another created small sections of fleece-like fabric and stitched it all along the inner seams of the garment covering the inner seams (Figure 5.22), Although the problems associated with seams in socks were rather problematic, these adaptations are discussed at the beginning of the chapter.

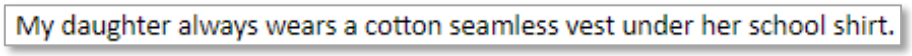


FIGURE 5.20: ANSWER (#32) TO QUESTION 16: OPEN-ENDED QUESTION

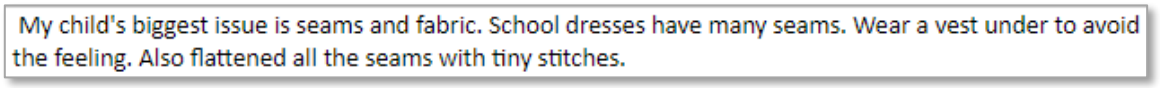


FIGURE 5.21: ANSWER (#53) TO QUESTION 16: OPEN-ENDED QUESTION

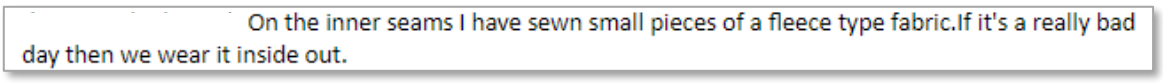


FIGURE 5.22: ANSWER (#33) TO QUESTION 16: OPEN-ENDED QUESTION

5.6.2 Labelling

At first, it was believed that all labels in garments tend to irritate children and encourage overreactive responses. After a thorough investigation, it was determined that two main

aspects played a role: the *fabrication* and *placement* of the label. To combat these issues, both parents and occupational therapists (in phase 1) mentioned a variety of adaptations they implement to reduce the effects of labels in clothing. These adaptations were narrowed down and presented in the questionnaire by once again requesting respondents to indicate how frequently (or not) they engaged in the adaptations presented in Table 5.10. Similarly to the aforementioned tables, this question included a 5-point rating scale with response options ranging from "Never"' to "Always''.

As can be gathered from Table 5.10, a high frequency of respondents indicated that they ''always" and "most of the time" cut out labels from garments (n = 82/81.18%). Furthermore, 12.87% (n = 13) indicated that they "sometimes" employ this adaptation which means that they *do* part-take in this adaptation in some way. Less than 6% (n = 6/5.94%) of respondents "rarely" or "never" have to remove labels. Therefore, with 94.05% (n = 95) of parents indicating that they *have* to cut out clothing labels in garments, the results are directly in line with the research presented by various researchers mentioning that labels are intolerable to some children with sensory overreactivity (Cheng & Boggett-Carsjens, 2005; Nederkoorn *et al.*, 2015; Roy *et al.*, 2018). The results are also supported by the mean value ($\overline{x} = 4.23$) and standard deviation ($s = 0.92$) revealed in Table 5.10.

TABLE 5.10: ADAPTATIONS RELATED TO LABELS (N = 101; MISSING: n = 5)

Question	Never		Rarely		Sometimes		Most of the time		Always		Mean	Standard deviation
	%	N	%	n	%	N	%	n	%	n		
Cut out clothing labels	0.99	1	4.95	5	12.87	13	32.67	33	48.51	49	4.23	0.92
Unpick (completely remove) clothing labels	10.89	11	8.91	9	25.74	26	27.72	28	26.73	27	3.50	1.27
Buy second-hand school clothing, since it is often softer than new school clothing items	34.65	35	19.80	20	16.83	17	18.81	19	9.90	10	2.50	1.38

The second question in Table 5.10 referred to the hypersensitivity some children experience towards labels in the sense that parents did not only have to cut out the label from the garment but fully remove the label using an unpicker. During phase 1 of the research study, it was determined that when labels are only cut out from a garment, a piece of the fabric remains that more often than not causes *even greater* discomfort than the full label itself. It was, therefore, a crucial question to include within the questionnaire. Clearly, the majority of respondents indicated that they "sometimes", "most of the time" and ''always" (n = 81/80.19%) have to unpick labels from their children's school uniforms. Only 8.91% (n = 9) indicated that they rarely employ this adaptation, and 10.89% (n = 11) revealed that they "never'' have to unpick a label from their child's school uniform. Results from the questions in

the latter and the former, undoubtedly demonstrate the extent of irritation that labels may cause in clothing.

Another question related to labelling in garments asked participants to identify the type of label that generally causes the most discomfort and irritation to their children, and included three pictures of three different labels – a satin label, a woven label and a printed label. This question was presented in a multiple-choice format whereby participants had to select one option from the three given labels. Since prior research related to the topic is extremely limited, the researcher included the three most common label types in the questionnaire after thorough research of different school uniforms and their specific labels were done. As can be seen in Table 5.11, woven labels are the most irritant label (n = 79/79.80%), and the reason for this could be due to these labels' various parts (base label and additional flap size indicator label) as well as their visibly (and tactile) discomforting texture. Some respondents (n = 18/18.18%) indicated that a satin label may also cause issues. These issues could be attributed to the heat processes some manufacturers use to finish off the labels that ultimately melts the edges of the label, creating a hard and rough-textured edge-finish that scratches. A similar event can occur when one irons over a label. Lastly, 2% (n = 2) of parents indicated that a printed label would irritate their child the most (Table 5.11). It is, therefore, clear that a printed label causes the least irritation, and since labelling is mandatory in South Africa (International-Trade-Administration, 2020), suppliers should rather opt for this option.

TABLE 5.11: LABELS (n = 99; MISSING n = 7)

Label type			
	Satin label	**Woven label**	**Printed label**
%	**18.18**	**79.80**	**2.02**
N	**18**	**79**	**2**

5.7 CONCLUSION

This chapter encasulates the results of the quantitative data obtained in phase 2. The data is interpreted in accordance with the objectives discussed in Chapter 1 and external findings (such as the findings from the open-ended questions and introductory questions) are discussed in relation to their individual topics. The chapter to follow, Chapter 6, provides the conclusion of the study, as well as the recommendations and limitaton s for furture studies.

CHAPTER 6

CONCLUSION, RECOMMENDATIONS AND LIMITATIONS

6.1 INTRODUCTION

This chapter serves as a brief reflection of the overall study and commences with a summary of the findings in accordance to the objectives specified. The implications for the study as well as its theoretical contributions are identified and includes the limitations of the current study, in addition to recommendations for future studies. This chapter closes with concluding remarks of the study at hand.

6.2 SUMMARY OF THE FINDINGS

6.2.1 Objective 1.1: Textiles

Objective 1.1 addresses the influence of textile properties of school uniforms on children with sensory overreactivity. It was revealed that specific fabric textures and the feeling of new clothes seemed to pose as the biggest contributors to stress and enhancement of sensory overreactivity. Specific questions related to the textiles of school uniforms were presented to determine the issues, discomfort and irritation present in children's garments. One of the most dominant themes in the research results was the influence of fibre content as children had a definite preference for natural fabrics- specifically high cotton garments, as opposed to synthetic garments. A respondent reported that "just the look" of synthetic fabrics could set off an emotional reaction and that anything "more natural and less synthetic" is generally better.

Children's preferences towards textiles were based on two main factors-including the hand of textiles (hard vs. soft textures) and the noise fabrics made. When fabrics have a soft hand, children tend to regard these garments as comfortable, and thus, cotton was preferred due to its naturally soft texture. Other fabrics with hard and rough textures such as Dri-mac

are disliked. Although not related to tactile sensitivity, cotton fabrics also do not generally produce a sound when the fabric moves or rubs together due to its irregular surface contour and slight protruding fibre ends (unlike synthetics that have smooth contour) thus, eliminating the auditory discomfort usually presented by certain synthetic fabrics. Both the preference for soft garments as well as the dislike for noisy fabrics were mentioned by previous researchers. Additionally, many parents would purchase secondhand school uniforms from the school as these garments have a soft hand and are more comfortable. Other parents would wash their children's school uniforms profusely in light of trying to soften the fabric, however, due to profuse washing, pilling emerged which raised another concern. Pilling occurs when fabrics of different fibre combinations (e.g. cotton and polyester) experience abrasion resistance (Kadolph, 2013:37,39). Referring to cotton-polyester blends specifically, during use, wear and care, short pieces of cotton fibres break off and get entangled with the stronger polyester fibres, creating small balls of fibre on the surface of the fabric (Kadolph, 2013:37,39). Although the majority of school uniform garments are not prone to pilling, some garments do still pill which irritates approximately 50% (determined in phase 2) of children and can create an uncomfortable sensation as mentioned by Biel and Peske (2009:61) and Kadolph (2013:39).

Finally, the temperature of garments is another factor that seems to influence discomfort and contributes to irritation. Interestingly, various parents mentioned that their children preferred garments which were slightly heated-up which was implemented with the simple use of a tumble drier, heater, hair drier or placing garments in the sun.

6.2.2 Objective 1.2: Design

The findings expressed in the following section is based on the results obtained in line with objective 1.2 that explored the influence of different design properties of school uniforms. The aim was to distinguish which design factors specifically cause irritation during wear and which design features were preferred by children with sensory overreactivity. Considering the irritation and discomfort experienced from necklines and collars, it was established that collars of school uniforms can potentially cause irritation depending on the collar type. The results obtained from phase 2 indicated that a collar with a stand is the main culprit as suggested by more than 80% of respondents. It was determined that standing collars presented the most issues due to their restrictive and stiff nature and because the neck is highly sensitive. Standing collars are manufactured specifically in such a way to retain a specific shape, and therefore, contain fusible interlining that assists in supporting the stand of the collar (Bubonia *et al.*, 2012:134). Participants mentioned that the standing collar felt like it consisted of cardboard whereas, in actual fact, its stiffness and crispness is due to the

support of the interlining that can produce a hard textured collar. Furthermore, when the top button of the collar is fastened or when the child is expected to wear a tie, it becomes “unbearable”. The results from phase 2 revealed that almost 85% of children avoid buttoning their shirts all the way to the top as this enhanced the feeling of discomfort. The reason for this common irritant could be due to the fact that the neck is highly sensitive. It is for this exact reason why many children prefer wearing t-shirts underneath their uniform to refrain the collar from touching their skin, and why some children get special permission to wear crew-neck t-shirts to school, instead of shirts with a collar. It is said that the tie contributed to additional discomfort as it added to the feeling of restriction. Collars and necklines’ discomfort is widely mentioned in the literature (Roy *et al.*, 2018).

The results related to sleeves and sleeve finishes were deemed as interesting. Identified in phase 1, the dislike towards long-sleeved garments was prominent. It was mentioned that children experienced great discomfort from buttoned-up cuffs often found on long-sleeved shirts and elasticised wrist finishes on long-sleeved jackets. Phase 2 reiterated the findings in that almost 80% of children prefer wearing short-sleeved garments, even when the weather permits the wearing of long-sleeved, warmer garments. Reasons for short-sleeved garment preference could be related to the preference for looser, non-restrictive clothing as well as the avoidance of buttoned-up cuffs- which almost 75% of children dislike due to its associated discomfort. It was also determined that children dislike the feeling of any wrist finish’ texture. For the abovementioned reasons, many children prefer wearing their school tracksuit or sportswear to school instead of the formal uniform.

Discussions surrounding the waistline finishes of school uniforms pertained mainly to the type of waistband- specifically waistbands that include an elastic and their position on the human body. While it was recognised that elasticised waistbands irritate (Roy *et al.*, 2018), the root of irritation was unknown. Coincidentally, during the focus group discussion, it was indicated that irritation originated from the elasticised waistbands’ ruffled and bulky texture. Phase 2 revealed that more than 60% of children turn the elasticised waistband over to avoid the texture from touching their skin. Some parents revealed that they purchase bigger sized soft underwear that creates a “barrier” between the waistband and the child’s skin, which ultimately prevents the elasticised waistband from touching the child’s body. Finally, it was also determined that for some children, the discomfort was less due to the type of waist finish, but rather the position of the garment on the child’s body. Parents would often buy bigger sized garments to change the position of the waistband for it to fit high waisted or on the child’s hips. This adaptation is often implemented to prevent the waistband from being positioned on the naval-which is regarded as a highly sensitive area.

Closures in the form of mainly buttons, zippers, and Velcro were explored and the only fastener that proved to be problematic from a sensory viewpoint is the button. Children experienced great discomfort when especially shirts, including a standing collar, had to be buttoned all the way to the top-as previously mentioned. Furthermore, the buttons (or threads used to attach the buttons) on the inside of the garment also contributed to sensory irritation. In alleviating the discomfort caused by buttons on shirts, some parents mentioned that their children would wear a cotton or sleeveless shirt underneath their school uniform to refrain the buttons from touching their bodies.

An additional point of discussion is the results of the wearing ease of school uniforms. Phase 1 presented mixed results pertaining to wearing ease as some participants mentioned their children prefer tight and form-fitting clothing, while others mentioned their children prefer loose garments which allows movement. Overall, it seems that looser garments are more desirable as opposed to restrictive clothing. This is congruent with the research by Kyriacou *et al.* (2021) and Roy *et al.* (2018). Many parents mentioned that their children preferred wearing their school tracksuit or sportswear kits as these outfits were more comfortable, less restrictive and had a looser fit. Furthermore, it was indicated that many children avoid wearing various layers of clothing over one another, and even avoid tucking in their school shirts, as they dislike the fabric layers tucked into the waistband of their school bottoms. It could be assumed that layering contributes to the actual tightness and restrictiveness of garments' fit. Additionally, by layering garments, one essentially wears a combination of different fibre types on top of one another. This could create an uncomfortable sensation as heat and moisture are unable to escape from the skin through the different fabric layers. One parent specifically mentioned that their child prefers wearing "drier" clothing as it was regarded as more comfortable.

Lastly, the results based on the views of decorative trimmings (i.e. embroidery) were anticipated and corresponded with prior research on this topic (Royeen, 1985). Phase 1 revealed that more than 85% of children experienced discomfort from the stabilizer (backing of embroidery) and bobbin thread used to construct the embroidered school crest, which is generally positioned on the chest. This was identified as one of the most common issues presented throughout the study. Various adaptations were made including, applying the iron-on school badge instead of the embroidered badge (where possible) and attaching a soft piece of fabric on the inside of the garment to prevent the stabiliser and thread from scratching the child's body.

Overall, it was determined that winter uniforms had more associated challenges than summer uniforms as children were expected to wear garments that contributed to sensory

overreactivity during colder weather conditions. The prescribed winter uniformgenerally includes a tucked-in long-sleeved shirt with a standing collar and tie (in some cases), long trousers and several other layers of clothing such as a jersey and blazer.

6.2.3 Objective 1.3: Construction

Objective 1.3 looked at the influence of different construction properties of school uniforms and how these characteristics may influence children with sensory overreactivity. Two main construction properties were explored which included seam types and seam classes, as well as labelling. Phase 1 identified that an overlocked superimposed seam was deemed as the least favourable and phase 2 determined that 75% of respondents agreed to this finding in that this seam type (which is one of the most widely used seam types in school clothing) caused the most irritation to their children. It can be assumed that overlocked seams irritate as they are characterised as the bulkiest seam type, and due to the fact that superimposed seams often include an additional "flap" which might increase tactile stimulation. The adaptations mentioned in the open-ended question included wearing seamless garments underneath the school uniform to avoid *any* seams from touching the child's body. Furthermore, parents would create fine stitches all along the seams on the inside of the garment in order to flatten the seams and decrease the overall bulkiness. Lastly, sewing an additional fleece-like fabric over the seams on the inside of the garment also tend to alleviate the irritation from seams.

Labelling in school uniforms presented to be largely problematic as the fabrication of the label as well as its placement highly influenced sensory overreactivity. Additionally, a woven label type caused the most sensory issues as indicated by almost 80% of respondents. Furthermore, nearly 95% of respondents indicated that they have to cutout labels from garments to alleviate the irritation, and more than 80% specified that they did not only cut-out the labels but had to fully remove the label by unpicking the label from the garment.

6.2.4 Objective 2

The final objective aimed to establish a guideline that indicates easy and affordable changes that can be made to a school uniform to alleviate the discomfort and irritation associated. The research findings and recommendations pertaining to this objective are presented in Table 6.1 and Table 6.2 and is aimed at parents, retailers and manufacturers of school clothing. Additionally, an infographic presenting creative, affordable and effortless approaches that can be taken towards school uniforms (to alleviate its tactile stimulation) was created and is presented in Figure 6.1. Throughout the data collection process, various

at-home adaptations were described by parents themselves to alleviate the discomfort and irritation their children experience from their school uniforms.

FIGURE 6.1: INFOGRAPHIC (Self-developed)

The results from both phases 1 and 2 were combined, along with additional findings presented by prior literature and are presented in Table 6.1. The information presented in Table 6.1 aims to assist parents with valuable adaptations which they can easily implement and have not necessarily thought of. Furthermore, it may assist parents to make the correct clothing choices for their children to alleviate irritation and decrease the effects of sensory overreactivity. This resource may also assist occupational therapists in their daily practice in providing advice to their clients and their parents. Lastly, the information may encourage schools to include "sensory-friendly" uniforms in their current school uniform range and assist with changes to the current uniform. Since the data was already analysed and explained in previous chapters, the tables below as well as the infographic, present a summary of the findings and are self-explanatory.

TABLE 6.1: ''AT-HOME'' ADAPTATIONS OF SCHOOL UNIFORMS

Discomfort from	Adaptation
Fibre content	Recreate design and style of garment but substitute the fabric for a more tolerable and comfortable textile. (i.e. Knit a school jersey from a different yarn.)
	Wear seamless garments underneath uniform.
Synthetic fabrics	Avoid garments made from synthetic fabrics and opt for high cotton garments if options in school uniform garments are presented.
Noisy fabrics	Avoid garments made from synthetic fabrics and opt for textiles from natural fibres if options in school uniform garments are presented.
Hard/rough textured fabrics	Wash garments several times.
	Purchase second-hand school uniforms.
	Avoid hard/rough textured fabrics and opt for soft textured fabrics if options in school uniform garments are presented.
Pilling	Remove pilling from fabric using a razor or "Bobble-off" device.
Temperature of fabrics	Heat-up clothing by tumble-drying.
	Heat-up clothing using an electric heated blanket.
	Heat-up clothing with a hair drier.
	Place garment in sun to heat it up.
Collars	Wear a t-shirt underneath a shirt with a collar to mask the collars' texture.
	Avoid standing collared shirts and opt for a shirt collared shirt (Chapter 3, Section 3.3.3).
	Avoid standing collared shirts (if possible) and wear a t-shirt.
	Avoid buttoning collars up all the way to the top.
Ties	Add a magnetic press stud to the back of the tie and clip to shirt.
Long-sleeved shirts	Wear shorts sleeved shirts if possible.
	Winter: If too cold, wear cotton long sleeve shirt underneath short sleeve school shirt.

Elasticised cuffs	Fold cuff over towards the outside of the sleeve.
	Remove the elastic from the cuff.
Buttoned-up cuffs	Avoid wearing long-sleeved shirts.
	In extremem cases, replace the button on the cuff with a magnetic press stud.
Waistline	Avoid tucking garments into the waistband and rather shorten the hem of the shirt so that it cannot be tucked in (and will not stick out underneath a jacket/jersey).
	Wear garments on the hips/high-waist instead of the naval.
	Purchase up-sized garments so that the waistband fits loosely.
	Turn the elasticised waistband over to avoid it from touching the skin.
	Wear upsized underwear to create a “barrier” between the waistband and skin.
Buttons	Avoid buttoning collars up all the way to the top.
	Replace with Velcro/ magnetic buttons (if possible).
	Wear garment underneath shirt to avoid shirt buttons and thread from touching the body
Tight-fittinggarments	Wear looser garments that allows for movement.
	Wear up-sized garments.
	Increase the armhole size on shirts.
	Wear school tracksuit or sportswear instead of formal uniform.
Loose-fitting garments	Wear fitted, form-fitting garments (garment-hugging).
Embroidery	Cover stabaliser (backing) with a soft fabric.
	Replace the embroidered logo with an iron-on badge (if possible).
	Put embroidered crest on shirt pocket instead of on the “chest”.
	Sew embroidered badge to another piece of fabric and sew to the school garment with a single stitch.
Seams	Avoid garments with a superimposed seam. If unavoidable, sew “flap” to the garment using fine stitches.
	Choose garments with flat felled seams when options are available.
	Iron seams flat.
	Choose seamless garments (if possible) (Roy *et al.*, 2018)
Seams in socks	Cut-off toes.
	Wear socks inside out.
	Wear seamless socks.
	Wear tolerable socks underneath prescribed school socks.
Labelling	When diffirent options are available, choose garments with heat-transferred printed labels and avoid woven labels and embroidered labels.
	Cut out labels from garments.
	Completely unpick labels from garments. (More effective than cutting the label out).

Shoes	Wear well-fitted shoes with socks/stockings (deep pressure stimulation).
	Select soft shoes (e.g. leather shoes from Froggie or Crocs).
Formal school uniform	Wear school sportswear or tracksuit. If not permitted, request permission to do so.
	Wear compression clothing underneath uniform (Roy *et al.*, 2018).
Other	Wear undergarments inside out.

While easy and affordable changes can be made to school uniforms by parents themselves, from a retailers' perspective, it is important to consider the changes that need to be made to attend to the needs and demands of consumers. In addition, schools also need to take the influence of the different properties of a school uniform into consideration when deciding on a specific uniform and/or dress code. This argument relates to the discussion surrounding universal design (Chapter 2, Section 2.2.4) which suggests the creation of products that are usable by all people regardless of age and potential sensory issues- allowing for all consumers to be accommodated (Thunberg *et al.*, 2021). Therefore, specific long-term adaptations to be made by schools, retailers and manufacturers are presented in Table 6.2.

TABLE 6.2: RECOMMENDATIONS FOR RETAILERS FOR SENSORY-FRIENDLY SCHOOL UNIFORMS

TEXTILES	
Fibre content and fabrication	Fibre content: Opt for more natural fibres (specifically cotton).
	Fibre content: Avoid synthetic fibres (specifically acrylic and nylon).
	Avoid noisy fabrics (such as Dri-mac).
	Opt for textiles with a soft hand and feel.
	Avoid fabrics containing a rough and textured feel.
DESIGN	
Collars	Avoid standing collared shirts (stiff, restrictive nature, rough textured).
	Opt for a regular shirt collar (Chapter 3, Section 3.3.3)
	Ease the strictness of rules regarding buttoning shirts and collars to the top.
Cuffs	In extreme cases, eliminate buttons on buttoned-up cuffs and replace with magnetic fasteners.
	Eliminate elasticised wrist finishes and replace with soft, untextured casing for elasticised "cuffs".
	Eliminate the use of interlining within cuffs to reduce its stiff and restrictive nature.
Buttons	In extreme cases, replace buttons with Velcro.
	In extreme cases, replace regular buttons with magnetic buttons.

Waistline	Design school bottoms that it is either high-waisted or fiton the hips.
	Soft, untextured waistband casing for elasticised waistbands.
Wearing ease	Create school shirts that do not have to be tucked in that feature a neatly designed hem finish.
	Ease the strictness of rules regarding tucked-in shirts.
	Allow children to wear school tracksuits/sportswear to school.
Embroidery	Replace the embroidered logo with an iron-on badge.
	Put embroidered crest on shirt pocket instead of on the “chest”.
CONSTRUCTION	
Seams	Replace overlocked superimposed seams with flat-felled seams.
	Press seams flat during manufacturing.
	Introduce seamless garments e.g. ski-pants or socks.
Labelling	Implement the use of only heat-transferred/printed labels within garments.
	If woven labels are unavoidable, use soft base fabrics and rather print than embroid on the label.
	If woven labels are unavoidable, place labels on shoulder line seams or outside leg seams (least sensitive areas on the body).
OTHER	
Ties	Ease the dress code of wearing ties.
	Introduce clip-on ties.
Socks	Instead of a specific school sock, opt for a plain sock (e.g. white or grey). Parents can then choose seamless versions if needed.
	Introduce seamless school socks.
Shoes	Ease of strictness on rules pertaining to shoes.
Blazer	Ease of strictness on rules pertaining to wearing a blazer (layers create discomfort).
Preferred winter outerwear	Fleece top*

*as recommended by 54.55% (N = 54) of respondents in the questionnaire (Question 19)

6.3 IMPLICATIONS AND THEORTETICAL CONTRIBUTIONS OF THE STUDY

The findings of this study have a considerable amount of possible practical and real-life contributions and will contribute vastly to various fields of research. This study is useful to consumers- specifically school children that wear school uniforms, parents of children with sensory overreactivity as well as occupational therapists that treat children with this condition. It is furthermore beneficial to schools and especially their foundation phase departments, as well as retailers that include school uniform garments as part of their product offering.

6.3.1 Consumer Science: Clothing Retail

To date, from a sensory point of view, few studies have focused on the textile, design, and construction properties of children's clothing and more specifically, school uniforms, especially within the South African context. Additionally, limited studies have focused on the effects of school uniforms and possible issues presented by these garments. Few studies have determined the exact root of irritation of specific garment elements, such as the reason why some seam types irritate more than others, or why some children prefer specific collars over others. This study, therefore, fulfils the current gap in research pertaining to the irritant clothing properties presented by school uniforms.

6.3.2 Children

The motivation to conduct this study was ultimately to try and make a difference in the lives of children with sensory overreactivity. This study has emphasised the significant effect of children's clothing and specifically, their school uniforms may have on sensory overreactivity. The influence of a school uniform on a child's emotional state while getting dressed and during wear was prominent during the first phase and the data from the second phase indicated the magnitude of its influence. It was established that more than 80% of the respondents' children experience unhappiness in the morning while getting dressed for school and often experience meltdowns when putting on their school uniforms. In addition, more than 50% of the respondents indicated that regular school uniforms may affect their children's concentration if they experience discomfort from the garments and may sometimes even contribute to meltdowns at school. The results pertaining to these questions are alarming in the sense that children are severely affected by the clothing on their bodies and that their school uniform may affect their academic performance and overall quality of life. This study has created awareness surrounding the influence of a school uniform on a child with sensory overreactivity and that it should not be underestimated. Finally, this study has also allowed the implementation of various adaptations that could be made to uniforms which will allow the discomfort children may experience, to be easily alleviated.

6.3.3 Parents of children with sensory sensitivities

This study has voiced parents' concerns regarding uniforms and has created a supporting tool that parents can utilise in the event when their children experience discomfort from school uniforms. Although it was clear that parents realised the contribution that school uniforms may bring to a sense of uniformity and discipline at school, they felt that it is important that their children remained comfortable and avoided wearing a uniform that increased sensory overreactivity. Therefore, some parents questioned the schooling

systems' ideas of prescribing formal uniforms to seven and eight-year-old children if more informal options are available. Specifically, formal uniforms often feature many textiles, design, and construction elements that contribute to tactile stimulation. Furthermore, as previously mentioned by van Jaarsveld (2014), specifically children in the foundation phase age group experience hypersensitivity to tactile stimulation. It was implied that schools should allow children to wear less formal and more comfortable school uniforms on a daily basis.

"…as a parent...you do ask, why do children in grade 1, or grade 2 need to wear formal winter uniforms… surely there's also a conversation that needs to be had around -why we do these things? … I know for uniformity and for discipline and for presentation but…surely…an eight-year-old seven-year-old really doesn't need to wear a collar and tie" **(P2:213).**

"… if the child is constantly…in the state of fight or flight because of the uniform…, what are we doing here as a school system?" **(P2:219).**

The allowance for variation was another dominant point of discussion. It was argued that schools should allow children with sensory sensitivities to make certain adaptations to their uniforms to accommodate their special needs.

"So, I took him out him out of a school that could not compromise on the fact that my child had a sensory processing difficulty, and I've put him into schooling environment where that wasn't requested. A schooling environment that was more open to my child buying the badge of the school and me sewing it on or ironing it onto a similar colour jacket that didn't elicit all these responses. And now he's a happy learner. He's thriving in his academic environment, just because he doesn't have that added sensory experience. That is an autonomic nervous system response that he cannot control and it's not his fault" **(P4:222).**

"Can we not then say just as much as a child needs hearing aids because they can't hear and spectacles because they can't see that a child is able to come to school comfortably dressed in a manner in which they can come to school for the primary reason for learning. I'm just putting it up there" **(P4:242).**

Therefore, to parents of children with sensory sensitivities, this study may be used as a supportive tool in the decision-making process of establishing which school garments to purchase, the care instructions to follow and easy and affordable adaptations that can be made to garments to alleviate irritation. Parents may use this study as supporting evidence when asking for school uniform exceptions at their children's schools.

6.3.4 The educational system

This study has allowed for awareness creation surrounding the needs of children with sensory overreactivity has to be implemented, specifically at school and in the classroom. For parents, it was important for their children's teachers to be made aware of the difficulties

their children experience in the classroom once they experience discomfort and irritation from their uniform. It is important that their children are not discriminated against based on the sensitivities they experience.

"Teachers need to be educated on this … [The other day] the teacher phoned me and she said, I think your child should go on medication because he's struggling to concentrate.
***[I asked] him [my child] why he doesn't concentrate, and he [said]: 'Something really irritated me, [and] I couldn't get it right'"* (P1:225).**

The research may therefore be beneficial to teachers and especially foundation phase teachers who educate children between the ages of 5 and 9 years old. By creating awareness surrounding the effects of tactile stimulation, teachers will fully comprehend the nature of sensory overreactivity and its influence on children's daily lives. Awareness will contribute positively to children's (and teachers') morale within the classroom and play a role in enhancing children's concentration at school and, overall quality of life. This concept is emphasised in Figure 6.2, which represents a comment by one of the participants in the focus group discussion.

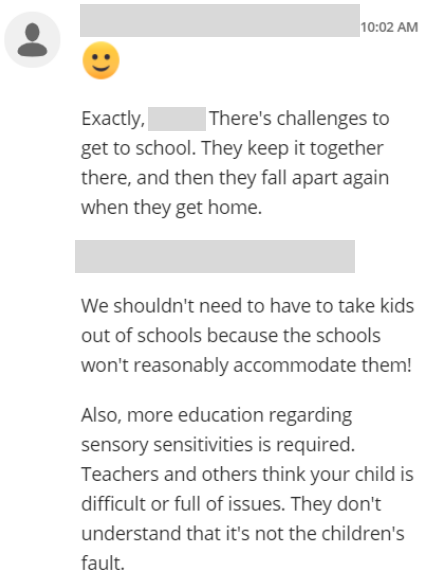


FIGURE 6.2: CHAT-LINE: P2 FOCUS GROUP 1

In the event where schools consider introducing newly designed school uniforms, schools and their independent retailers may use this study as a basis to establish the needs and demands of children to make uniforms as universally designed as possible. This will ensure that all children are accommodated.

6.3.5 Occupational therapists

The study may furthermore act as a reference point for occupational therapists and assist in creating useful advice which parents of children with sensory overreactivity may follow to decrease the effects of sensorial stimulation. The study also highlights opportunities for future studies specifically in the occupational therapy field related to, for instance, ready-to-wear garments and its influence on the sensorial system.

6.3.6 Clothing retailers and general consumers

Finally, the findings of this study may be beneficial to various South African (and international) retailers who include school uniform garments as part of their product offering. Not only will this meet the demands of a specific niche market, encourage inclusivity, and simultaneously boost sales, but it will also create awareness amongst the general consumer of the struggles many children with sensory issues face. The study also proves that variations of uniforms can be implemented easily and affordably by both developing and developed countries, as there is no real need for advanced technological measures to ensure its implementation.

6.3.7 Conclusion

This exploratory study thus contributes to the existing research surrounding the clothing of sensory-sensitive consumers but adds another dimension by focusing on specific elements which may cause discomfort in particularly school uniforms. This study thus provides a platform for future research regarding similar topics. Although this study was conducted in a South African context, the findings may be easily applied to different environments and different categories of children's clothing, for instance, as briefly mentioned, an entire study based on ready-to-wear garments and socks as the principles of the research remain the same. Section 6.4 provides a comprehensive explanation for future studies.

6.4 RECOMMENDATIONS AND LIMITATIONS FOR FUTURE STUDIES

6.4.1 Recommendations

Throughout the research study, it became apparent that there is still opportunity for other research endeavours pertaining to the clothing properties of sensory-sensitive consumers. During phases 1 and 2, it was established that an entire study based on children's socks, vests, pantyhose/stockings, and undergarments would be extremely valuable, as these garments' influence was mentioned over and again throughout the data collection process. Another valuable research opportunity relates to the care instructions of sensory-sensitive consumers' clothing, as many participants mentioned the effects that laundering may

provide. Several extractions from the focus group discussions as well as the online questionnaire are presented below.

"So, no socks, no shoes, and that's a breeze. But in winter, you have the stocking with the shoe. And normally you don't, you get nicer school shoes, like from Froggies or one of those. But it's also extremely expensive than normal Toughies all the normal school shoes that are available" **(P3:44).**

"One of my therapy kids, she's wearing boys' vests and not girl's vests because of the lace that they usually have. So, she wears boys' vests underneath a school shirt…I think it's also inside out. But then that makes wearing her school shirt and uniform more bearable" **(P5:81).**

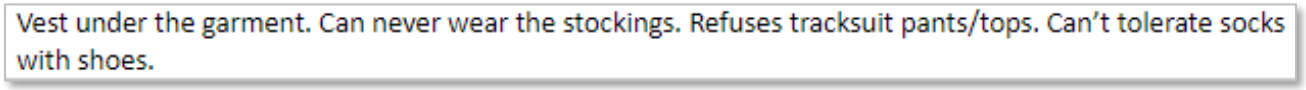


FIGURE 6.3: ANSWER (#7) TO QUESTION 16: OPEN-ENDED QUESTION (PHASE 2)

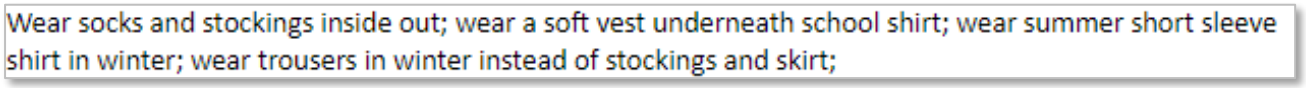


FIGURE 6.4: ANSWER (#20) TO QUESTION 16: OPEN-ENDED QUESTION (PHASE 2)

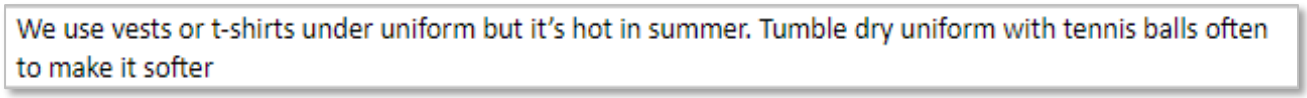


FIGURE 6.5: ANSWER (#50) TO QUESTION 16: OPEN-ENDED QUESTION (PHASE 2)

''I think the seams that have the flap, it can be really influenced by the cleaning method that you use. So, if you don't iron your shirt… that could influence how that flap lies. And that can also cause irritation. And sometimes it might not be on correctly and it might be ironed with like a bit of a kink in it…'' **(P8: 41).**

It would also be significant to explore other senses' such as children's olfactory (i.e., sound) and visual sense, and how these senses may be influenced by different clothing properties.

"And as well as the 52 [Dri-mac fabric] he indicated to me, he is non-verbal, but he indicated to me that he likes the inside of the 52 [Dri-mac fabric] but definitely not the outside. I think it might be the noise that it makes, but I'm not sure..." (P6:101).

''So, if you think about that synthetic kind of school jersey, just the look of it can even set off an emotional reaction already'' **(P5:74).**

From an occupational therapy viewpoint, it would be vastly interesting to explore the influences of clothing on specific occupations in-depth. These occupations include children's education, social participation, play and activities of daily living.

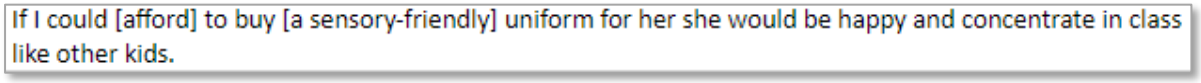


FIGURE 6.6: ANSWER (#37) TO QUESTION 16: OPEN-ENDED QUESTION (PHASE 2)

Another interesting and critical viewpoint is the consideration taken by retailers in their approaches and methods in the production of children's clothing. It would be worthwhile to explore the entire production process, whether the end-consumer is *actually* considered and whether retailers think about the socio-economic impact.

From an occupational therapy viewpoint, it would be vastly interesting to explore the influences of clothing on specific occupations in-depth. These occupations include children's education, social participation, play and activities of daily living.

6.4.2 Limitations

6.4.2.1 Qualitative phase

Despite the fact that extreme measures were implemented to ensure optimised data collection, some limitations within the qualitative and quantitative phases were encountered.

Due to the public health emergency, the Covid-19 pandemic, the study's data collection methods had to be adapted to adhere to governmental regulations. It was, therefore, decided that the focus group discussion occur online to ensure safety and physical social distancing. Participants were able to communicate over the Blackboard collaborate platform by speaking or typing in the chatbox, and all cameras were turned off to decrease data usage. While participants were able to express their emotions by means of ''emoticons'' in the chatbox, due to the lack of facial expressions and body language, the researcher was unable to gauge participants' actual feelings and determine whether some questions might have been stressful or upsetting, as briefly mentioned by Leedy and Ormrod (2015:176). Therefore, future research could benefit from hosting online focus group discussions by asking participants to turn on their cameras, adding depth to the data provided or conduct face-to-face interviews.

Qualitative methodologies such as focus group discussions are valuable in determining significant points of discussion extracting diverse information from participants(Babbie, 2016:282; Kumar, 2018:336). Despite its advantages, gathering participants to partake in the study proved to be a challenge. Even when various participants agreed to participate by accepting the emailed invitation and parcel containing several samples of fabric, some participants failed to attend the virtual meeting which resulted in a smaller sample as initially planned for. This potential issue was also mentioned by Malhotra *et al.* (2017:188).

Therefore, future research can perhaps conduct one-to-one interviews which encourages participant attendance, resulting in an adequate, representative sample population.

6.4.2.2 Quantitative phase

Leedy and Ormrod (2015:176) mention the limitations associated with online surveys. Although an effort was made to include a representative sample population within the research study, online questionnaires only represent a particular group of consumers including people who have access to the internet, are comfortable with utilising their smart devices or computer, and spend a reasonable time utilising emails and social media. This means that only consumers who are active social networking users were more likely to complete the survey, resulting in a sample which is biased to some degree.

Some challenges occurred in reaching participants for the focus group discussions, as invitational links via email were sent out but that there was no guarantee whether the email reached the potential participant. Similarly with the messages sent via Facebook Messenger as many potential participants did either not receive the invitational link or open the message sent. Finally, some participants were also reluctant to complete the survey even when it was posted on a private Facebook group, indicating the nature of the research study, what would be expected of them and the names of the academic parties involved. The aforementioned events contributed to a smaller sample population recruitment. Additionally, Babbie (2016:260) mentions that with self-administered online questionnaires, respondents tend to spend more time on answering the initial questions within the questionnaire, paying less attention to answers closer to the end of the survey. This was proven by the fact that 106 respondents started the questionnaire however, only 99 completed the survey.

6.5 CONCLUDING REMARKS

This study was conducted to facilitate children (and parents of children) with sensory sensitivity issues. It focused on a particular clothing category that is very relevant to specifically South African children namely school uniforms. It was important to consider the textile, design and construction properties of these uniforms and how they might influence a schoolchild on a daily basis since all three categories of properties influence the sensory characteristics of the garment. From the findings, it was evident that a school uniform indeed has an impact on a child's emotions, well-being, and occupations (e.g. education, social participation, play, and activities of daily living). Various parents even mentioned additional problems that school uniforms caused, including meltdowns before and at school, lack of concentration in the classroom, constant negotiation with schools to adapt uniforms and

make them bearable for the child, and a constant search for garments that would be non-irritating to their children.
Therefore, the outcome of this study contributes significantly towards the large research gap presented and is regarded as highly relevant to children, parents, occupational therapists, retailers and other researchers within this field of study.

This study's significance and relevancy were furthermore confirmed since this exploratory study was chosen to form part of a well-known and sought-after conference- Pangborn, an international sensory science conference focusing on emerging research within the field of sensory and consumer science. The abstract of this specific study was accepted and the Master's student was granted the opportunity of presenting the findings at the virtual conference.

The emotional connection that exists between humans and their clothing is often much stronger than often perceived, and it is important to recognise the potential impact that clothing may have on one's emotional well-being. While clothing may be a wonderful aid to schools in assisting with inclusivity, discipline and uniformity, the child with sensory overreactivity suffer due to the physical irritation and psychological discomfort a uniform provides. In essence, the intervention of school uniform manufacturing and its processes are of vast importance to support, primarily, a child's well-being.

Even if this study can only assist one child or one parent, the effort was most certainly worthwhile.

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ADDENDUM A

ETHICS LETTER OF APPROVAL

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Natural and Agricultural Sciences
Ethics Committee
E-mail: ethics.nas@up.ac.za

21 June 2021

ETHICS SUBMISSION: LETTER OF APPROVAL

Dr L Diedericks
Department of Consumer and Food Sciences
Faculty of Natural and Agricultural Science
University of Pretoria

Reference number: NAS081/2021
Project title: The influence of different clothing properties on children with Sensory Integration Dysfunction

Dear Dr L Diedericks,

We are pleased to inform you that your submission conforms to the requirements of the Faculty of Natural and Agricultural Sciences Research Ethics Committee.

Please note the following about your ethics approval:

- Please use your reference number (NAS081/2021) on any documents or correspondence with the Research Ethics Committee regarding your research.
- Please note that the Research Ethics Committee may ask further questions, seek additional information, require further modification, monitor the conduct of your research, or suspend or withdraw ethics approval.
- Please note that ethical approval is granted for the duration of the research (e.g. Honours studies: 1 year, Masters studies: two years, and PhD studies: three years) and should be extended when the approval period lapses.
- The digital archiving of data is a requirement of the University of Pretoria. The data should be accessible in the event of an enquiry or further analysis of the data.

Ethics approval is subject to the following:

- The ethics approval is conditional on the research being conducted as stipulated by the details of all documents submitted to the Committee. In the event that a further need arises to change who the investigators are, the methods or any other aspect, such changes must be submitted as an Amendment for approval by the Committee.
- **Applications using GM permits:** If the GM permit expires before the end of the study, please make an amendment to the application with the new GM permit before the old one expires
- **Applications using Animals:** NAS ethics recommendation does not imply that Animal Ethics Committee (AEC) approval is granted. The application has been pre-screened and recommended for review by the AEC. Research may not proceed until AEC approval is granted.

Post approval submissions including application for ethics extension and amendments to the approved application should be submitted online via the Ethics work centre.

We wish you the best with your research.

Yours sincerely,

Prof VJ Maharaj
Chairperson: NAS Ethics Committee

ADDENDUM B

CONSENT FORM

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Faculty of Natural and Agricultural Sciences
Department of Consumer and Food Sciences
1 July 2021

CONSENT FORM

Dear Participant

NATURE AND PURPOSE OF THE RESEARCH PROJECT

This research forms part of a larger research project in the Department of Consumer and Food Sciences, University of Pretoria to explore the influence of different clothing properties on children with Sensory Integration Dysfunction. The purpose of this research project is to get a better understanding which properties of a school uniform cause sensory irritation to a child living with SID or tactile defensiveness.

RESEARCH PROCEDURE

You will be asked to engage in a focus group discussion about school uniforms and the properties (elements of the clothing items) that you have experienced causes irritation from a sensory point of view.

Please note: No prior preparation is needed to participate in this focus group discussion. Participation is voluntary, with no penalty or loss of benefit if you decide not to take part. The focus group discussion will take approximately 60 minutes to complete, and will not be longer than 90 minutes at the most.

PRIVACY AND CONFIDENTIALITY

Participants' responses are strictly confidential, and only members of the research team will have access to the information. At no time will personal opinions be linked to specific individuals. Data will be safely and securely stored and will not be accessible from the public domain. The privacy and confidentiality of your participation are therefore ensured.

WITHDRAWAL CLAUSE AND RIGHTS OF ACCESS TO DATA

Participants may withdraw at any stage of the research without having to explain why. By no means will your withdrawal be held against you. As a participant, you also have the right of access to your data.

POTENTIAL BENEFITS

The findings derived from this research could assist parents when purchasing school uniforms for their children. In addition, it could also provide valuable findings that schools (and specifically special needs schools) can consider when revising their school uniform. This research could be valuable for clothing retailers that offer basic school uniform items to see how they can improve their product offering. All of the above would enhance the well-being of the child living with SID.

ADDITIONAL INFORMATION

Dr Lizette Diedericks can be contacted at Lizette.Diedericks@up.ac.za or at (012) 420 2575/ 082 787 1833 for further information about the research project.

CONSENT

I have read the above information relating to the research project and declare that I understand it. I have been allowed to contact and discuss relevant aspects of the project with the project leader, and hereby declare that I agree voluntarily to participate in the project.

I indemnify the University and any employee or student of the University against any liability that I may incur during the project.

_____ _____

Signature Date

ADDENDUM C

QUESTIONNAIRE

Section A: Consent form

Q1
Faculty of Natural and Agricultural Sciences
Department of Consumer and Food Sciences
15 July 2021

CONSENT FORM
Dear Participant

NATURE AND PURPOSE OF THE RESEARCH PROJECT
This research forms part of a larger research project in the Department of Consumer and Food Sciences, University of Pretoria to explore the influence of different clothing properties on children with Sensory Integration Dysfunction (SID). The purpose of this research project is to get a better understanding which properties of a school uniform cause sensory irritation to a child living with SID or tactile defensiveness.

RESEARCH PROCEDURE
You will be asked to indicate how the school uniform that your child wears cause irritation from a sensory point of view.
Please note: No prior preparation is needed to complete the questionnaire. Participation is voluntary, with no penalty or loss of benefit if you decide not to take part. Completion of the questionnaire takes approximately 5 minutes. The procedure is completed by a word of appreciation for your time and effort.

PRIVACY AND CONFIDENTIALITY
Participants' responses are strictly confidential, and only members of the research team will have access to the information. Your response will be bulked with those obtained from other participants and appropriate statistical analysis will be performed on the bulked data. At no time will personal opinions be linked to specific individuals. Data will be safely and securely stored and will not be accessible from the public domain. The privacy and anonymity of your participation are therefore ensured.

WITHDRAWAL CLAUSE AND RIGHT OF ACCESS TO DATA
Participants may withdraw at any stage from the research without having to explain why. By no means will your withdrawal be held against you. As a participant you also have the right of access to your data.

POTENTIAL BENEFITS
The findings derived from this research could assist parents when purchasing school uniforms for their children. In addition, it could also provide valuable findings that schools

(and specifically special needs schools) can consider when revising their school uniform. This research could be valuable for clothing retailers that offer basic school uniform items to see how they can improve their product offering. All of the above would enhance the well-being of the child living with SID.

ADDITIONAL INFORMATION
Dr. Lizette Diedericks can be contacted at lizette.diedericks@up.ac.za or at (012) 420 2575/ 082 787 1833 for further information about the research project.

CONSENT
I have read the above information relating to the research project and declare that I understand it. I have been allowed to contact and discuss relevant aspects of the project with the project leader, and hereby declare that I agree voluntarily to participate in the project.

I indemnify the University and any employee or student of the University against any liability that I may incur during the course of the project.

Q2 I agree to the terms and conditions as stated above:

- ○ Yes, I agree (1)
- ○ No, I do not agree (2)

Skip To: End of Survey If Q2 = 2

Section B: Information of the child

Q3 Do you have a child that has mild to severe overreactive responses towards light touch input (especially to clothing)? (Tactile defensiveness)

- ○ Yes (1)
- ○ No (2)

Skip To: End of Survey If Q3 = 2

Q4 Does your child wear a school uniform to school?

- ○ Yes (1)
- ○ No (2)

Skip To: End of Survey If Q4 = 2

Q5 If you have more than one child with sensory issues, please complete the questionnaire with your child with the MOST severe overreactive responses towards light touch in mind. (The child that is the MOST sensitive).

Please indicate your child's year of birth:

_____

Q6 What is the gender of your child?

- ○ Female (1)
- ○ Male (2)
- ○ I prefer not to say (3)

Q7 In which province do you live?

- ○ Eastern Cape (1)
- ○ Free State (2)
- ○ Gauteng (3)
- ○ KwaZulu-Natal (4)
- ○ Limpopo (5)
- ○ Mpumalanga (6)
- ○ Northern Cape (7)
- ○ North West (8)
- ○ Western Cape (9)

Q8 Indicate how you experience the level of severity of your child's sensory issues by using the slider.

0 1 2 3 3 4 5

0 = not severe; 5 = extremely severe ()	

Q9 Please indicate how frequently your child becomes distressed by the following:

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Very often (5)
the feeling of new clothes (1)	○	○	○	○	○
wearing of socks (2)	○	○	○	○	○
wearing of shoes (3)	○	○	○	○	○
textures of certain textiles (4)	○	○	○	○	○
long sleeve garments (5)	○	○	○	○	○

Section C: School Uniform

Q10 Think about your child's emotional state while putting on and wearing his/her school uniform. Please indicate how frequently the school uniform affects your child in the following scenarios:

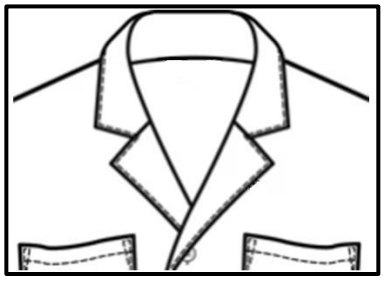
	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Very often (5)
The school uniform causes irritation and unhappiness in the morning while getting ready for school. (4)	○	○	○	○	○
The school uniform causes meltdowns in the morning while getting ready for school. (3)	○	○	○	○	○
The school uniform influences my child's ability to concentrate on his school work. (1)	○	○	○	○	○
The school uniform contributes to meltdowns at school. (2)	○	○	○	○	○

Q11 Please indicate your level of agreement with the following statements related to fabrication:

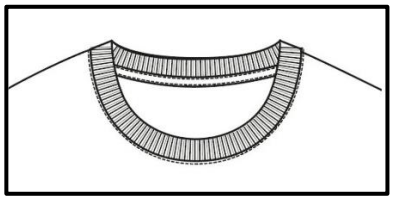
	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)
The fiber content of the fabric used has a direct influence on the level of irritation of the clothing item. (1)	○	○	○	○	○
My child prefers clothing with a high cotton fibre content. (2)	○	○	○	○	○
My child prefers a softer fabric opposed to a harder fabric. (4)	○	○	○	○	○
If pilling (little balls of fluff) forms on the surface of clothing due to wearing and laundering, it causes irritation to my child. (5)	○	○	○	○	○
If the fabric makes a sound during wear, my child gets irritated by it. (3)	○	○	○	○	○

Q12 Which one of the following collars would irritate your child the MOST?

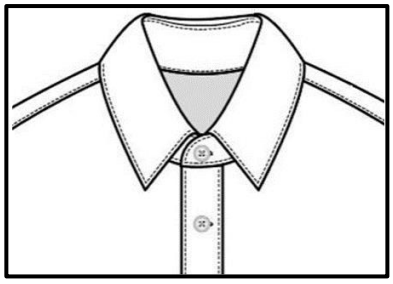
○ Crew neck (1)



○ Shirt collar (2)



○ Collar with a stand (4)



Q13 Please indicate your level of agreement with the following statements:

	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)
If a shirt (formal school shirt/ golf shirt) has buttons, my child prefers not to close the top button(s). (1)	○	○	○	○	○
My child prefers short sleeve clothing opposed to long sleeve clothing. (2)	○	○	○	○	○
The cuff of the school shirt/ school jacket irritates my child. (4)	○	○	○	○	○
The backing of embroidery on a shirt causes irritation to my child (e.g. the embroidery of the school crest/name). (6)	○	○	○	○	○

Q14 Read through the list of possible adaptations related to a waistband/elastic and indicate how frequently (or not) you engage in the following adaptations:

	Never (1)	Rarely (2)	Sometimes (3)	Most of the time (4)	Always (5)
We have to turn the waistband/elastic over that it does not touch my child's body. (1)	○	○	○	○	○
My child wears underwear that covers the skin specifically to prevent the waistband/elastic from touching his/her skin. (2)	○	○	○	○	○
We have to buy pants/skirts in bigger sizes to avoid the positioning of the waistband/elastic around the naval (abdomen), but rather on the hips. (3)	○	○	○	○	○

Q15 Read through the list of possible adaptations and indicate how frequently (or not) you engage in the following adaptations:

	Never (1)	Rarely (2)	Sometimes (3)	Most of the time (4)	Always (5)
Cut out clothing labels. (1)	○	○	○	○	○
Unpick (completely remove) clothing labels. (2)	○	○	○	○	○
Buy second-hand school clothing, since it is often softer than new school clothing items. (3)	○	○	○	○	○

Q16 Please tell us of any other adaptations to your child's school uniform you engage in that makes it more tolerable.

_____

ADDENDUM D

PLAGIARISM DECLARATION

DECLARATION OF ORIGINALITY
UNIVERSITY OF PRETORIA

The Department of Consumer and Food Sciences places great emphasis upon integrity and ethical conduct in the preparation of all written work submitted for academic evaluation.

While academic staff teach you about referencing techniques and how to avoid plagiarism, you too have a responsibility in this regard. If you are at any stage uncertain as to what is required, you should speak to your lecturer before any written work is submitted.

You are guilty of plagiarism if you copy something from another author's work (e.g. a book, an article or a website) without acknowledging the source and pass it off as your own. In effect you are stealing something that belongs to someone else. This is not only the case when you copy work word-for-word (verbatim), but also when you submit someone else's work in a slightly altered form (paraphrase) or use a line of argument without acknowledging it. You are not allowed to use work previously produced by another student. You are also not allowed to let anybody copy your work with the intention of passing if off as his/her work.

Students who commit plagiarism will not be given any credit for plagiarised work. The matter may also be referred to the Disciplinary Committee (Students) for a ruling. Plagiarism is regarded as a serious contravention of the University's rules and can lead to expulsion from the University.

The declaration which follows must accompany all written work submitted while you are a student of the Department of Consumer and Food Sciences. No written work will be accepted unless the declaration has been completed and attached.

Full names of student: Wenette Jordaan

Student number: 16015887

Topic of work: The influence of the properties of school uniforms on children with sensory overreactivity

Declaration

1. I understand what plagiarism is and am aware of the University's policy in this regard.

2. I declare that this thesis is my own original work. Where other people's work has been used (either from a printed source, Internet, or any other source), this has been properly acknowledged and referenced in accordance with departmental requirements.
3. I have not used work previously produced by another student or any other person to hand in as my own.
4. I have not allowed and will not allow anyone to copy my work with the intention of passing it off as his or her own work.

SIGNATURE: