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# INFLUENTIAL FACTORS THAT CONTRIBUTE TO CONSUMERS' CHOICE OF CHILDREN'S UNDERWEAR IN AN EFFORT TO ALLEVIATE SENSORY OVERREACTIVITY

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**Masters Dissertation**

**M Consumer Science: Clothing Retail Management**

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# Declaration

I, **Leoné Gouws**, declare that this dissertation, which I hereby submit for the degree of M Consumer Science Clothing Retail Management, at the University of Pretoria, is my own work and has not previously been submitted for a degree at the University of Pretoria or any other tertiary institution.

Leoné Gouws

December 2023

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# SUMMARY

**Influential factors that contribute to consumers' choice of children's underwear in an effort to alleviate sensory overreactivity**

**By**

**LEONÉ GOUWS**

**Keywords:** Tactile defensiveness, clothing, sensory overreactivity, underwear

Numerous children exhibit heightened sensitivity to sensory stimuli, leading to the possibility of them experiencing sensory overreactivity (also known as hypersensitivity) in response to such stimuli (Ilić-Savić, Petrović-Lazić & Resimić, 2021). While this is frequently associated with children with special needs, it's also prevalent among typically developing children. In situations where a child encounters sensory discomfort or agitation, the nervous system can react with either a "fight" response, evident through actions like tantrums, or a "flight" response, characterized by withdrawal. Clothing, that remains in close contact with the body, consistently delivers sensory input (Shin & Gaines, 2018). Underwear is often referred to as the "second skin," given its role as the initial clothing layer. Underwear contains elements such as seams and labels, which can be particularly distressing for children sensitive to touch (Roy, Ghosh & Bhatt, 2018). If the individual wearing them struggles to redirect their focus from the discomforting sensation, they may react excessively. This heightened response significantly impacts their occupational performance in education, social participation, and activities of daily living (Kabel, McBee-Black & Dimka, 2016).

South Africa is not yet equipped to satisfy the unique and diverse needs of these children, comfortable and sensory-friendly clothing, being one of those (Pillay, Duncan & de Vries, 2021). Currently, parents and caregivers of children with sensory overreactivity might be struggling to find sensory-friendly underpants in the local market. South African retailers might not consider these special needs when designing and/or procuring their underpants collections or they do not see the endeavour as worthwhile. This interdisciplinary study aimed to get a better idea of the elements that influence underpants shopping for children with

sensory overreactivity to provide practical guidelines to parents of children with sensory overreactivity when purchasing underpants.

The study consisted of two phases. The first phase was an artefact analysis of a selection of girl and boy underpants from leading clothing retailers operating in South Africa. This phase involved an assessment of products, entailing a comparison of various attributes such as fibre composition, elastics, seams, and labelling. A total of thirty-six diverse samples were subjected to evaluation. The subsequent, main phase of the study followed a phenomenological investigative approach and comprised eleven individual interviews. The unit of analysis was parents of children aged between 4 and 13, who exhibited sensory overreactivity. Both phases are classified as qualitative research (Nieuwenhuis, 2019:102, 108).

The findings unveiled fabric types, elastic materials, seam styles, and labelling that are susceptible to irritation, as well as those that offer more sensory-friendly alternatives. Intriguingly, elements chosen for decorative purposes in girls' underwear often ended up being highly discomforting. It was evident that parents struggle with buying underwear for their children, and factors like the ability to try on the underwear and return policies significantly influence the perceived risk for parents. It was apparent that sensory-friendly choices are lacking among the offerings of brick-and-mortar clothing retailers in South Africa.

This study provides practical guidelines aimed at assisting parents during their underwear shopping endeavours. Such guidelines have the potential to alleviate the perceived risk associated with underwear purchases, empowering parents to make more well-informed decisions (Mpinganjira, 2013:234). Moreover, the study makes a noteworthy contribution to the retail sector by potentially aiding in the design and sourcing of underpants for children with sensory overreactivity. This contribution could enable retailers to establish a competitive edge by providing a product with enhanced value to consumers in comparison to their competitors. The findings of this study address an important theoretical gap in the existing literature and create a basis for further research.

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# Chapter 1

# THE STUDY IN PERSPECTIVE

## 1.1 INTRODUCTION

Sensory overreactivity is a subdivision of Sensory Integration Dysfunction (SID) where individuals may respond unusually to sensory stimuli (Dunn, 1997). Sensory overreactivity is a common disorder among many children (Liss, Saulnier, Fein & Kinsbourne, 2006). These children have unusual reactions to sensory stimuli where they may overreact to touch, noise, different smells, movement and visual stimulation (Roy, Ghosh & Bhatt, 2018). This is because the sensory signals do not provide appropriate reactions due to improper integration (Shin & Gaines, 2017). Sensory processing difficulties are diagnosed in special needs children who are normally on the Autism Spectrum or are diagnosed with ADHD (Dunn, 2007) yet it can also occur in typically developing children (Ayres & Robbins, 2005). Since these children may react in unconventional ways, they receive labels such as “disruptive”, “naughty” and “difficult” because most teachers at their school are not educated on the problem and cannot always provide a solution (Hand, Lane, De Boeck, Basso, Nichols-Larsen & Darragh, 2018). These children may also have trouble performing daily tasks in their routine and struggle to fit in with friend groups (Dunn, 2007; Kabel, McBee-Black & Dimka, 2016). Between 5%-15% of playschool children have difficulties with sensory processing (Roy *et al.*, 2018). Hypersensitivity to touch is the most common sensory system to be affected by this disorder (Shin & Gaines, 2017). This specific form is referred to as tactile defensiveness. Ayres (1979) defines tactile defensiveness as a perceptual deficit, where the individual overreacts negatively to touch sensations that would normally provoke positive or neutral responses (Spies & Van Rensburg, 2012).

Clothing has a direct influence on the tactile sense since it is in direct contact with the skin (Datta & Seal, 2022). Underwear, also known as innerwear is seen as the second skin as it is the first layer of clothing (Datta & Seal, 2022). Clothing items of children’s underwear include vests, and/or underpants, thermal vests and leggings, socks, and bras for older girls. It directly transfers its comfort features and protection to the skin, making it as important as outerwear on a cold day (Datta & Seal, 2022). Underpants is an article of underwear clothing that many

children with sensory overreactivity find uncomfortable (Spies & Van Rensburg, 2012). Tactile defensive children often exhibit aggressive behaviour and/or react inappropriately due to constantly feeling uncomfortable and overwhelmed (Spies & Van Rensburg, 2012). Their brains are constantly being told to be in "flight-or-fight" mode by their nervous systems and being in this state for a prolonged period can lead to an individual feeling exhausted and irritable (Cheng & Boggett-Carsjens, 2005).

Underpants with stiff and rough textiles, seams, and labels are most bothersome to children with sensory overreactivity (Roy *et al.*, 2018). If made from the wrong fabric and/or worn with rough outerwear clothing, underpants may bunch up and move around during the day, making the wearer increasingly aware of the discomfort they are experiencing (Datta & Seal, 2022). If the wearer is unable to shift their attention from the aversive sensation, they will overreact to it (Liss *et al.*, 2006). Thus, this study focuses specifically on underpants and which elements cause the most irritation as well as what can be done or changed to make it more sensory-friendly.

The problem with uncomfortable underpants does not only impact the child but also their parents (Spies & Van Rensburg, 2012). The parents are responsible for purchasing the underpants and when the child rejects the underpants that have been purchased, it could influence the household dynamic as the parents may feel guilty for not providing their child with comfortable underpants (Butler, 2021). When the child responds unfavourably, the bidirectional parent-child relationship will cause the parents to react negatively (Spies & Van Rensburg, 2012). Thus, the parents feel significant pressure to purchase the correct underpants. Adding to the pressure is the lack of sensory-friendly options available on the local market as retailers are still relatively uneducated on this issue (Pillay, Duncan & de Vries, 2021). This increases the perceived risk that parents attach to the underpants shopping experience. Thus, this study also focuses on the impact this problem has on the parents, what perceived risks they face when shopping for underpants, and what can be done to reduce the perceived risks.

## 1.2 PROBLEM STATEMENT

Sensory Processing Disorder (SPD) is often not recognized in children as it is misdiagnosed or assumed to be included with other diagnoses (Butler, 2021). For example, a child with Autism Spectrum Disorder (ASD) and SPD may only be diagnosed with ASD and the SPD will be assumed to form part of the ASD (Butler, 2021). Thus, sensory overreactivity, as a subtype, is also misunderstood. Children with sensory overreactivity and who are tactilely sensitive may be mistaken to have sensitive skin. Sensitive skin is described as skin that reacts negatively

(itching, tightness, dryness, burning, etc.) to sensory stimuli that normally provoke neutral sensations (Farage, 2019). Sensory overreactivity is a deeper and more complex condition than sensitive skin. Simply treating a child for sensitive skin, will not alleviate the other symptoms of sensory overreactivity. In this case, the child will not receive the most effective care and treatment, which could lead to great challenges that the child might face (Butler, 2021).

A common example of one of those challenges would be clothing. We often take feeling comfortable in our clothes for granted. Children with sensory overreactivity have significantly different experiences with their clothing. The neurological thresholds are much lower than typically developing children, causing them to be more sensitive to the tactile stimuli that clothing provides (Dunn, 2007). These children need clothing that will cater to their needs and are not uncomfortable.

Studies such as conducted by Ross (2016), have focused on therapeutic clothing for children with special needs, however, not many have focused on the children's underwear, especially underpants. According to Roy *et al.* (2018), underpants play such a significant part in the child's overall comfort that they will refrain entirely from wearing them if it is uncomfortable. Over the past few years, many advancements have been introduced to produce sensory-friendly clothing and underpants, for example, Kiddie Pal in Indonesia (Oetojo, 2019), Soft Clothing, Smart Knit Kids and Therapro in the United States of America, just to name a few (Schectman, 2013). However, there are no brands available in the South African market.

Many parents, especially those with children with sensory overreactivity, have reported that finding clothing with the desired design properties, such as comfortable fabric, smooth or no seams, and elasticated waistbands, proves to be a challenge within the existing market (Kabel *et al.*, 2016). The South African market is not yet prepared to cater to these needs as retailers are still relatively unaware of the sensory impact their clothes have on the wearer (Pillay *et al.*, 2021). Currently, parents of children with sensory overreactivity might be struggling to find sensory-friendly underpants in the local market. South African retailers might probably not consider these special needs when designing and/or procuring their underpants collections or they do not see the endeavour as worthwhile. To create functional clothing, the design process needs to focus on the fabric, design details and trims that would be used (Oetojo, 2019). As a result, parents are forced to purchase these items from international brands if the local market cannot satisfy their needs. The prices of international brands often end up costing the parents even more money as they have to pay import tax (International Trade Administration, 2021). Some companies such as Autism Resources South Africa recognized the need for more sensory-friendly options and have started importing sensory-friendly clothing, underpants and toys to South Africa to sell at a relatively cheaper price (Autism Resources South Africa, 2022). However, these prices are still unattainable for many South African parents.

The shortage of available and adequate clothing in the local market results in many children with special needs having to wear underpants which they find uncomfortable. If they are not able to alleviate the aversive stimulation, they may overreact to it and display unfocused, aggressive and irritable behaviour (Spies & Van Rensburg, 2012). When this occurs at school or daycare, it can result in social participation barriers as friends and classmates may not know how to respond to this behaviour (Kabel *et al.*, 2016). These children may then be avoided and oftentimes punished for their abnormal behaviour as their reaction to the discomfort may not be understood (Jordaan, 2021). In turn, they may struggle to build and maintain social relationships with other children which can result in social outcasts. Children's daily engagement in social interactions is an important part of developing their social skills and achieving a sense of well-being (Kabel *et al.*, 2016). If something as insignificant as wearing comfortable underwear and clothes could prevent sensory overreactivity, and social participation barriers and improve the child's quality of life, then it is a worthy cause to explore the possibilities of sensory-friendly design and construction.

This study aimed to get a better understanding of the factors that influence underpants shopping for children with sensory overreactivity to provide practical guidelines to parents of children with sensory overreactivity when purchasing underpants.

## 1.3 JUSTIFICATION OF RESEARCH

The need for appropriate clothing items for children with sensory overreactivity has been established (Kabel *et al.*, 2016). Many studies have focused on everyday clothing items (Güçlü, Tanidir, Mukaddes & Ünal, 2007; Suelar & Okur, 2007; Ravandi & Valizadeh, 2011; Rahman, 2012; Spies & Van Rensburg, 2012; Oetojo, 2019; Butler, 2021; Kyriacou, Forrester-Jones & Triantafyllopoulou, 2021) and other therapeutic clothing such as weighted vests (Ross, 2016; Shin & Gaines, 2017; Tadesse, Harpa, Chen, Wang, Nierstrasz & Loghin, 2019), however, there seems to be little to no studies conducted on underpants. Underpants is the very first layer of clothing and contribute significantly to the comfort of the wearer (Datta & Seal, 2022), thus making it an important clothing piece to research. This study therefore contributes to the academic body of knowledge and sensory studies.

This study provides a practical contribution by spreading awareness of the elements of underpants that can irritate children with sensory overreactivity. As the parents are more aware of what is causing their children discomfort, they will be in a better position to alleviate their discomfort (Spies & Van Rensburg, 2012). This study acknowledges the challenges that parents with children with sensory overreactivity face when needing to purchase new underpants. The aim of purchasing appropriate underpants is to have the child in a calm, alert

and attentive state of mind (Ross, 2016). However, the local market may not always be in a position to provide appropriate options (Pillay *et al.*, 2021). This complicates the shopping experience and increases the perceived risks that parents face. This study addresses all perceived risks, namely functional, social, time & effort as well as financial risks, that the parents face and provides solutions and suggestions. This study also provides a guideline to the parents that will assist them when shopping for underpants. The correct underwear contributes to the overall well-being of the child and allows them to engage more comfortably in daily activities (Kabel *et al.*, 2016). The well-being of the child will have a direct influence on the parents' well-being and the dynamic of the household (Spies & Van Rensburg, 2012). This study will enable parents to be able to make more informed choices and better meet the needs of their children (Mpinganjira, 2013:234).

This study also provides a significant contribution to the local retail sector since the findings might assist in terms of designing and procuring underpants for children with sensory overreactivity. These efforts could also enable them to gain a competitive advantage by offering a product with more value to consumers than their competitors (Venter & Van Rensburg, 2014:198). The development of a sensory-friendly product line can have the potential to gain the retailer a bigger market share. Children with sensory overreactivity will not be the only ones benefitting from the sensory-friendly underpants, other children will also benefit from the more comfortable underpants.

Lastly, this study also acts as a guideline to occupational therapists when assisting and advising their patients. The findings of this study will help occupational therapists better inform their patients of what types of underpants would be suitable and which would cause irritation. The findings will enable occupational therapists to provide more in-depth insights to their patients and offer a better service which in turn will impact both the child's and the parents' well-being (Kabel *et al.*, 2016).

Overall, this study contributes greatly in multiple aspects and disciplines. This study could also create new opportunities for further sensory studies where the overarching research problem could be investigated more deeply and thoroughly.

## 1.4 RESEARCH AIM AND OBJECTIVES

Focussing on underpants, this study aims to get a better understanding of the factors that influence underpants shopping for children with sensory overreactivity in order to provide practical guidelines to parents of children with sensory overreactivity when purchasing underpants. The research objectives have been set out as follows:

**Objective 1**: To analyse a selection of underpants specifically in terms of:

- Fiber content
- Fabrication
- Elastic
- Design/fit
- Construction
- Labelling
- Price

**Objective 2:** To explore and describe the sensory irritation of the different elements of underpants specifically in terms of:

- Fiber content
- Fabrication
- Elastic
- Design/fit
- Construction
- Labelling
- Other

**Objective 3:** To identify and analyse the risks parents face when underpants shopping for children with sensory overreactivity.

**Objective 4:** To develop underpants shopping guidelines for children with sensory over-reactivity.

## 1.5 RESEARCH DESIGN AND METHODOLOGY

### 1.5.1 Research design

This exploratory and descriptive study consists of two phases. The first phase was an artefact analysis of a selection of girl and boy underpants from the leading clothing retailers operating in South Africa. The process consisted of basic identification methods such as visual and tactile, then comparing the differences between the artefacts. During the second phase, this study made use of a qualitative research approach (Quinlan, Babin, Carr, Griffin & Zikmund, 2019:127). The study conducted eleven personal face-to-face interviews. Both phases are cross-sectional. The personal interviews were the primary data source while the artefact analysis was a supportive data source.

### 1.5.2 Methodology Phase 1: Artefact analysis

A selection of samples was purchased during May 2022. The retailers include Ackermans, Cotton:On Kids, Edgars, H&M, Jet, MRP, Pep Stores, PnP clothing and Woolworths. All the underpants options available for girls and boys aged 4 to 5 years from each retailer were purchased and formed part of the artefact analysis. This study only included a basic analysis, however, the samples can be used for more scientific experiments for further publications. Table 1.1. provides an overview of how the different elements were evaluated.

**TABLE 1.1.: INDICATION OF EVALUATION METHOD**

| | |
|---|---|
| Fibre content | Information on label. |
| Fabrication | Basic identification with magnifying glass (e.g. single jersey / double knit). |
| Elastic | Basic identification of the type of elastic. |
| Design/fit | Style variations (e.g. bikini vs. boyleg; side seams vs. center front (CF) and center back (CB) seams). |
| Construction | Seam class, seam type (e.g. superimposed seam vs. lapped seam). |
| Labelling | Basic identification of label type and placement. |
| Other (e.g. bows) | Basic identification of other elements present. |

### 1.5.2 Methodology phase 2: Personal interviews

*1.5.2.1 Unit of analysis, sample and sampling*

The unit of analysis for Phase 2 consisted of parents of children aged three to thirteen with sensory overreactivity residing in close proximity to Centurion and Brooklyn, Pretoria to participate in the study. The participants were reached through non-probability sampling methods which is the selection of a sample based on convenience and personal judgement (Quinlan *et al.*, 2019:181). The researcher made use of an existing database of occupational therapists to reach parents who fulfil the participant criteria. An advertisement was placed on social media to further reach more possible participants. The specific non-probability sampling methods used in this research study were convenience sampling and purposive sampling (Creswell & Creswell, 2018:234; Quinlan *et al.*, 2019:184-185). Quota sampling was to some extent also made use of to ensure that the number of parents of boys and girls are almost equally represented (Quinlan *et al.*, 2019:185).

*1.5.2.2 Measuring instrument*

The measuring instrument was a semi-structured topic guide that was developed containing specific questions participants had to answer to provide the researcher with insight into the problem they faced as well as practical application of past research on problematic design elements (Quinlan *et al.*, 2019:263). The topic guide consisted of different questions dedicated

to certain properties of the underpants samples such as the fibre content, fabrication, elastics, design/fit, labelling and construction and other elements. The topic guide consisted of open-ended questions to gather as much information from the participants' understanding, thoughts and reflection on the questions (Quinlan *et al.*, 2019:254). The topic guide is included in Addendum E. The topic guide was finalised after the artefact analysis (phase 1). Free and natural discussion was encouraged and the topic guide was therefore not followed word for word during the personal interviews.

The topic guide was accompanied by a file containing samples from the artefact analysis of Phase 1. The file contained samples from both genders and represented the different variety of the all the underpants elements from Objective 1. The samples served as probes during the interviews. Most of the questions from the topic guide asked the participants to evaluate the selections in the file.

#### *1.5.2.3 Data collection and analysis*

The chosen data collection method for this research study was qualitative face-to-face personal interviews. Eleven personal interviews took place during the data collection period. The interviews took place at a location deemed appropriate by each respective participant. The personal interviews took place on different dates, times and weekdays. During the interviews, samples from different underpants available in the local market were available for the participants to observe and feel. To avoid any bias towards a certain retailer, the labelling on each sample were removed and the samples were identified through a three-digit code. In addition, fabric swatches and elastic swatches were also used. These swatches were obtained by unpicking underpants from Phase 1 and labelling the individual elements with their own corresponding codes. With the permission of the participants, the interviews were recorded and transcribed with the Otter.AI app. Content analysis were used to analyse all language-based text derived from the transcripts of the interviews to come to research conclusions (Quinlan *et al.*, 2019:160). The researcher as well as the supervisor coded the data on Atlas.it using an *a priori* coding list to achieve inter-coding reliability.

## 1.6 TERMS AND DEFINITIONS

Table 1.2. below contains definitions of important terms and concepts used throughout the research study for the purpose of further clarification and theoretical validity.

**TABLE 1.2.: TERMS AND CONCEPT DEFINITIONS**

| TERM OR CONCEPT | DEFINITION | REFERENCE |
|---|---|---|
| Apparel-related participation barriers | Clothing and apparel related issues preventing people from engaging in meaningful activities, occupations and other areas within their community. | (Ayres, 1979) |
| Attention deficit/ hyperactivity disorder (ADHD) | A chronic condition, usually occurring in childhood before the age of seven, that is mainly characterized by short attention spans and impulsivity. | (Plug, Meyer, Louw & Gouws, 1986:1) |
| Autism Spectrum Disorder (ASD) | A lifelong neuro developmental disorder manifesting through communication and social interaction impairments, accompanied by stereotypical restricted and repetitive behaviour. | (Güçlü *et al.*, 2007) |
| Neurological threshold | A point where sensory stimuli are enough to activate a nerve cell or system where the individual becomes aware of the stimuli. | (Dunn, 2007) |
| Self-regulation | A behavioural construct continuum where on the one side a person may allow things to happen in their surrounding environment and then react or endure it, however on the other side the person may adjust his/her surrounds to a more manageable level. | (Dunn, 2007) |
| Sensitive skin | The prevalence of unpleasant sensations such as burning, stinging, tingling, pruritus, and pain in response to stimuli that should not provoke these sensations which may also occur without any visible lesions or skin diseases. | (Farage, 2019) |
| Sensory integration | The sensory input organization process within the nervous system. | (Ayres, 1979) |
| Sensory modulation | The process of information obtained from multiple sensory systems processing reactions to sensory input in a graded adaptive manner. | (Ross, 2016) |
| Sensory overreactivity | Adverse reactions to overwhelming sensory stimuli. | (Roy *et al.*, 2018) |
| Sensory Processing Disorder (SPD) | When the brain is unable to correctly analyse, filter and organize sensory information received from the body or surrounding environment. Also known as Sensory Integration Disorder or Sensory Modulation Disorder. | (Kabel *et al.*, 2016) |
| Social participation barriers | Limitations persons may face when participating in social situations. | (Dunn, 2007) |
| Tactile defensiveness | Unusual and adverse responses to some or any sort of tactile stimuli. | (Roy *et al.*, 2018) |
| Underwear/ Innerwear | Clothing items that are worn underneath to protect outer clothing from damage from any body excretions, to limit friction between outer clothing and the skin, to shape the body, and to provide support and concealment to sensitive areas. | (Datta & Seal, 2022) |

## 1.7 CHAPTER OUTLINES

This chapter covers the introduction of the research study by discussing the prevalent problems of children with sensory overreactivity feeling uncomfortable because of their underpants. This chapter provided a general introduction, the research problem and research justification, the aim and objectives of the research study, the research design and research methodology that this study made use of along with a list of definitions of terms that were used throughout the study.

Chapter 2 covers a review of available literature relating to the study's research problem. The conceptual framework of this research study is presented through the discussion of the relevant concepts to address the existing literature surrounding the research problem. It introduces SPD in children and explains how Dunn's (1997) model relates to SPD and the influence of clothing and underpants on sensory processing patterns. Furthermore, the elements in the study objectives are discussed and its sensory effect on the children as well as the perceived risks the parents face when shopping for underpants.

Chapter 3 explains the research design and research methodology in a detailed manner. The sample, sampling techniques, research questions development, collection of data, and the analysis of data are discussed and explained in detail. Special care was taken to ensure high-quality and ethical data. The measures taken to ensure the ethical soundness are also explained in this chapter.

Chapter 4 discusses the findings of the research study. The demographic characteristics of the sample are discussed according to the pre-requisites. Thereafter, the characteristics of the underpants selections were described. Each question asked in the interviews were discussed and analysed in each respective element with the help of insightful tables, to determine what elements of underpants are causing irritation to children with sensory overreactivity as well as the perceived risks that the parents face when shopping for underpants.

Chapter 5 is the final chapter of the dissertation. It explains and discusses the conclusions derived from the interpretations of the findings of the data collection. It also discusses the practical implications the research study faced regarding the findings, physical and theoretical limitations of the research study, and suggestions and recommendations for future studies.

## 1.8 CONCLUSION

This chapter was a general introduction to the research study. It covered the necessary background information about SPD to give insight into the research problem regarding underpants design properties that provoke sensory overreactivity among children, as well as the justification of the study. It also provided and briefly explained the key theories and concepts of the research problem. The following chapter will discuss them in more detail as mentioned in the outlines of the study.

# Chapter 2

# LITERATURE REVIEW

## 2.1 INTRODUCTION

This chapter covers a review of available literature relating to the research problem. Although the focus of this study is on the clothing properties and the consumer's perceived risks related to the purchasing of underwear, it is important to understand the reason why underwear can pose problems for children with sensory overreactivity. Therefore, for this interdisciplinary study, this chapter first explains the concept of overreactivity and the influence of underwear on sensory processing. Thereafter, focusing on the product itself, comfort is discussed followed by the various properties of underwear namely fiber content, fabrication, elastic, design/ fit, construction and labels. Furthermore, the difficulties parents face when shopping for underwear are reviewed in terms of perceived consumer risks. The chapter ends with the conceptual framework of the study.

## 2.2 SENSORY OVERREACTIVITY AND CHILDREN

Stimuli from the body and the environment provide the brain with information to understand and classify experiences and organize the appropriate responses to those experiences (Dunn, 2007). In some cases, a child's brain does not process sensory input in a typical way. This causes the brain to be unable to properly analyse, filter, sort and organise sensory input (Ross, 2016). This phenomenon is known as Sensory Integration Disorder (SID). SID is also known by other terms such as Sensory Overreactivity, Sensory Processing Disorder (SPD), Sensory Modulation Disorder, Sensory Integrative Disorder and Sensory Disintegration (Ross, 2016; Butler, 2021; Salkic, Ahmetovic, Velic & Krnojelac, 2022). This study will use the term Sensory Overreactivity.

There are various signs of sensory overreactivity and one of the most prominent signs is children being over-reactive towards sensory stimuli such as sight, sound, smell, and/or touch

sensations (Roy *et al.*, 2018). Children may also experience difficulty with their body coordination as well as fine hand movements, and organization and planning of daily activities (Ross, 2016). These reactions are attributed to the existence of sensory registration and modulation dysfunctions (Ayres, 1979).

Sensory overreactivity can affect any or multiple of the seven senses (Dunn, 2007; Ross, 2016). The seven senses include sight, hearing, smell, taste, touch, vestibular- and proprioceptive sense (Dunn, 1997). Any atypical sensory processing may result in undesirable behaviour in children (Gaines, Curry, Shroyer, Amor & Lock, 2014). Many children with sensory overreactivity experience unusual anticipation of being touched, wearing certain clothing items, listening to loud music and avoiding bright or flashing lights (Kyriacou *et al.*, 2021). Attributes of this kind of behaviour are more commonly observed among children with special needs but can also be detected in typically developing children (Salkic *et al.*, 2022). Sensory dysfunction in children may lead to distractibility and lack of focus, speech/language complications, and academic underachievement (Gaines *et al.*, 2014).

### 2.2.1 Sensory processing

Sensory processing (also known as sensory integration) is defined as the organisation of sensory stimuli received from the central nervous system to enable a person to respond to and interact with the surrounding environment (Ayres, 1979). Ordinarily, we are not aware of a single sense as the senses collaborate and integrate automatically to provide an appropriate response (Ross, 2016).

Understanding the neurological thresholds is vital to understanding sensory processing (Dunn, 2007). A neurological threshold is a point or amount of stimuli necessary to activate a single nerve cell or system (Dunn, 2007). Individuals can be hypo-responsive, where they experience a lack of stimuli according to their neurological thresholds thus not reacting to it, or they can be hyper-responsive, where they experience an excess amount of sensory stimuli (Kyriacou *et al.*, 2021). Sensory processing difficulties can affect the senses to a different degree as each individual has their own threshold range and these can differ for every sense (Dunn, 2007). Certain children, for example, may have a low threshold for touch while having a high threshold for hearing (Butler, 2021).

It is important to note that the stimuli do not change but rather that each individual's perception and experience of the stimuli differ (Ayres, 1979). Young children's central nervous systems may even fluctuate on particular days as well as particular sensory systems (Dunn, 2007). For

example, when the child is feeling tired after not getting adequate sleep the night before, loud auditory stimuli might be less tolerated (Dunn, 1997).

The findings of Dunn (1997) supported the relationship between the nervous system operations and the self-regulating strategies of an individual. When interacting with each other, they are categorized into four basic sensory processing patterns (Dunn, 1997). The four sensory processing patterns, as shown in Table 2.1., are Sensation Seeking, Sensation Avoiding, Sensation Sensitivity, and Low Registration (Dunn, 2007).

**TABLE 2.1.: DUNN'S (1997) MODEL OF SENSORY PROCESSING**

| | **BEHAVIOURAL RESPONSES/ SELF-REGULATING STRATEGIES** | |
|---|---|---|
| **Neurological Thresholds** | **Passive** | **Active** |
| **High threshold** | Low Registration | Sensation Seeking |
| **Low threshold** | Sensory Sensitivity | Sensation Avoiding |

Individuals functioning in the sensation-seeking pattern do not easily notice stimuli in their environment, thus they set out to create sensory experiences to stimulate their need for specific senses as they derive enjoyment from sensations in everyday experiences (Dunn, 2007; Gaines *et al.*, 2014). Intense sensory stimuli are needed for these individuals to register the input and react to it (Kyriacou *et al.*, 2021). Individuals functioning in the sensation-avoiding pattern have low thresholds causing them to be aware of more things in their environment that others may be oblivious of (Dunn, 2007; Gaines *et al.*, 2014). Their nervous system's limits are reached easier than others and they tend to avoid stimuli and overwhelming environments (Dunn, 2007; Kyriacou *et al.*, 2021). Individuals functioning in the low registration pattern do not notice stimuli that others would be aware of and have to engage in self-regulating strategies to capture stimulating input (Dunn, 2007). Individuals functioning in the sensory sensitivity pattern easily detect stimuli in their environment and usually react to them rather than avoid them by engaging in self-regulating approaches (Dunn, 2007). This study focuses solemnly on the sensory sensitivity or overreactivity pattern.

### 2.2.2 Tactile sensitivity

Touch is the first sense to develop in the body and the touch receptors are located in the skin, the largest organ of the body (Spies & Van Rensburg, 2012). The touch receptors also have

a significant influence on other bodily systems like cognition, emotions, interpersonal interaction, language and motor skills (Spies & Van Rensburg, 2012). From this information, it can be established that touch is one of the most important and influential senses. Hyper-responsiveness to stimuli of touch is also referred to as tactile defensiveness (Kyriacou *et al.*, 2021).

As mentioned earlier, each individual has their own unique sensory processing pattern which affects their functionality on a daily basis (Dunn, 2007). It is important for parents with sensory overreactive children to understand their child's sensory processing patterns, as well as for the child to understand them to the best of their ability (Spies & Van Rensburg, 2012). This will enable the parents to create an environment and a routine that are compatible with the child's sensory processing patterns to allow the child to participate as successfully as possible in everyday life (Dunn, 2007).

Children with sensory overreactivity who are very sensitive to the touch sense can also be referred to as tactile defensive (Roy *et al.*, 2018). Children who are tactile defensive may dislike being touched and will remove themselves from situations where light or unexpected touch will be involved (Ross, 2016). Clothing and, underwear in particular, have the potential to cause intense discomfort to these children (Roy *et al.*, 2018). Underpants is worn underneath the outer layers of clothing and is generally the first layer that touches the skin (Datta & Seal, 2022). If the underpants is perceived to be uncomfortable, these children will constantly feel distracted by the unpleasant sensation the underpants are causing them (Roy *et al.*, 2018). When the central nervous system continuously sends information about how uncomfortable the underpants feel, the child will find it challenging to focus on anything else (Dunn, 1997). This will lead to the children having physical, behavioural or in some cases both reactions (Kabel *et al.*, 2016). When the touch sense is overwhelmed, the sensory overreactivity can also spill over to other senses (Roy *et al.*, 2018). It may manifest in them not being able to complete their daily tasks, walking and moving clumsily, having emotional outbursts, and avoiding social interaction and physical touch (Roy et al., 2018). For this reason, this study will focus on ways in which underpants specifically can reduce tactile sensory overreactivity, aiding children in participating successfully in their daily activities and engaging with other children.

## 2.3 UNDERWEAR

Underwear is defined as clothing items that are worn close to the skin underneath outer layers of clothing to protect the body from friction and provide concealment (Datta & Seal, 2022).

Underwear clothing items consist of underpants, vests, socks and bras (Datta & Seal, 2022). However, this study focuses solely on basic undergarments for both girls and boys, specifically underpants. It is important to note that the term "underpants" carries a different meaning in the United States compared to the United Kingdom. In the United States, female underpants are commonly referred to as "panties" (Datta & Seal, 2022). For consistency within this study, the term "underpants" will be used to refer to underpants for both genders. Vests and weighted vests, which share similarities, can be examined in a separate research study and will not be included in this particular study. Additionally, socks present sensory challenges and can cause considerable irritation (Roy *et al.*, 2018). Given their significance, socks warrant a dedicated study and are therefore not included in this research. Furthermore, bras were not considered in this study as most young girls do not yet wear them.

### 2.3.1 Comfort

Comfort is the neutral state where an individual does not experience any pain or discomfort (Kamalha, Zeng, Mwasiagi & Kyatuheire, 2013). Three different types of comfort sensations have been identified: psychological, physiological, and sensorial/physical comfort (Ravandi & Valizadeh, 2011; Kamalha *et al.*, 2013; Tadesse *et al.*, 2019). Psychological comfort is described as comfort relating to whether the garment is appropriate or inappropriate in any way to the individual using it, either in a personal manner or for an occasion/specific environment (Ravandi & Valizadeh, 2011). Psychological comfort mainly deals with the subjectivity of the wearer and the aesthetic variables such as current fashion trends, colour, design/fit, and societal acceptance (Ravandi & Valizadeh, 2011; Kabel *et al.*, 2016). Psychological comfort is not as important for underpants as it is not a visible piece of clothing thus many of the variables are not applicable. Physiological discomfort deals with the discomfort the body may be experiencing at any given moment, such as feeling too cold, itchy, or excessive tightness of the garment (Ravandi & Valizadeh, 2011). Sensorial/physical comfort is derived from the many sensations of comfort or discomfort that the wearer may experience when a clothing item wholly or partially comes into contact with the skin (Kamalha *et al.*, 2013). This study will mainly focus on the sensorial/physical comfort of the underpants as it is the most important factor relating directly to SPD (Kamalha *et al.*, 2013). This type of discomfort can physically manifest in a child struggling to concentrate on a conversation with another child, or even school work because their brain is struggling to filter the sensory information he/she is currently receiving from their central nervous system (Roy *et al.*, 2018).

### 2.3.2 Underpants properties

As mentioned, this study specifically focuses on girls' and boys' underpants, aiming to explore the sensory overreactivity associated with these garments. Figure 2.1. provides a basic anatomical overview of both boys' and girls' underpants, highlighting the key elements comprising the underpants. Only the properties relevant to underwear will be discussed. In terms of fabric, the fiber content and fabrication are crucial factors (Ravandi & Valizadeh, 2011). An explanation of elastic will follow, examining its significance in the garment. The design and fit analysis will consider the type of cut and the wearing ease of the underpants. The discussion will then shift towards construction, specifically addressing seams and will conclude by exploring aspects related to labelling and trims.

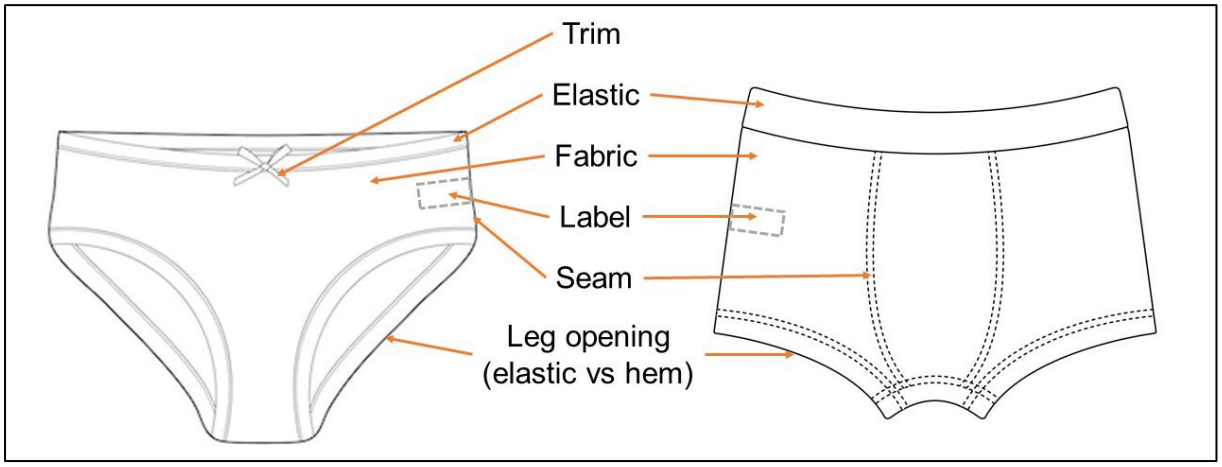


**FIGURE 2.1.: UNDERPANTS ANATOMY (Self-developed)**

*2.3.2.1 Fiber content*

Fiber content is the most effective variable in determining the overall comfort of the end product (Ravandi & Valizadeh, 2011). Fiber content depicts the ratio of different fiber types contained in textile production (Ravandi & Valizadeh, 2011). The fibers that are mostly used in underwear are cotton, polyester, nylon and elastane (Datta & Seal, 2022). Although there are many different fibres used, this study will primarily focus on cotton, polyester, elastane, and fiber blends as they are the most widely used fibers in children's underpants. These fibres are responsible for comfort, mild-good absorbency, and mild resiliency when a wrinkle-recovery finish is applied (Kadolph, 2007:41).

Cotton is one of the most comfortable fibers to wear as it has high moisture retention, a soft hand, good heat conductivity, and does not become static (Kadolph, 2007:47). The fibers absorb body moisture such as sweat and allow it to evaporate easily, making the fibers

breathable and water-vapour permeable (Ravandi & Valizadeh, 2011). The lumen inside the fiber structure can absorb and contain moisture, giving the fiber its desirable qualities (Kadolph, 2007:47). Figure 2.1. shows the cross-sectional and longitudinal views of cotton fibers, where the lumen can clearly be seen in the cross-sectional view. Additionally, cotton fibers are also strong, dye absorbent, and have high abrasion resistance (Ravandi & Valizadeh, 2011). Aside from all the advantages of cotton such as its comfort and breathability, it is however more prone to be a breeding ground for bacteria (Datta & Seal, 2022). Thus it requires more processing during fabric production than synthetic fibers to make them more resilient to environmental damage from insects, mould, mildew, and sun overexposure (Kadolph, 2007:332,374).

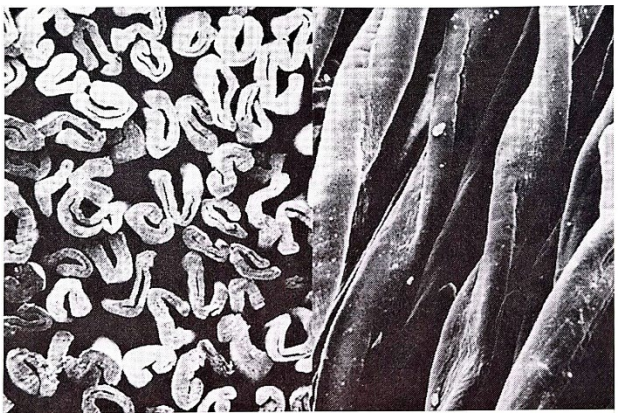

**FIGURE 2.2.: CROSS-SECTIONAL (LEFT) AND LONGITUDINAL (RIGHT) PHOTOMICROGRAPHS OF COTTON FIBERS (Kadolph, 2007:44)**

Due to their chemical structure and physical properties, synthetic fibers cannot compare to natural fibers in terms of heat conduction and thermal isolation, sufficient bulk, soft hand, and moisture absorbency (Ravandi & Valizadeh, 2011). They are however strong fibers and have good abrasion resistance, dimensional stability, and durability (Ravandi & Valizadeh, 2011). In comparison to cotton fibers, polyester does have lower water-vapour resistance, however, it does not have good thermal resistance and liquid-water permeability (Kadolph, 2007:134; Ravandi & Valizadeh, 2011). Polyester has lower moisture retention and better crease resistance than cotton, but it is not breathable (Kadolph, 2007:135). Figure 2.2. shows the cross-sectional and longitudinal views of polyester fibers.

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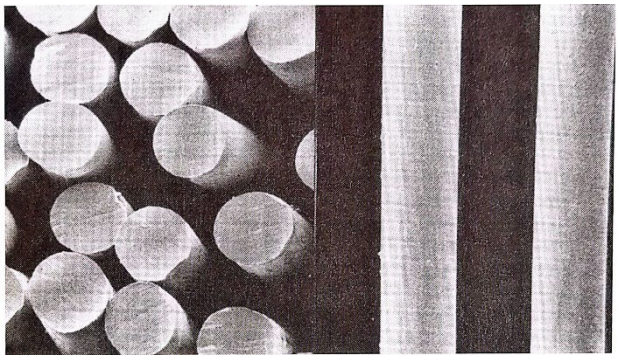


**FIGURE 2.3.: CROSS-SECTIONAL (LEFT) AND LONGITUDINAL (RIGHT) PHOTOMICROGRAPHC OF POLYESTER (Kadolph, 2007:133)**

In an effort to retain the advantages of both fibers and reduce the disadvantages, cotton fibers are frequently blended with different fibers such as linen, nylon, polyester, and wool (Ravandi & Valizadeh, 2011). Most blended fibers used in underpants are cotton and polyester. A blend level of 65% polyester and 35% cotton is normally recommended for lightweight and/or medium-weight fabrics (Kadolph, 2007:189). Underpants are expected to fit snugly on the body, thus requiring a certain amount of stretch. Elastane is one of the most desirable fibers for underwear as it reduces the bulk of the fabric and increases its abrasion resistance (Datta & Seal, 2022). Figure 2.3. shows the cross-sectional and longitudinal views of elastane fibers.

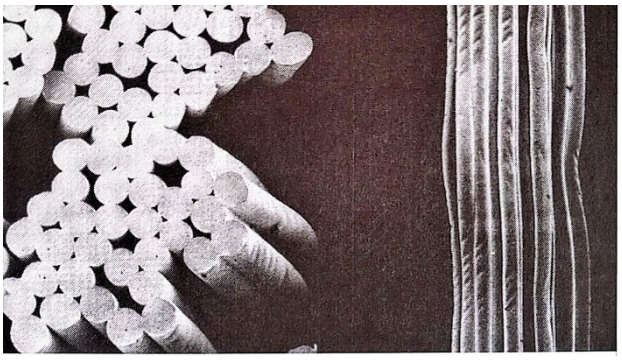


**FIGURE 2.4.: CROSS-SECTIONAL (LEFT) AND LONGITUDINAL (RIGHT) PHOTOMICROGRAPHS OF ELASTANE (Kadolph, 2007:157)**

Elastane is rarely used alone in fabric production and is commonly combined with cotton, nylon, polyester and other similar fibers (Kadolph, 2007:158). Elastane is not comfortable for direct skin contact thus the blended level rarely exceeds 10% for normal underpants (Kadolph, 2007:158; Datta & Seal, 2022). Although blended fibers are acquired through an expensive and complicated process involving much research and experimentation, there are several benefits that they provide; the final fabric will have more desirable performance characteristics, improved uniformity, better fabric appearance, texture, hand, reduced fiber costs and ability to cross-dye or obtain unique colour effects (Kadolph, 2007:189). However, the comfort of a

garment is the intricate effect of its textile properties, which depends on the chemical and physical structure of the fibers it contains, and also its fabrication (Ravandi & Valizadeh, 2011).

*2.3.2.2 Fabrication*

There are three distinctly different methods to produce fabric, namely woven, knitted, and non-woven methods (Kadolph, 2007:214). Figure 2.4. shows the difference between a woven and knitted fabric. The fabrication of underpants is knitted (Kadolph, 2007:274). The knit structure is an integral factor in the overall comfort of a garment (Datta & Seal, 2022). Knitted fabrics have higher elasticity than woven fabrics making them more desirable for underpants as the loop structure of the knitted fabric allows the garment the dimensional properties it needs to conform to the body (Ross, 2016; Datta & Seal, 2022).

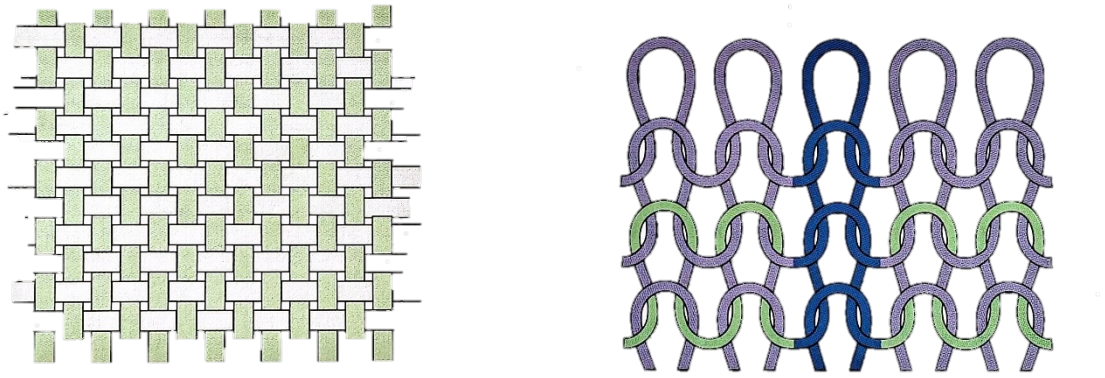


**FIGURE 2.5.: TECHNICAL FACE OF BASIC WOVEN FABRIC (LEFT) AND JERSEY KNIT FABRIC (RIGHT) (Kadolph, 2007:216, 269)**

There are two different methods of knitting, namely weft knitting and warp knitting (Kadolph, 2007:270, 283). Figure 2.5. shows the difference between the two knitting methods. Weft knitting is when a yarn or yarn set is knitted in crosswise directions to produce a fabric, while warp knitting is when yarns are interloped in lengthwise directions to produce a fabric (Kadolph, 2007:470, 489). Weft-knitted fabrics for underpants have excellent elastic recovery and form-fitting properties that depend on how the yarn loops change form when stretched (Datta & Seal, 2022). Warp-knitted fabrics have similar advantages to weft-knitted fabrics, however, it does not curl at the edges, are normally run-resistant, and are flatter (Kadolph, 2007:283), also making them suitable for use in underwear.

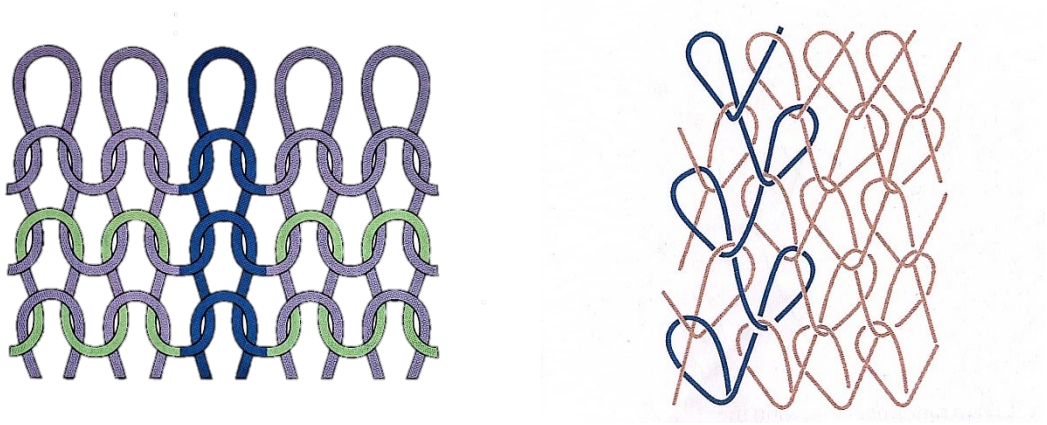


**FIGURE 2.6.: TECHNICAL FACE OF WEFT KNITTING (LEFT) AND WARP KNITTING (RIGHT) (Kadolph, 2007:269, 283)**

The most common fabrication method for underpants is single jersey knit, raschel, one-by-one rib knit, double-layer rib knit, and in the case of thermal underwear, interlock fleece (Kadolph, 2007:278; Datta & Seal, 2022). Upon inspection, most underpants are fabricated with a single jersey knit. Single jersey knit is a single-filling knit that can be flat-knitted or circular-knitted (Kadolph, 2007:474). The right side of the fabric displays the knit stitch and the wrong side of the fabric the purl stitch (Datta & Seal, 2022). Single jersey knit is the fastest knit to make and uses the least complicated machinery (Kadolph, 2007:274). Single jersey knits can also contain any fiber content and are also available in many different colours and patterns thus making the fabric customizable (Kadolph, 2007:474; Datta & Seal, 2022). The desirable characteristics of single jersey knit fabric includes a soft hand, comfortable wear and good stretch, making it a suitable option for underpants (Datta & Seal, 2022).

*2.3.2.3 Elastic*

An elastic is a thread, cord, ribbon or fabric with flexibility (Bubonia, Kontzias, Gioello & Berke, 2012:150). The majority of underpants have an elastic as a waistband (Datta & Seal, 2022). The elastics that are most widely used in underpants waistbands are braided, knitted, plush-back elastics and other variations of these elastics (Brown & Rice, 2014). The following table summarizes the most widely used elastics with their definitions and appearance.

**TABLE 2:2.: SUMMARY OF ELASTICS**

| Figure | Type of Elastic | Definition |
|---|---|---|
|  | Braided elastic | An elastic braid with a pre-determined length used to fit garment fullness to the body (Bubonia *et al.*, 2012:150). |
|  | Encased braided elastic | A knitted elastic that is applied to the garment in the same manner as bias binding (Bubonia *et al.*, 2012:151). |
|  | Knitted elastic | An knitted elastic with a thread covered core (Bubonia *et al.*, 2012:151). |
|  | Elastic with picot top | A variation of a knitted or braided elastic. An elastic with a soft strip of edge finishing (Bubonia *et al.*, 2012:151). |
|  | Plush-back elastics | Elastics with a soft surface that faces the skin and provides cushioning (Brown & Rice, 2014:322). |
|  | Jacquard Rib knit elastic | Elastics with a repeat pattern woven into the elastic band (Kadolph, 2007:250). |
|  | Webbed elastic | Also known as “non-roll” elastics. These elastics are used around the waist in circumstances where an ordinary elastic would be uncomfortable (Brown & Rice, 2014:322). |

The majority of underpants only have the elastic as a waistband finish instead of also having a fabric covering (Brown & Rice, 2014:322). The boys’ underpants normally have elastic braids and non-roll ribbed elastics as their waistband elastics (Bubonia *et al.*, 2012:150). These elastics typically range in width between 0.06 cm to 7.65 cm and 1.9 cm to 5.1 cm (Bubonia *et al.*, 2012:150). The elastics can either be sewn on or it can be enclosed in the fabric (Glock & Kunz, 2005:558). In some cases, lingerie elastic will be used for girls’ underpants since it has a picot top (Brown & Rice, 2014:322). These elastics are used where a casing is not applicable and to provide a decorative finish (Bubonia *et al.*, 2012:151).

Research conducted on elastic waistbands and their effect on children with sensory overreactivity remains limited, however, it has been established that they pose a problem (Jordaan, 2021). Elastics are one of the main culprits in clothing, not just because of how they feel, but also because they are normally positioned to fit around sensitive areas on the body such as the waist (Jordaan, 2021). An uncomfortable elastic fitting over a sensitive area of the body can trigger children with sensory overreactivity (Roy *et al.*, 2018). Many factors

contribute to the comfort of an elastic waistband such as the texture of the elastic, tightness of the elastic, and where the elastic fits on the body (Jordaan, 2021). Girls' underpants that normally use decorative and edged elastics can cause severe discomfort as the rough edges and decorative yarns (such as lurex yarns) of the elastics can trigger sensory overreactivity (Bubonia *et al.*, 2012; Roy *et al.*, 2018).

*2.3.2.4 Design and fit*

The appropriate design and fit of underpants are directly related to the preferences of the child (Datta & Seal, 2022). A certain cut will suit one child's body while it can feel extremely uncomfortable to another child (Ravandi & Valizadeh, 2011). Some children prefer a looser fit while others want the garment to cover more parts of the body to make them feel more secure (Roy *et al.*, 2018; Datta & Seal, 2022). The inappropriate design/ fit may cause the wearer discomfort and lead them to lose preference for that particular product (Farage, 2019; Datta & Seal, 2022). Correctly fitting underpants will enhance physiological and psychological comfort and increase product satisfaction (Ravandi & Valizadeh, 2011; Datta & Seal, 2022). Sometimes, the simple act of putting the underwear on can be a long process if the child is uncomfortable in the tight fit of the garment and/or if there is a specific detail that disturbs them (Oetojo, 2019).

Regarding the design of clothing, a recent study found that the colour, design and trend preferences of typically developing children and children with special needs do not differ significantly (Oetojo, 2019). It is safe to assume that the same principle applies to underpants. Some will prefer bright and warm colours, while some will be more drawn to muted natural colours (Gaines *et al.*, 2014). Both like design details and will enjoy themed garments, however, sensitive children may choose more minimalistic designs (Oetojo, 2019). Although the underpants are not visible to others, children still enjoy underpants in their favourite colour or with prints of their favourite television show character (Oetojo, 2019). Retailers depend on theming their underpants merchandise with popular cartoon or television characters as it has proven to increase sales (Cook, 2009).

One overlooked factor in most studies is the fit of the garment during different ranges of movement. The majority of clothing items are designed to fit well in the anthropometric position where an individual stands with their feet squared and their arms next to their sides (Datta & Seal, 2022). Children spend little time in this position as they are known to be active and rarely keep still. When walking, sitting, climbing stairs or running uphill, the garment will require additional tolerances for better ease of movement (Datta & Seal, 2022). Children with sensory overreactivity may find it overwhelming to constantly receive negative feedback from their

bodies regarding the fit of their underwear as they move around (Dunn, 2007). Some underpants do not tolerate sudden changes in body dimensions while moving and have a tendency to restrict these movements which causes the wearer discomfort (Ravandi & Valizadeh, 2011). The most popular styles for girls' underpants manufactured in South Africa are the bikini cut and boyleg cut, while for boys' underpants, the preferred styles are briefs and trunks.

*2.3.2.5 Construction*

Many studies have indicated that seams are one of the big culprits from a sensory point of view (Roy *et al.*, 2018; Kyriacou *et al.*, 2021; Salkic *et al.*, 2022). Most underpants are constructed using superimposed, lapped, bound and edge finished seams. Their specific seam classes are SSa, BSa, LSa, Efa, and EFd (Shaeffer, 2014:514-522). SSa seams are used for the side seams, BSa and LSa to attach the elastic, and EFa and EFd to attach the leg opening elastics. This construction method has remained relatively unchanged over the past few decades. It is time- and cost-efficient and requires relatively low skills (Shaeffer, 2014:119-120). Figure 2.7. shows the most common seams used to construct underpants.

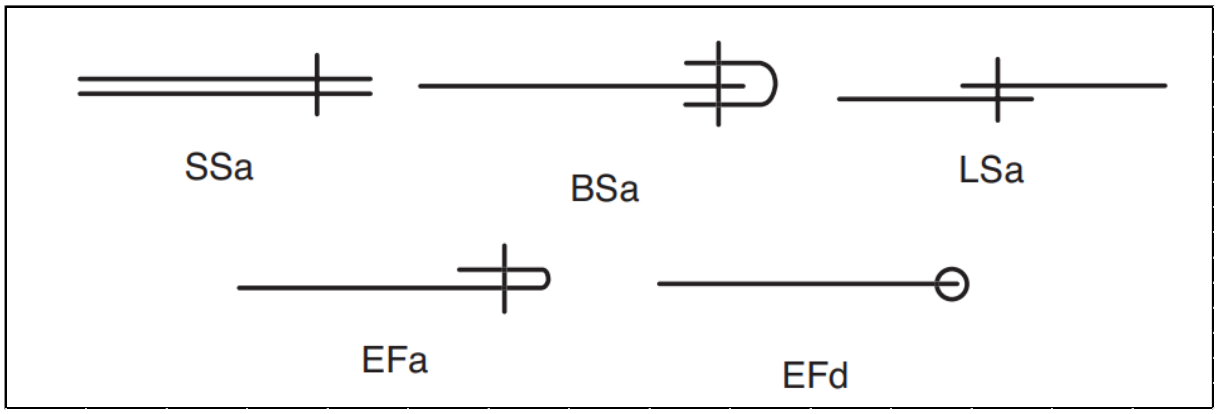



**FIGURE 2.7.: ASTM SEAM CLASSIFICATION OF COMMONLY USED SEAMS (Shaeffer, 2014:514; 516)**

Many children with sensory overreactivity have displayed unfavourability toward seams, specifically the basic superimposed seams (SSa) (Roy *et al.*, 2018; Jordaan, 2021). Usually, the fabric surface or edges of the underpants are rough, it abrades or pricks the skin, or leaves imprints on the skin which can be uncomfortable and in some cases, painful (Datta & Seal, 2022). Skin irritation can also stem from seams and any loose threads on the garment (Datta & Seal, 2022).

In an effort to minimize rough seams and stitches, a variety of sew-free methods are being applied by different brands (Datta & Seal, 2022). Advancing technology has produced special weft and warp knitting machinery to produce “seamless” garments (Zhao, Hu, Shen & Rong, 2013). Seamless garments, also known as “one-step-moulding garments”, are defined as knitted products that were produced without the use of neck, waist, or hip seams (Zhao *et al.*, 2013). These seamless garments almost eliminate the problem of uncomfortable bulky seams that the original construction method created, and due to their flexible nature can create room for customization to specifically cater to the needs of children with sensory overreactivity (Oetojo, 2019). These “seamless” garments are knitted on circular machines and during the finishing of the garments still require some seams and hems (Kadolph, 2007:271). Thus, even these garments that are being marketed as seamless, are not truly seamless. However, the reduced number of seams is a step in the right direction. The gusset is one of the areas that will always have some seams. Gusset is defined as a piece of fabric that is cut into a diamond-like shape which is inserted between seams at the bottom of the underpants (Carrillo, 1997). The problem with the gusset is that the seams can often times be bulky and thick (Lau & Yu, 2016), which can be very bothersome to children with sensory overreactivity (Roy *et al.*, 2018). Thus, more research can be done in the industry to improve seamless knitting designs to eliminate those bulky seams.

*2.3.2.6 Labels and trims*

Consumers use different terms to refer to the labels found inside the underpants such as “tags”. This study will use the term “label”. The label typically contains information about the fiber content, care instructions and manufacturer details, which are permanently sewn onto the garment to provide consumers with the necessary information for product use and care (Kadolph, 2007:432-433). These labels are mostly printed labels, however, some retailers have started using heat transfer labels (Bubonia *et al.*, 2012:156-157). The care labels are normally inserted in a center fold manner inside the side seam of the garment while the sizing labels are sewn either also in a center fold or a miter fold (Bubonia *et al.*, 2012:159). Unfortunately, they can add bulk to the seam in which they are inserted and the stitching can be rough and abrasive to the skin. It has been established that labels can be bothersome to children with sensory overreactivity and often end up requiring removal from the garment (Oetojo, 2019). Retailers cannot opt out of attaching labels to their garments as government labelling regulations state that the fiber content, country of origin, manufacturer identification number and care instructions must be permanently fastened to every garment (Bubonia *et al.*, 2012:160-162). Thus, it is not a matter of producing garments without any labels but finding a way to make those labels more sensory-friendly. Nowadays, technology has advanced to the

point where brands can attach their brand and size labels seamlessly through the use of thermal transfer printing, where the labels will be printed onto the finished garment (Datta & Seal, 2022). Screen-printed labels can be used to display the brand image while causing the wearer little to no discomfort (Oetojo, 2019).

Underpants do not contain many if any, trims (Datta & Seal, 2022). The boys' underpants mostly make use of prints, however, some of the girls' underpants may have a small ribbon bow attached to the waistband elastic at the front.

## 2.4 UNDERWEAR SHOPPING: PERCEIVED RISK

Much stress is placed on the parents when shopping for comfortable underpants for children with sensory overreactivity. The child's internal system, including bodily sensations and experiences, has a reciprocal relationship with his/her external system, which includes their surrounding environment and their parents (Spies & Van Rensburg, 2012). The behaviour of the child will influence the response of the parent and vice versa. The parents want to make sure that their child's needs are met in the best way possible and if they are unable to, feelings such as guilt and incompetence might surface (Butler, 2021; Kyriacou *et al.*, 2021). Potentially contributing to the problematic situation is the limited availability of sensory-friendly underpants in the South African market. The local retailers remain uneducated or oblivious on the special needs of some members of society as this is reflected in their merchandise mix (Pillay *et al.*, 2021). Consumers' sensory reactions toward a product greatly influence their purchasing decisions (Farage, 2019). Seventy-eight percent of consumers who claim to have sensitivities avoid products when having previous unpleasant sensory reactions towards them (Farage, Berardesca & Maibach, 2012; Farage, 2019). Previous unpleasant experiences can increase a consumer's perceived risk since their trust in a similar product is diminished (Ortega-Egea & García-de-Frutos, 2021). This applies to shopping for suitable underpants for children with sensory overreactivity. There are multiple different designs, types, and cuts of underpants on the market (Datta & Seal, 2022). A child may reject specific underpants and the parent will want to replace it hoping another would be more suitable, however, they might be hesitant to believe that a different pair may work better. This process can snowball, especially if the parents are still experimenting with the different types of underpants to find a pair that their child will accept. It is a tiring process that can evoke negative feelings such as guilt, hopelessness, and disappointment in the parents (Spies & Van Rensburg, 2012).

### 2.4.1 Perceived risk

In consumer decision-making it is not only the product that is taken into consideration, certain psychological factors also play a pivotal role (Schiffman, Kanuk & Wisenblit, 2018:36). Of great importance is the perceived risk associated with the purchase which directly influences the consumer's motivation to purchase a product or not (Hoyer, MacInnis, Pieters, Chan & Northey, 2017:58). When purchasing a product, the consumers' first concern is seldom the product itself, but rather the perceived risks they associate with the product which can decrease their purchase intention (Chen & Huang, 2017). Bauer (1960) first introduced the concept of perceived risks. Bauer (1960) defined perceived risk as a subjective consumer behaviour that relates to the amount of uncertainty and the consequences which the consumer associates with a purchasing action (Demirgüneş, 2015). A perceived risk consists of two components: uncertainty (a possibility of unfavourable outcomes), and consequences (situations occurring as a result of a bad purchase) (Mathur & Gangwani, 2021). Although the child is the end consumer who will wear the product, the parent is responsible for purchasing the underpants. Therefore, the parent will experience perceived risks. Although perceived risk has received a lot of attention in consumer research (Almousa, 2019; Ortega-Egea & García-de-Frutos, 2021), inconsistencies still occur with the categorisation and naming of the types of perceived risks. This study decided to use the below categories (see Figure 2.3.) that was applicable to the research aim by consulting a variety of sources (Solomon, Russell-Bennett & Previte, 2004:361; Demirgüneş, 2015; Hoyer *et al.*, 2017:59). As illustrated in Figure 2.8., perceived risk can be categorised into six main types namely functional/ performance risk, social risk, psychological risk, time and effort risk, financial/monetary risk, and physical/safety risk (Solomon *et al.*, 2004:361; Demirgüneş, 2015; Hoyer *et al.*, 2017:59). Only the perceived risks that are most likely to occur when shopping for underpants for children with sensory overreactivity will be discussed. Physical/ safety risk refers to the potential harm that purchasing and consuming a product might pose to the consumer (Hoyer *et al.*, 2017:59). In terms of clothing, a safety risk can be that which threatens the health or vitality of the consumer (Solomon *et al.*, 2004:272). The underpants itself may not pose many safety risks to the consumer, but the topic of hygiene risks can be explored when it comes to the fitting of the underpants. Many consumers may not feel comfortable fitting the item or the packaging may not allow them to thus this will form part of the functional risk. Physical/ safety risk will therefore not be discussed any further.


**FIGURE 2.8.: TYPES OF PERCEIVED RISK (Self-developed from Hoyer *et al.*, 2017, Solomon and Rabolt, 2012 and Demirgüneş, 2015)**

**Functional/ performance risk** is when the product does not perform according to the consumer's expectations leading to the consumer's dissatisfaction (Schiffman *et al.*, 2018:155). Functional risk is inherent to all products in every industry and when the perceived functional risk is high, consumers automatically become less willing to purchase the product (Chen & Huang, 2017). When the product cannot be accurately judged or evaluated, the perceived functional risk often increases (Chen & Huang, 2017). Many times, the parents are not able to bring their children with them to shop for underpants because they may not react well to the retail environment or the parent could only go shopping while the child is at school or an after-school activity (Kabel *et al.*, 2016). This can lead to the parents feeling uncertain about a product and becoming less willing to purchase it since the child is not present to confirm or deny the uncertainties (Demirgüneş, 2015). In this study, the focus will be whether the underpants are comfortable or not. A possible solution to perceived functional/performance risk is to provide the consumers with more information about the product to enable them to make a more informed choice (Demirgüneş, 2015).

When the consumer is concerned that a purchase does not receive approval from the consumer's friends or family **social risk** is experienced (Jacoby & Kaplan, 1972). Different products will have varying levels of social risk (Mpinganjira, 2013:234). Products that could contain social risk are products that are noticeable to others and correspond to the self-image of the consumer, for example, clothing and fashion accessories (Mpinganjira, 2013:234). Apparel products are more prone to face social risks as they are seen as experiential and have a sense of symbolism (Mathur & Gangwani, 2021). Although underpants will not be visible to other people, the effect of the product might manifest in behaviour that might pose a social risk to the parent. When the child feels agitated or stressed by the uncomfortable underpants, they may react negatively towards others or even themselves. Their reactions

may include aggressive outbursts such as screaming, crying or being unable to sit still, and even self-injurious actions such as throwing themselves on the floor or hitting themselves (Kabel *et al.*, 2016). This situation can cause the child and parent discomfort in social gatherings and can lead to them avoiding any social opportunities (Kabel *et al.*, 2016). Thus, social risk might demotivate a consumer from purchasing a product, especially if the consumer will be placed in a situation where they would experience disapproval from family or friends (Mathur & Gangwani, 2021).

**Psychological risk** is very similar to social risk in the sense that both deals with how society may view the self. Psychological risk is related to the self-image of the consumer (Ortega-Egea & García-de-Frutos, 2021). Although children may be young, they can still feel self-conscious. Wearing a particular pair of underpants may make them feel more self-conscious and even weaken their self-image even if nobody else sees the underpants (Ortega-Egea & García-de-Frutos, 2021). This could lead to the child refusing to wear the underpants and to rather pick another pair that they find comfortable. Often they choose a pair that has been washed multiple times and may have a few holes or loose threads/seams (Ortega-Egea & García-de-Frutos, 2021).

**Time and effort risk** is the uncertainty related to the time spent in the process of purchasing the item (Hoyer *et al.*, 2017:59). In terms of this study, it might probably be of great importance since searching for the best product can be highly time-consuming. Local retailers haven't quite started to cater for the needs of sensory-sensitive children (Pillay *et al.*, 2021). Thus, finding suitable underpants in the local market may be very time consuming and come with great effort as the available merchandise may not offer suitable products. One participant in Kabel *et al.* (2016) stated that an innovative idea for retailers to make their products more accessible to sensory-sensitive children could be to offer home visit appointments where the children could try on the new clothing items in the safety and familiarity of their own home. This solution could potentially eliminate this perceived risk as the parent will not be required to leave the house and spend an extended time trying to guess which underpants their child would approve of. However, this venture could be deemed too expensive for a relatively low-price item such as underpants.

Lastly, **financial risk** occurs when consumer fears that a purchase will not be worth the money spent (Schiffman *et al.*, 2018:202). With the limited range of comfortable underwear in the South African market, parents might perceive a large financial risk associated with the shopping endeavour. The perceived financial risk generally increases the more expensive the product is (Mpinganjira, 2013:234). Underpants may be relatively cheap compared to other articles of clothing, however, when the parents need to buy more underpants, they will end up

spending a large sum of money on a relatively cheap product. Some parents might also be importing sensory-friendly underpants from other countries. The tariff rate for finished goods is 30% (International Trade Administration, 2021). Thus, apart from the initial price of the product, consumers need to pay the shipping fee as well as import tax which can increase the cost of the purchase drastically (International Trade Administration, 2021). Additionally, young children grow at a rapid pace. They outgrow their clothing items between a few months and a few years (Gam, Cao, Farr & Kang, 2010). As a result, their clothes and underwear need to be replaced before they have been worn to the end of the product's lifetime. Many families might not have the financial means to sustain these purchasing decisions and are forced to compromise by purchasing cheaper local alternatives (Roy *et al.*, 2018). These alternatives may not be able to cater as efficiently to the child's needs and cause sensory overreactivity. A popular way to mitigate financial risk is by offering better exchange/return policies (Mathur & Gangwani, 2021). However, underwear and specifically underpants often cannot be exchanged due to hygienic implications thus financial risk will always be relatively higher than the rest of the perceived risks for underpants.

It has been empirically proven that product knowledge has a direct effect on the perceived risk the consumer experiences during consumer decision-making (Solomon *et al.*, 2004:360). It is therefore important to gain knowledge on the properties of underwear and how it influences sensory overreactivity. It will not only enhance the life of the child wearing the underwear but the parent as a consumer, will also benefit from it.

## 2.5 CONCEPTUAL FRAMEWORK

The conceptual framework, as illustrated in Figure 2.9., visually demonstrates the main objectives of the research study and the different concepts linked to the objectives.

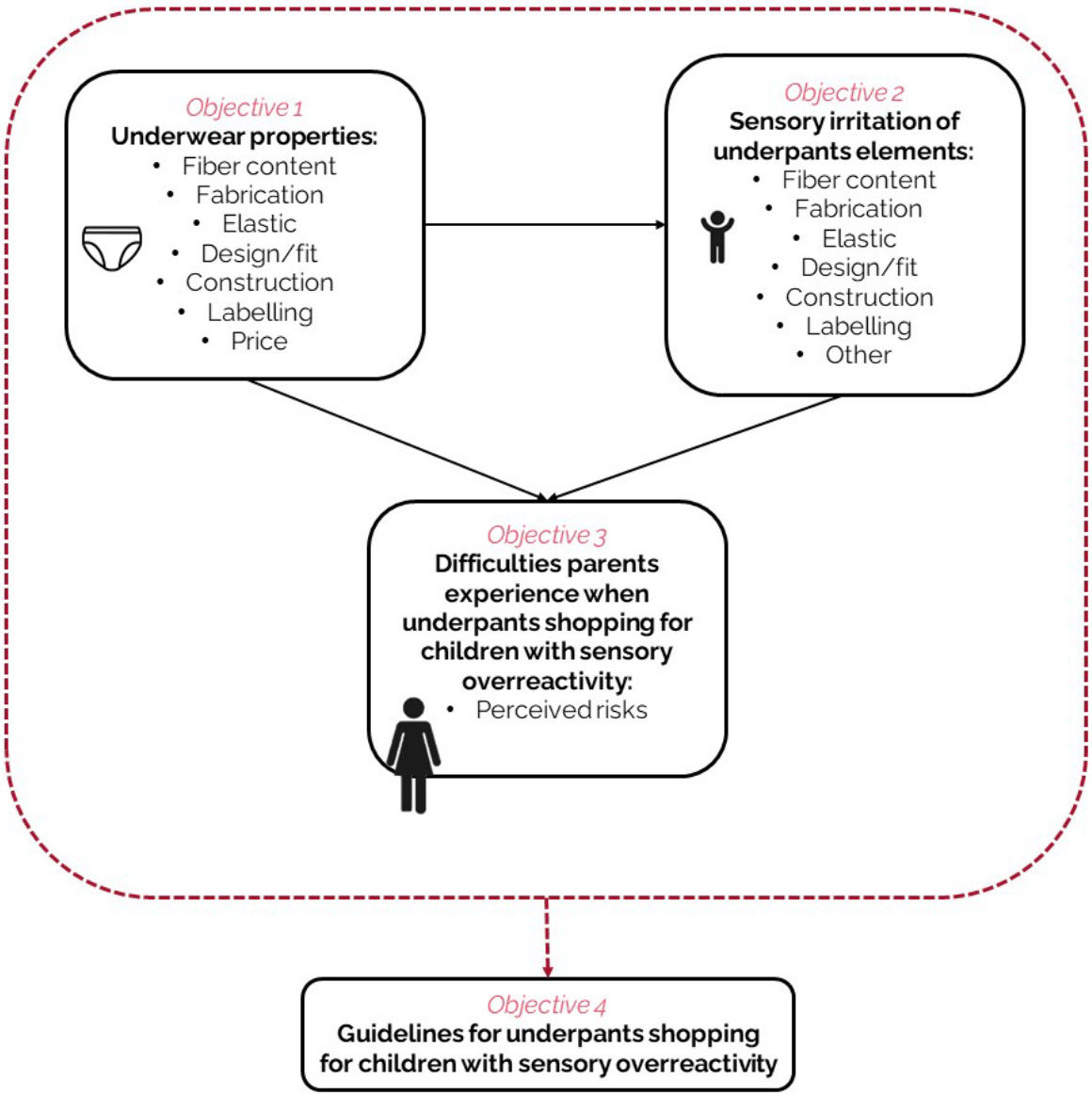



**FIGURE 2.9.: CONCEPTUAL FRAMEWORK**

With the use of artefact analysis, objective 1 focused on the properties of a selection of underpants specifically in terms of fiber content, fabrication, elastic, design/fit, construction, labelling, and price. Objective 2 focused on determining which elements of underpants cause sensory irritation for the child, from the parent's perspective. Objective 3 aimed to explore and describe the various difficulties that a parent faces when shopping for underpants for a child with sensory overreactivity. It will mainly focus on the perceived risks a consumer faces and in addition also the effect of the availability of suitable options. After the completion of objectives 1, 2, and 3, objective 4 took a holistic view of the findings of the preceding objectives and use it to compile a guideline to aid parents in the purchasing of underpants for their children with sensory overreactivity.

## 2.6 CONCLUSION

In this literature review, sensory overreactivity in children has been discussed. Shopping for underwear and specifically underpants, remain a problematic situation for both the parents and the child. The different properties namely, fiber content, fabrication, elastic, design/fit, construction, and labels, and their contribution towards the research problem have been discussed as how certain elements could be improved to provide a more sensory-friendly product. The perceived risk that the parents are subjected to while shopping for underpants has been identified and discussed and the problems faced in the local retail market have been identified. Lastly, the study's proposed conceptual framework containing the research objectives was presented.

# Chapter 3

# METHODOLOGY

## 3.1 INTRODUCTION

Research in the social sciences focuses on human beings' behaviour towards issues they face living in a society in an attempt to gather information and explain certain situations (Kumar, 2015:7). This chapter aims to explain the research design, the methodology the study followed as well as the aspects related to the quality of the study and the ethical soundness. Firstly, the research design is presented and the research paradigm is discussed. As explained in Chapter 1 this study used two phases, namely artefact analysis and face-to-face interviews. The methodology of these different phases is explained separately in chronological order. The operationalisation table of the study is thereafter presented. Lastly, this chapter explains the measures that were taken to ensure quality through credibility, transferability, dependability, confirmability, and ethical soundness throughout the study.

## 3.2 RESEARCH DESIGN

The study's research aim and objectives were included in this section to provide clarity as the research design is discussed. This study aimed to get a better understanding of how and why the different elements of underpants cause discomfort for children with sensory overreactivity, as well as factors that influence parents of children with sensory overreactivity when shopping for underpants to provide practical guidelines to them when purchasing underpants. The research objectives were set out as follows:

**Objective 1**: To analyse a selection of underpants specifically in terms of:

- Price
- Fiber content
- Fabrication
- Elastic
- Design/Fit
- Construction
- Labelling

**Objective 2**: To explore and describe the sensory irritation of the different elements of underpants specifically in terms of:

- Fiber content
- Fabrication
- Elastic
- Design/Fit
- Construction
- Labelling
- Other

**Objective 3**: To identify and analyse the risks parents face when underpants shopping for children with sensory overreactivity.

**Objective 4**: To develop underpants shopping guidelines for children with sensory overreactivity.

This study was exploratory and descriptive since this research problem is still relatively under-researched and needs to be further explored. The study aimed to develop a deeper understanding of the problem (Quinlan *et al.*, 2019:130). The following diagram visually demonstrates the sequential flow of the study's methodology:


**FIGURE 3.1.: SEQUENTIAL FLOW OF THE RESEARCH DESIGN**

The study consisted of two phases. The first phase was an artefact analysis of a selection of girl and boy underpants from the leading clothing retailers operating in South Africa. It consists of a basic evaluation of the product and a comparison of the differences between products. Personal interviews were conducted during the second phase, of this study. Both phases followed qualitative research approaches. Both phases were cross-sectional as they only focused on gathering data once instead of over a period (Quinlan *et al.*, 2019:290).

In the two phases, this study used two different types of data sources. The use of multiple types of data sources in a single project specifically enhances triangulation (Flick, 2014:11). Triangulation is paramount in instituting the trustworthiness of data by reducing any forms of bias and associations that the researcher may have (Nieuwenhuis, 2019:45). The findings of Phase 1 were used to construct the topic guide questions for Phase 2 as it became clear where sensory problems could be experienced and what questions would provide the most relevant information. The primary data source of this study was the personal interviews conducted in

Phase 2. The findings of Phase 1 supported the findings gained from the interviews (Phase 2) (Nieuwenhuis, 2019:103).

Lastly, the research paradigm of this study, which is the fundamental collection of beliefs that direct the actions, will be discussed (Guba, 1990:17). The paradigm of this study was rooted in constructivism. Constructivism aims to rely as far as possible on the views multiple participants have of the phenomenon in question and to seek understanding (Creswell, 2014:8). Broad and descriptive questions were asked during the interviews to allow the participants to construct the meaning of the phenomenon (Creswell, 2014:8,147). The focus is placed on understanding the perspectives the participants hold (Creswell, 2014:6,9). Since this study is explorative and descriptive, this paradigm is the most suitable as it provides the researcher with a means of gathering the information personally and gaining a deeper understanding through the constructs of meaning provided by the participants.

## 3.3 METHODOLOGY

As mentioned earlier, although the interviews were the primary data source of this study, the findings from the artefact analysis were used during the interviews. The methodology related to the artefact analysis will therefore be explained first, followed by the methodology of the interviews in chronological order.

### 3.3.1 Phase 1: Artefact analysis

Artefacts are defined as objects with artistic, educational, functional, religious, or technological natures that individuals, cultures or communities create for a purpose (Nieuwenhuis, 2019:102). Artefacts may not have meaning in themselves but derive their meaning from who made them as well as what it has been created to do (Nieuwenhuis, 2019:102). Artefact analysis normally forms part of ethnography studies where the cultural symbolism and/or social association of an artefact is studied (Creswell & Poth, 2018:95). Another type of artefact analysis is material artefact analysis. This type of analysis is not ethnographic but observational and examines the material qualities or characteristics of artefacts such as fabric composition (Hanington & Martin, 2019:14). This study did not observe the artefacts from a cultural point of view nor did the study aim to uncover the meaning of the artefacts and utilised material artefact analysis. The focus was rather to analyse them from a physical and functional point of view. Material artefact analysis entails an expert inspection of the physical artefact recording the findings in worksheets and with photographs (Goldkuhl, 2019). The findings gained from the analysis were then used to construct the sample file that was referenced during

the interviews. For this phase, a selection of different underpants options were the artefacts used. They were purchased from the leading brick-and-mortar retailers in South Africa.

*3.3.1.1 Artefact sample selection*

The artefacts were purchased in May 2022. The retailers include Ackermans, Cotton:On Kids, Edgars, H&M, Jet, MRP, Pep Stores, PnP Clothing and Woolworths. These retailers are the main brick-and-mortar retailers in South Africa (Marketline, 2021) that include children's underpants in their product offerings. All the underpants options available for girls and boys aged 4 to 5 years from each retailer were purchased and formed part of the selection of artefact samples. Note that due to time and financial constraints, the selection was not extended to online retailers such as Superbalist and Shein, since it would have been extremely difficult to determine which retailers and artefacts to include in the selection. The sample of artefacts purchased from the nine retailers that did form part of the study totalled 38 different artefact samples, including 16 girl samples and 22 boy samples. The distribution per retailer is presented in Table 3.1.

**TABLE 3.1.: ARTEFACT SAMPLE DISTRIBUTION PER RETAILER**

| Retailer | Number of girl samples | Number of boy samples |
|---|---|---|
| Ackermans | 2 | 4 |
| Cotton:On Kids | 1 | 2 |
| Edgars | 2 | 3 |
| H&M | 2 | 2 |
| Jet | 1 | 3 |
| MRP | 2 | 2 |
| Pep Stores | 2 | 3 |
| PnP Clothing | 1 | 1 |
| Woolworths | 3 | 2 |
| **TOTAL** | **16** | **22** |

*3.3.1.2 Data collection and analysis*

In this study, content analysis, a systematic and detailed approach to analysing data aimed at identifying distinct characteristics and themes (Leedy & Ormrod, 2015:102), was utilised. This method aligns well with the systematic nature of artefact analysis conducted in Phase 1 of the study. Unlike thematic analysis, content analysis may incorporate quantitative elements, such as counting (Leedy & Ormrod, 2015:276; Denzin & Lincoln, 2018:1074) which was evident in the data analysis of Phase 2, where frequencies were employed to present certain findings. Unlike other methods of data analysis, such as thematic analysis, content analysis necessitates comprehensive planning before the commencement of the analysis (Leedy & Ormrod, 2015:276). Despite its frequent use in secondary data analysis, this study employed

content analysis for primary data analysis. Verbal, visual, or textual data can be effectively analyzed using content analysis techniques (Leedy & Ormrod, 2015:276). Furthermore, content analysis is closely associated with the constructivist research paradigm (Denzin & Lincoln, 2018:1074). Within a constructivist worldview, the primary objective is to comprehend the issue at hand, particularly by considering the perspectives of various participants.

Data analysis took place from April 2022 until July 2022. As prescribed by Martin and Hanington (2019:14), the data analysis was systematic, since a set of variables/ elements under investigation was decided on and a corresponding table was drafted in Excel that was completed per artefact. Each underpants sample was provided with a unique three-digit code and placed inside a plastic zip-lock bag for organisation and safe-keeping (See Figure 3.2.). The codes were used throughout the study for the individual elements such as elastic, labels, and fibre content. The use of the codes disassociated the samples from the retailers and largely aided in the avoidance of any subconscious and subjective bias toward any retailer or characteristic. Most of the underpants were sold in multipacks. The whole multipack was classified under the same three-digit code to avoid confusion and unnecessary complications. Once the samples received a code, they were prepared for evaluation by way of deconstruction. All elements were placed back inside the same zip-lock bag when they were ready for evaluation. Table 3.2. provides an overview of how the different variables/elements were evaluated. Note that a follow-up study (possibly a PhD study) will delve into the fit of the garments and mechanical quality assessment, as such an investigation falls outside the scope of this study.


**FIGURE 3.2.: PHOTO OF SAMPLE MANAGEMENT**

**TABLE 3.2.: INDICATION OF EVALUATION METHOD**

| Variable | Analysis |
|---|---|
| Price | Information on the label. |
| Fibre content | Information on the label. |
| Fabrication | Basic identification with a magnifying glass. (e.g. Single jersey) |
| Elastic | Basic identification of the type of elastic. |
| Fit | Style variations (e.g. bikini vs. boyleg). |
| Construction | Seam class, seam type (e.g. Superimposed seam vs. lapped seam) |
| Labelling | Basic identification of label type and placement. |
| Other | Basic identification of other elements present (e.g. bows). |

To add to the convenience of the evaluation process a separate supportive document was created to correspond the samples with their respective codes. This allowed the researcher to sort the selection according to the abovementioned variables. During the deconstruction process and set-up of the supporting document, each underpants from the selection was compared in a visual and tactile manner.

### 3.3.2 Phase 2: Face-to-face interviews

Semi-structured interviews formed part of the second and primary data source of this study. A topic guide with a combination of closed- and open-ended questions was followed and the opportunity was given for probing and further clarification (Nieuwenhuis, 2019:108). All participants received the same set of questions, however, there was some flexibility to encourage new information (Nieuwenhuis, 2019:108-109).

#### *3.3.2.1 Sample and sampling techniques*

The target population was South African parents with children who have sensory overreactivity and struggles specifically with underpants. Instead of the children, the parents/guardians were targeted as their shopping experiences and associated risk perceptions were researched to complete the last two research objectives. Potential participants had to be residing close to Centurion and Pretoria in the Gauteng province to participate in the study. Their geographical location formed part of the selection criteria as the researcher, who was based at the University of Pretoria, had to be able to travel to them. The participants need to have a child with sensory overreactivity between the ages of three and thirteen at the time of data collection. Other than the area of residence and age of the child, there were no specific requirements for the demographic variables of the participants which increased the scope of possible participants.

The participants were reached through non-probability sampling methods which is the selection of a sample based on convenience and personal judgement (Quinlan *et al.*,

2019:181). The specific non-probability sampling methods used in this research study were convenience sampling and purposive sampling (Creswell & Creswell, 2018:234; Quinlan *et al.*, 2019:184-185). Convenience sampling was used to recruit participants who were conveniently and easily available to the researcher (Maree & Pietersen, 2019:219). Purposive sampling was used to recruit participants with children with sensory overreactivity to fulfil the specific purpose of the study (Maree & Pietersen, 2019:220).

The researcher approached a few occupational therapists (OTs) to assist in reaching the correct unit of analysis. All the OTs adhered to the South African POPIA Act in the way they introduced possible participants to the researcher. A custom-made invitation was also shared with occupational therapists in the area to distribute to their clients who fit the criteria. This invitation was also shared on online support groups and social media. The invitation had a brief description of the research study and what the participants could expect to participate in, as well as the contact details of the researcher and the research supervisor. With the online distribution of the invitation, a Google Forms link was attached where individuals could disclose their contact details for the researcher to use to make an appointment.

Snowball sampling was used to reach other possible participants in the interconnected group (Maree & Pietersen, 2019:220). The participants were asked to share the details of the study with other individuals who fit the criteria. Quota sampling was to some extent also utilised to ensure that the number of parents of boys and girls was almost equally represented (Quinlan *et al.*, 2019:185). Data collection continued until data saturation occurred, resulting in a final sample of 11 participants. As a token of appreciation, an R250 Checkers voucher was given to each participant after the interview took place.

#### *3.3.2.2 Sample file development*

After Phase 1 a sample file was developed for use during Phase 2, the personal interviews. During the interview, it was necessary for the researcher to make use of probing to clarify some answers given by the participants and to gain more insight (Quinlan *et al.*, 2019:222). Probing also eliminates any personal bias or assumption from the interviewer making its way into the research data (Quinlan *et al.*, 2019:221), especially in this case where the research phenomenon is relatively unexplored and has ample opportunity for misunderstandings. The samples in the sample file served as probes during the interviews. The file contained samples from both genders. The samples in the file included different fabric bases, elastics, leg opening seams/elastics, design/fit, seams, labels, prints and other decorative elements. All samples were sorted according to gender to create a chronological and organized flow during the interview. The samples were cut in a manner that the brand/retailer could not be identified. The only exception was with the label samples and two of the print samples.

As can be seen in the sample file p.2 and p.13, the **fabric base** samples were 6cm x 6cm square samples cut from the fabric from the underpants. Samples representing all the different fibre compositions from the whole selection were chosen to be a part of the fabric base selection. Thus, the fabric base samples included all the different available fibre content combinations without repeating the same combination. The girls' fabric bases consisted of five samples, while the boys' fabric bases consisted of eight (Explanation in Chapter 4). Questions were asked regarding the fabric base of the underpants, whereafter the participant had to evaluate the selection of samples.

The **elastic samples** were cut off from the underpants' waistbands in 10cm long strips. For the girls' section, two strips were cut from each underpants, one containing the stitching and the other one where the stitches had been unpicked leaving only the raw elastic. This was done to draw more attention to the decorative/metallic yarns in the elastic than the stitching. The entire underpants selection was scanned to identify different types of elastics. If there were underpants with the same type of elastic, only one was chosen to be displayed in the file. The girls' samples were 13, while the boys' were nine in total. Participants were asked to evaluate each sample and identify the best and worst. (See sample file p.3 and p.15).

Similar to the elastic samples, the **leg opening samples** were cut. Some leg openings were finished with elastic and other leg openings were finished with hems. The entire selection of underpants was scanned to identify the different leg opening finishes. The samples were chosen in the same manner as the elastics, with no samples displaying the same finishing. The girls' samples were eight, while the boys' were seven. The participants were asked to evaluate each sample and identify the best and worst. (See sample file p.5 and p.17).

The **design/fit samples** were approached differently from all the other samples in the file. The samples had to be an entire garment, thus out of the product selection a handful was chosen to represent all possible style variations (e.g. bikini vs boyleg). The samples were placed inside an envelope inside the file. They were not fastened to the page like the rest of the samples as they had to be evaluated and compared from every angle. The girls' samples included four style variations, while the boys' samples included five style variations. The participants were asked which sample was most like the style they were purchasing and which best suited the preferences of their child. (See sample file p.7 and p.19).

The **seam samples** were cut 2 cm away from the seam on both sides. Aside from appearance, the samples were chosen based on the feel of the seams and the different places they were located on the underpants. The girls' seams were mostly located on the sides, while the boys' seams were also located at the side front. For the girls' samples, eight different seams were included and for the boys, 13 seams were included. The participants were asked to evaluate every sample and point out the best and worst seam. (See sample file p.8 and p.20).

The **label samples** consisted of the underpants' label unpicked from its point of fastening. The labels were then fastened to the page inside the file. The samples included booklets and different styles of labels such as center folds. The samples were also chosen based on the feel of the labels. The girls had seven samples while the boys had 12. The participants were asked about the child's placement preference and if printed labels would be accepted as well as the evaluation of the samples. (See sample file p.10 and p.22).

The **print samples** were the last samples to be displayed in the file. The samples were cut in the same manner as the fabric base samples. The samples were chosen based on the feel and texture of the print. Prints were the main decorative element across all underpants, however, some of the girls' underpants had decorative bows placed usually in the centre front on the waistband. Thus, the girls had four print samples and one bow sample, while the boys had six samples. (See sample file p.11 and p.23).

*3.3.2.3 Topic guide development*

The measuring instrument was a semi-structured topic guide that was used during each interview. This topic guide consisted of open-ended questions to gather as much information from the participants' understanding, thoughts and reflection on the questions (Quinlan *et al.*, 2019:254). The topic guide was finalised after the conclusion of Phase 1 since the findings from the artefact analysis were used to structure the questions. A free and natural discussion was encouraged and the topic guide was therefore not followed word for word during the personal interviews. The topic guide is included in Addendum E and consists of the following sections:

**Section A:** The first section of the topic guide consisted of different questions dedicated to certain properties of the underwear samples such as the fibre content, fabrication, elastics, design/fit, labelling, and construction. The questions in this section specifically focused on objectives 1 and 2 to gain insight into the problems and experiences regarding specific elements. The findings gained from the artefact analysis in Phase 1 were used to structure and organize the questions. The samples contained in the file were strategically chosen from the artefact selection. The participants had to evaluate them according to their child's preferences followed by the most and least favourite of the selection. The questions were structured in a way to encourage participants to give feedback on each sample and to give further insight into a specific problem or one relating to it. For example, the participants were asked to evaluate every fabric base sample (sample file p.2,13) according to their child's preferences. The follow-up question asked the participants which sample would be best suited to their child's preferences, and which one not.

**Section B:** While Section A focused solemnly on the underpants, Section B focused on the whole shopping experience for underpants. The questions aimed to gain information about the parents'/caregivers' experience when shopping for underpants for their children and the perceived risks they may potentially face. For example, the participants were asked if they found it challenging to purchase underpants for their child and to elaborate by explaining why.

*3.3.2.4 Data collection*

The chosen data collection method for Phase 2 was qualitative face-to-face personal interviews. The interviews took place at a location deemed appropriate by the participant. These locations included their personal residence, coffee shops, and even at afterschool activities while the parents waited for their children. The personal interviews took place on different dates, times and weekdays. Depending on the amount of information the participants provided, the interviews took between 20 – 40 minutes. In order to provide the participants with ample time to answer the set questions, the researcher told them that the interview would take an hour of their time. Before the interviews commenced the researcher explained to the participants that their participation was voluntary and that they had the right to stop the interview at any time. It was also explained that there was no pressure to answer the questions in a certain way as there were no right or wrong answers. All the information was also disclosed in the consent form that they were required to sign beforehand.

During the interviews, the participants were presented with a sample file to evaluate with the corresponding questions as set out in the topic guide. With the permission of the participants, the interviews were recorded to be transcribed during the data analysis process.

*3.3.2.5 Data analysis*

The chosen data analysis method must be suitable for the research and design approach of the study (Nieuwenhuis, 2019:125). As discussed in 3.3.1.2, this study used content analysis for both phases. The interview recordings were transcribed with the Otter.AI app. The researcher checked each transcription by reading through the typed verbatim while listening to the recording. This process was done shortly after the interview while the researcher could still clearly recall the information. This enabled the researcher to identify poor-quality audio in the recording while reading through the transcription. The researcher as well as the supervisors coded the data on Atlas.ti. An initial code book with *a priori* codes was used where the meaning units of the codes were identified, based on the elements discussed in the research objectives, before the data analysis process began (Nieuwenhuis, 2019:138). During the data analysis, new codes emerged as there were data that could not be coded. The data was then analysed to determine if it belonged to a subcategory of an existing code, or if it belonged to an entirely new code (Nieuwenhuis, 2019:138). The coders periodically re-evaluated the codebook and

debated the codes until an agreement was reached and adjusted accordingly. This enhanced the inter-coder reliability (Cofie, Braund & Dalgarno, 2022). The chosen data analysis method must be suitable for the research and design approach of the study (Nieuwenhuis, 2019:125). The text data from the transcriptions were categorized underneath different dimensions of the overarching problem to increase the organization of the data set. This would ensure efficient interpretation of the data and aid in the write-up of the findings.

## 3.4 OPERATIONALISATION

Table 3.3. below represents the objectives, and dimensions, together with the corresponding measurement and data analysis methods.

**TABLE 3.3.: TABLE OF OPERATIONALISATION**

| Objective | Dimension | Measurement | Data analysis |
|---|---|---|---|
| **Objective 1: To analyse a selection of underpants specifically in terms of:** | Fibre content | **Phase 1**: Artefact analysis | **Phase 1**: Content analysis |
| | Fabrication | | |
| | Elastic | | |
| | Design/Fit | | |
| | Construction | | |
| | Labelling | | |
| | Other | | |
| **Objective 2: To explore and describe the sensory irritation of the different elements of underpants specifically in terms of:** | Fibre content | **Phase 2**: Qualitative personal interviews | **Phase 2**: Content analysis |
| | Fabrication | | |
| | Elastic | | |
| | Design/Fit | | |
| | Construction | | |
| | Labelling | | |
| | Other | | |
| **Objective 3: To explore and describe the difficulties parents experience when underpants shopping for children with sensory overreactivity.** | Availability of suitable products | **Phase 2**: Qualitative personal interviews | **Phase 2**: Content analysis |
| | Perceived risks | | |
| **Objective 4: To develop guidelines for underpants shopping for children with sensory overreactivity.** | | | Integrating findings from Objectives 1, 2, and 3. |

## 3.5 QUALITY OF THE STUDY

The quality of qualitative research studies lies in the trustworthiness of the study. There are four criteria for trustworthiness namely, credibility, transferability, dependability, and

conformability (Lincoln & Guba, 1985:301). Each criterion is discussed in detail below. Table 3.4. outlines the measures taken in this study for each criterion.

Credibility relates to the internal validity of the study (Shenton, 2004). Credibility was established through prolonged engagement with the participants to build trust and to gain important knowledge of their backgrounds to eliminate any biased interpretation (Lincoln & Guba, 1985:303). They were also given a supporting document which contained information about the study they were participating in, a consent form, and information on how the interview would take place. This enabled the researcher to have prolonged as well as varied engagement with each participant (Forero, Nahidi, De Costa, Mohsin, Fitzgerald, Gibson, McCarthy & Aboagye-Sarfo, 2018). The data sources used in this study were triangulated to form a sound justification for the themes used during the data analysis process (Creswell, 2014:201). Purposive sampling was used to obtain a nominated sample of participants (Forero *et al.*, 2018).

Transferability relates to the external validity of the study (Shenton, 2004). The transferability was demonstrated by providing the widest possible scope of information that can be disclosed in the research report (Lincoln & Guba, 1985:316). The boundaries of the study were clearly described. These boundaries included the requirements and restrictions possible participants had to adhere to, the number of participants that were participating in the study, the chosen data collection methods and reasons as to why they were most suited, the length of the face-to-face interviews, and the time in which Phase 1 and 2 took place (Shenton, 2004).

Dependability relates to the reliability of the study (Shenton, 2004). To increase dependability, the data were collected consistently throughout the artefact analysis and all personal interviews. If the research is to be repeated at a later stage, similar findings should be achieved (Quinlan *et al.*, 2019:402). A detailed description of the research design and implementation, thorough detail of data gathering, and a reflective appraisal have been provided throughout the report (Shenton, 2004). The researcher also made sure to document and transfer the data collected from both Phase 1 and 2 to secure storage online thus safeguarding the data for future use.

Conformability relates to the objectivity of the study (Shenton, 2004). To ensure reflexivity, the individuals on the research team each brought different perspectives to the data interpretation to achieve a collective interpretation of the findings (Forero *et al.*, 2018). Data source and investigator's triangulation were made use of to increase conformability (Forero *et al.*, 2018). All individuals on the research team provided their perspectives and expertise to improve and/or change the research methodology to best suit the nature of the study and to yield the best findings from the data collection.

**TABLE 3.4.: STRATEGIES TO ENSURE TRUSTWORTHINESS (Shenton, 2004)**

| Possible provision | Strategies applied to study |
|---|---|
| **Credibility** | |
| Use of appropriate, well-recognized research method/s. | Artefact analysis and face-to-face interviews are widely recognized and trusted research methods. |
| Use of random sampling to acquire participants. | Purposive sampling was used. |
| Triangulation via the use of different methods, types of participants, and different sources. | Supporting data was derived from Phase 1 for Phase 2. |
| Strategies to help ensure the honesty of participants. | Participants were encouraged to be frank and provide their full opinion whilst knowing that their participation was voluntary. |
| Debriefing sessions between researcher and supervisors. | The researcher and supervisor held several debriefing sessions before, during, and after the data collection process. |
| Inclusion of “reflective commentary”. | Throughout the process, the researcher and supervisor took note of certain aspects that could be improved upon or changed. |
| Member-checks of collected data and interpretations. | The transcripts of the face-to-face interviews were examined by more than one individual on the research team. Participants were also asked to confirm their given information after the conclusion of the interview. |
| **Transferability** | |
| Provision of background data to provide context and detailed description of the researched phenomenon to allow comparisons to be made. | Provision of the widest possible scope of information. The participant requirements and number, data collection methods, length of interviews, and the timeframe of collection were thoroughly discussed. |
| **Dependability** | |
| Use of “overlapping methods”. | All data was collected consistently throughout the data collection process. |
| In-depth description of methodology. | The research design, data gathering, and evaluation were discussed in detail. |
| **Confirmability** | |
| Use of triangulation to reduce the effect of investigator bias. | Different data sources and investigator’s triangulation were used. |
| Recognition and discussion of shortcomings in the methods used and their potential effects. | All individuals on the research team provided their perspectives and expertise to develop the most suitable research methodology. |
| In-depth description of methodology to allow integrity of results/findings to be scrutinised. | The research design, data gathering, and data analysis were discussed in detail. |

In qualitative research, intercoder reliability is of great importance. However, the procedure to determine intercoder reliability has been a topic of debate among scholars for many years (Cofie *et al.*, 2022). Intercoder reliability is where multiple researchers work on the same data and constantly agree with one another (Quinlan *et al.*, 2019:282). This study made use of Cofie *et al.’s* (2022) recently developed checklist to establish intercoder reliability. The authors developed a list of eight guidelines that contribute to intercoder reliability. Table 3.5. indicates how this study followed the eight guidelines.

**TABLE 3.5.: EIGHT GUIDELINES FOR INTERCODER RELIABILITY (Cofie *et al.*, 2022)**

| Guidelines | | Justification |
|---|---|---|
| There was a minimum of two coders/observers. | Yes No | |
| At least one coder/observer was more removed from data collection. | Yes No | |
| At least one coder had expertise and previous experience with coding qualitative data. | Yes No | |
| If there were multiple participant groups, a minimum of two coders coded transcripts from each participant groups. | Yes No | Not applicable. |
| The coders used the same framework for analysis. | Yes No | |
| Coders focused on shared meaning of codes through dialogue and consensus. | Yes No | |
| Another coder with expertise in qualitative methods was consulted to resolve outstanding conflicts. | Yes No | No conflicts arose during the data analysis process. The coders discuss all discrepancies until a consensus was reached. |
| Coder consensus resulted in a codebook that was applied when coding the remaining transcripts. | Yes No | |

The study used most of the criteria to establish intercoder reliability. It is recommended that the researchers fulfil most of these guidelines to ensure the authenticity, meaningfulness, rigour, and trustworthiness of the research (Cofie *et al.*, 2022). Two of the guidelines had negative answers since they did not apply to this study or were not experienced.

## 3.6 ETHICS

Special care has been taken to ensure the ethical integrity of the research study. In-text references have been used throughout the study to give credit to the original authors and to avoid any form of plagiarism (Creswell & Creswell, 2018:182). The data collection only commenced after the acquirement of ethical clearance from the Faculty of Natural and Agriculture. The ethics approval document (NAS239/2022) is included in Addendum A.

Participants were invited to form part of the research study and they were informed that their participation was voluntary and they could withdraw at any given moment (Quinlan *et al.*, 2019:255). They were also informed that they may opt out of the process at any given moment without providing a reason and will not face any negative repercussions (Quinlan *et al.*, 2019:224). They were asked to sign the consent form before the interview commenced (see Addendum D). Since the discussion was about underpants, some participants might have been reluctant to share information on this sensitive topic. The researcher understood that this topic could potentially stir up negative emotions such as shame, embarrassment, and anxiety.

Special care was taken to avoid collecting and disclosing harmful and intimate information given by the participants and to mitigate any questions that could cause harm to the participant (Creswell, 2014:98). The privacy of the participants was protected by not revealing any personally identifiable information (Creswell, 2014:99). The information provided by the participants were not disclosed to any individuals outside of the research team or to other participants (Quinlan *et al.*, 2019:224). In addition, the names of retailers have been substituted by “Retailer A”, “Retailer B”, and so forth, throughout the final document to avoid any identifiers to avoid adding personal biases and to keep the study fair and ethical. The signed consent forms were placed in a locked drawer inside the office of one of the study supervisors. Any personal information contained in electronic documents was secured so that only the researcher and study supervisor could access it. The data was uploaded to the UP digital repository. The data collected has also been ethically analysed by multiple researchers to limit data entry errors (Creswell & Creswell, 2018:238) and to ensure there is no presence of researcher bias (Quinlan *et al.*, 2019:257). The researcher aimed to deliver the research findings honestly and to adhere to all applicable ethical considerations to provide a research report of high quality. Special consideration was given to avoid plagiarism by giving credit to the seminal authors of the research constructs. The plagiarism declaration from the researcher can be found in Addendum B.

## 3.7 CONCLUSION

This chapter explained the research design and methodology of the study in detail. The sample and sampling techniques, development of the topic guide and sample file, as well as the data collection and analysis, were discussed. It also explained the measures that were taken to keep the data quality at a high level and ensure ethical soundness.

# Chapter 4

# RESEARCH FINDINGS AND ANALYSIS

## 4.1 INTRODUCTION

This chapter provides an overview of the findings of the study. As explained, this study had two phases. Phase 1 consisted of an artefact analysis of a selection of 4-6-year sized underpants samples from the most popular brick-and-mortar stores in South Africa. Phase 2 consisted of 11 face-to-face semi-structured interviews. The participants were required to be parents of a child with sensory overreactivity aged between three and thirteen years old. Phase 2 was the main data source whereas Phase 1 was supportive. The findings of Phase 1 were used during Phase 2. In this chapter, the phases will be discussed in chronological order as they took place, starting with the artefact analysis (Phase 1), followed by the qualitative interviews (Phase 2).

## 4.2 PHASE 1: ARTEFACT ANALYSIS

Phase 1 included an analysis of a selection of underpants for both genders. The main focus points during the analysis were price, fiber content, fabrication, elastics, design/fit (the cut), construction (seams), labelling and other decorative elements. For ethical purposes, the retailers were not disclosed to the participants or in the study report and were renamed as Retailer A, Retailer B, Retailer C, etc. As explained in full in Chapter 3, for organisational purposes each underpants pack was given a unique 3-digit code. Tables 4.1. and 4.2. present the findings of the selection of underpants according to the outlined focus points. Table 4.1. presents the results of the girls' underpants and Table 4.2. presents the results of the boys' underpants. Some samples were listed as "(3-digit code)a" and "(3-digit code)b". This was done to demonstrate and distinguish between underpants in the same pack consisting of different fiber contents.

## TABLE 4.1.: ANALYSIS OF GIRLS' UNDERPANTS SELECTION

| Sample | Retailer | Price p/unit | Fiber content | Fabrication | Elastic | Image of elastic | Fit | Construction | Labelling | Other |
|---|---|---|---|---|---|---|---|---|---|---|
| 035 | Retailer A | R35.57 | 100% Cotton | Single jersey knit | Knitted elastic binding raw edge |  | Bikini | Side seams: SSa<br>Waist: BSa*<br>Leg opening: EFa*<br>Gusset: SSa | 3 Page printed satin label in CB | |
| 038 | Retailer B | R26.00 | 100% Combed Cotton | Single jersey knit | Knitted lingerie elastic with picot top |  | Bikini | Side seams: SSa<br>Waist: LSa*<br>Leg opening: LSa*<br>Gusset: SSa | Printed satin label in side seam | Ribbon bow CF |
| 036 | Retailer B | R25.80 | 100% Cotton | Single jersey knit | Plush-back elastic with lurex front |  | Bikini | Side seams: SSa<br>Waist: BSa*<br>Leg opening: EFa*<br>Gusset: SSa | Printed satin label in side seam | |
| 040 | Retailer C | R26.66 | 100% Cotton | Single jersey knit | Knitted elastic |  | Bikini | Side seams: SSa<br>Waist: BSa*<br>Leg opening: EFa*<br>Gusset: SSa | Printed satin label in side seam | Organza ribbon at waist elastic |
| 041 | Retailer C | R12.85 | 100% Cotton | Single jersey knit | Decorative elastic |  | Bikini | Side seams: SSa<br>Waist: BSa*<br>Leg opening: EFa*<br>Gusset: SSa | Printed satin label in side seam | |
| 042 | Retailer D | R18.00 | 100% Cotton | Single jersey knit | Braided elastic with picot top |  | Bikini | Side seams: SSa<br>Waist: BSa*<br>Leg opening: EFa*<br>Gusset: SSa | Printed satin label in side seam | Ribbon bow CF |
| 043 | Retailer E | R14.33 | 100% Cotton | Single jersey knit | Braided elastic with lurex insert and picot top |  | Bikini | Side seams: SSa<br>Waist: BSa*<br>Leg opening: EFa*<br>Gusset: SSa | Printed satin label in side seam | Ribbon bow CF |
| 044 | Retailer F | R18.00 | 65% Polyester 35% Cotton | Single jersey knit | Braided elastic |  | Bikini | Side seams: SSa<br>Waist: BSa*<br>Leg opening: EFa*<br>Gusset: SSa | Printed satin label in side seam | |

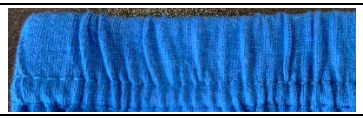
## TABLE 4.1.: ANALYSIS OF GIRLS' UNDERPANTS SELECTION (CONTINUE)

| Sample | Retailer | Price p/unit | Fiber content | Fabrication | Elastic | Image of elastic | Fit | Construction | Labelling | Other |
|---|---|---|---|---|---|---|---|---|---|---|
| 045 | Retailer E | R14.33 | 100% Cotton | Single jersey knit | Knitted elastic |  | Bikini | Side seams: SSa<br>Waist: BSa*<br>Leg opening: EFa*<br>Gusset: SSa | Printed satin label in side seam | |
| 032 | Retailer G | R21.99 | 100% Cotton | Single jersey knit | Plush-back elastic with lurex hearts |  | Bikini | Side seams: SSa<br>Waist: BSa*<br>Leg opening: EFa<br>Gusset: SSa | Printed satin label in side seam | |
| 046 | Retailer G | R29.99 | 100% Cotton | Single jersey knit | Braided elastic with picot top |  | Bikini | Side seams: SSa<br>Waist: BSa*<br>Leg opening: EFa<br>Gusset: SSa | Printed satin label in side seam/ center fold | Ribbon bow CF |
| 034 | Retailer A | R45.80 | 95% Cotton 5% Elastane | Single jersey knit | Elastic braid encased in fabric |  | Boyleg | Side seams: SSa<br>Elastic: EFa*<br>Leg opening: EFa<br>Gusset: SSa | 3 Page printed satin label in CB | Ribbon bow CF |
| 037 | Retailer I | R63.33 | 95% Cotton 5% Elastane | Single jersey knit | Knitted elastic with lurex stripe |  | Boyleg | CF & CB: SSa<br>Elastic: LSa<br>Leg opening: EFa<br>Gusset: EFd; SSa | 4 Page printed satin label in CB/ heat transfer size label in CB | |
| 039 | Retailer B | R49.98 | 95% Cotton 5% Elastane | Single jersey knit | Plush-back elastic with lurex stripes |  | Boyleg | Side seams: SSa<br>Waist: BSa*<br>Leg opening: EFa<br>Gusset: SSa | Printed satin label in side seam | |
| 058 | Retailer H | R20.00 | 95% Cotton 5% Elastane | Single jersey knit | Plush-back elastic |  | Boyleg | Side seams: SSa<br>Waist: BSa*<br>Leg opening: EFa*<br>Gusset: SSa | Printed satin label in side seam | |

## TABLE 4.2.: ANALYSIS OF BOYS' UNDERPANTS SELECTION

| Sample | Retailer | Price p/unit | Fiber content | Fabrication | Elastic | Image of elastic | Fit | Construction | Labelling |
|---|---|---|---|---|---|---|---|---|---|
| 027a | Retailer C | R39.98 | 86% Nylon<br>8% Elastane<br>6% Polyester | Double knit | Jacquard rib knit fabric |  | Trunks | Seamless<br>Legs & gusset: FSf | Jacquard knitted fabric |
| 027b | | | 50% Nylon<br>42% Polyester<br>8% Elastane | | | | | | |
| 030 | Retailer C | R39.98 | 95% Cotton<br>5% Elastane | Single jersey knit | Knitted elastic band |  | Trunks | Side seams: SSa<br>Elastic: LSa<br>Leg opening: EFa<br>Gusset: SSa | Printed satin label at CB |
| 026 | Retailer G | R39.98 | 95% Cotton<br>5% Elastane | Single jersey knit | Knitted elastic band |  | Trunks | Side seams: SSa<br>Elastic: LSa<br>Leg opening: EFa<br>Gusset: SSa | Printed satin label in CB seam |
| 052 | Retailer B | R56.33 | 95% Cotton<br>5% Elastane | Single jersey knit | Knitted elastic band |  | Trunks | Seams: SSa<br>Elastic: LSa<br>Leg opening: EFa | Printed satin label in CB |
| 053 | Retailer A | R76.33 | 95% Cotton<br>5% Elastane | Single jersey knit | Knitted elastic band |  | Trunks | Seams: SSa<br>Elastic: LSa<br>Leg opening: EFa | 3 Page printed satin label at CB |
| 056 | Retailer H | R33.33 | 96% Cotton<br>4% Elastane | Single jersey knit | Knitted elastic band |  | Trunks | Seams: SSa<br>Elastic: LSa<br>Leg opening: EFa<br>Gusset: SSa | Printed satin label in CB seam |
| 059 | Retailer I | R63.33 | 95% Cotton<br>5% Elastane | Single jersey knit | Braided elastic band |  | Trunks | Seams: SSa<br>Elastic: LSa<br>Leg opening: EFa<br>Gusset: SSa | 4 Page printed satin label in side seam/ heat transfer size label at CB |
| 033 | Retailer D | R33.33 | 95% Cotton<br>5% Elastane | Single jersey knit | Knitted elastic band |  | Trunks | Seams: SSa<br>Elastic: LSa<br>Leg opening: EFa<br>Gusset: SSa | Printed satin label at CB |
| 031 | Retailer E | R34.99 | 50% Nylon<br>40% Polyester<br>10% Elastane | Double knit | Jacquard rib knit fabric |  | Trunks | Seamless<br>Legs & gusset: FSf | Jacquard knitted fabric |
| 028 | Retailer E | R34.99 | 90% Nylon<br>10% Elastane | Double knit | Jacquard rib knit fabric |  | Trunks | Seamless<br>Legs & gusset: FSf | Jacquard knitted fabric |

## TABLE 4.2.: ANALYSIS OF BOYS' UNDERPANTS SELECTION (CONTINUE)

| Sample | Retailer | Price p/unit | Fiber content | Fabrication | Elastic | Image of elastic | Fit | Construction | Labelling |
|---|---|---|---|---|---|---|---|---|---|
| 047a | Retailer A | R35.80 | 100% Cotton | Single jersey knit | Encased braided elastic |  | Briefs | Side seams: SSa<br>Elastic: EFa*<br>Leg opening: EFa<br>Gusset: SSa | 2 Page printed label at CB |
| 047b | | | 99% Cotton<br>1% Viscose | | | | | | |
| 029 | Retailer D | R30.00 | 100% Cotton | Single jersey knit | Encased webbed elastic |  | Briefs | Side seams: SSa<br>Elastic: EFa*<br>Leg opening: EFa<br>Gusset: SSa | Center fold printed satin label/ printed satin label at CB |
| 024a | Retailer D | R13.33 | 100% Cotton | Single jersey knit | Encased webbed elastic |  | Briefs | Side seams: SSa<br>Elastic: EFa*<br>Leg opening: EFa<br>Gusset: SSa | Printed satin label in CB |
| 024b | | | 65% Polyester<br>35% Cotton | | | | | | |
| 048 | Retailer E | R15.00 | 100% Cotton | Single jersey knit | Encased braided elastic |  | Briefs | Side seams: SSa<br>Elastic: EFa*<br>Leg opening: EFa<br>Gusset: SSa | Printed satin label in CB |
| 049a | Retailer C | R17.99 | 100% Cotton | Single jersey knit | Encased braided elastic |  | Briefs | Side seams: SSa<br>Elastic: EFa*<br>Leg opening: EFa<br>Gusset: SSa | Printed satin label at CB |
| 049b | | | 60% Cotton<br>40% Polyester | | | | | | |
| 050a | Retailer F | R18.00 | 100% Cotton | Single jersey knit | Encased braided elastic |  | Briefs | Side seams: SSa<br>Elastic: EFa*<br>Leg opening: EFa | Printed satin label at CB |
| 050b | | | 60% Cotton<br>40% Polyester | | | | | | |
| 051 | Retailer B | R25.80 | 100% Combed Cotton | Single jersey knit | Encased webbed elastic |  | Briefs | Side seams: SSa<br>Elastic: EFa*<br>Leg opening: EFa<br>Gusset: SSa | Printed satin label at CB |
| 054a | Retailer H | R16.00 | 100% Cotton | Single jersey knit | Encased webbed elastic |  | Briefs | Side seams: SSa<br>Elastic: EFa*<br>Leg opening: EFa<br>Gusset: SSa | Printed satin label in side seam |
| 054b | | | 65% Polyester<br>35% Cotton | | | | | | |
| 055a | Retailer G | R21.99 | 100% Cotton | Single jersey knit | Braided elastic band |  | Briefs | Seams: SSa<br>Elastic: LSa<br>Leg opening: Efa<br>Gusset: SSa | Printed satin label at CB |
| 055b | | | 65% Polyester<br>35% Cotton | | | | | | |
| 060 | Retailer I | R63.33 | 95% Cotton<br>5% Elastane | Single jersey knit | Knitted elastic band |  | Briefs | Seams: SSa<br>Elastic: LSa<br>Leg opening: Efa<br>Gusset: SSa | 4 Page printed satin label/ heat transfer size label at CB |

The price per unit of underpants, calculated by taking the price per pack and dividing it by the number of units per pack, ranged from R12.85 to R76.33. The average price for girls' bikini-cut underpants was R21.63, and for boylegs was R44.78. The average price was R25.72 for boys' briefs and R45.26 for trunks. The boyleg and trunks were more expensive than the bikini-cut and briefs since the garment uses more fabric, thus justifying the higher price.

During the analysis, it was revealed that the fiber content does not have a direct connection to price. The fibre blends are expected to be more affordable than the high cotton content underpants. However, most of the underpants that had 100% cotton fiber content were cheaper than the blended fiber content underpants. All the underpants from the selection had a single jersey fabrication, except the seamless trunks which had a double-knit fabrication. The gauge differed among the packs of underpants with some having a higher gauge than others. The gauge of seamless underpants was significantly higher than the rest of the underpants, up to the point where the stitches were so fine it required higher magnification to identify the stitch type. Another interesting observation revealed that when a pack of underpants was labelled to be 100% cotton or "high in cotton", all the underpants would be 100% cotton except if the pack contained grey mélange underpants which were polycotton blends. The mélange effect in the fabric is a result of different coloured fibers being randomly mixed during the blending and spinning of the yarns (Hallett & Johnston, 2014:69).

Regarding the waistband elastics, the girls' underpants differed significantly from the boys' underpants. The girls' underpants had much thinner elastics than the boys' underpants. The thinnest elastics were found among the bikini-cut underpants. The majority of the elastics were either knitted or braided elastics with picot tops. According to Brown & Rice (2014:322), knitted elastics with picot tops are a common variation used for girls' underpants as they provide a decorative element to the elastic. The boyleg underpants had wider elastics than the bikini cuts and mostly consisted of knitted and braided elastics. The elastics of the boyleg cuts were closer in width to the briefs from the boys' underpants but were still slightly thinner. The elastics from the briefs mostly consisted of webbed elastics encased in the fabric and two underpants that had elastics sewn onto the raw edge. The elastics of the trunks were the widest out of the entire selection and mostly consisted of knitted elastics sewn onto the raw edge. The seamless boxer underpants all had jacquard rib knit fabric as an elastic. In comparison to the girls' elastics, the boys' had much less decorative elements and mostly only had patterns knitted into the elastic, while the girls' had decorative edges and lurex threads incorporated into the design.

To analyse the construction, Tables 4.1. and 4.2. provide the seam classes and seam types used to construct each sample. The side seams of the girls' underpants were mostly constructed with Ssa side seams, LSa and Efa seams to fasten the elastic, and Efa and LSa seams for the leg openings. The majority of the boys' underpants were also constructed with

SSa side seams, but some of them had an extra panel added to the center front with LSa seams. Both the girls' and boys' underpants had gussets that were constructed with either SSa seams or Efd seams. The seamless underpants did not have any side seams however they still needed seams to attach the panels and gusset at the inner leg seam. These seams were mostly FSf seams. The thread used to construct the underpants differed. For the basic construction, the thread used was mostly spun polyester with an average twist. For most of the boyleg and boxer underpants, an elasticated thread was used to edge finish the leg hem and to act as an elastic. These threads had lower twists than the spun polyester thread and were often used in combination with the spun polyester thread to create the hem.

Most of the underpants across the selection had a printed satin label inserted either in the side seam or at the center back below the waistband elastic. Bubonia *et al.* (2012a:156-157) states that a printed label is one of the most common types of labels used for everyday clothing items. The labels varied in shape and size from the different retailers. Some underpants had small and thin labels while others had bigger labels with multiple pages. The reason for their size is owed to the different translations of the information on the label. The seamless underpants did not have printed satin labels. The information that would appear on the label was knitted into the waistband in a contrasting colour through jacquard knitting. Thus, no additional label was necessary and because of the type of knitting, no texture was added to the fabric.

For the last focus point, any decorative features were counted underneath "Other". The girls' underpants had significantly more decorative elements than the boys'. Some of the bikini-cut underpants had a small ribbon bow sewn onto the elastic at center front. One bikini-cut underpants had a gathered organza ribbon along the elastic. Many underpants had decorative and themed placement prints. The texture, size and bulkiness varied from print to print. Some prints had a glossy finish, while others had glittery and textured surfaces. The prints were mostly placed at center front on the bikini cuts and briefs, while the boylegs and trunks mostly had prints situated on either of the leg panels closer to the hem. Some packs contained underpants with overall prints. These prints were applied to the fabric before the construction of the garment and varied in colours, shapes, motifs, and themes. The overall prints did not differ much from each other but the hand and texture of the prints depended on the type of ink used during printing as well as the fiber content of the fabric.

## 4.3 PHASE 2: QUALITATIVE INTERVIEWS

### 4.3.1 Description of participants

In this study, participants had to fulfil specific criteria. This was aimed at enhancing comprehension regarding the factors contributing to discomfort among children with sensory

overreactivity while wearing various undergarments. Additionally, the investigation aimed to shed light on the challenges parents encounter when selecting underpants for their children within the context of the South African apparel market. Acquiring participants proved to be a challenge. Initially, the researcher contacted various occupational therapists and schools to obtain participants while still adhering to the POPIA act. However, these attempts yielded little results and the researcher subsequently joined two Facebook support groups to seek potential participants. The first group was "Sensory Processing Disorder Support South Africa (SPDSSA)", and the second was "Autism Support Group South-Africa". These groups produced a better response rate. In the end, the researcher conducted 11 interviews. Table 4.3. gives a summarised description of the participants and their children.

**TABLE 4.3.: DESCRIPTION OF THE PARTICIPANTS' CHILDREN**

| P | Gender of participant | Gender of child | Age of child | Conditions of the child as reported by the caregiver |
|---|---|---|---|---|
| 1 | Female | Male | 9 | SPD |
| 2 | Female | Female | 9 | SPD |
| 3 | Female | Male | 6 | ASD, ADHD, SPD |
| 4 | Female | Female | 9 | Asperger's Syndrome, ADHD, SPD |
| 5 | Female | Female | 13 | ASD, SPD |
| 6 | Female | Female | 6 | Tactile Sensitive |
| 7 | Female | Female | 8 | Hypermobility Syndrome |
| 8 | Female | Female | 10 | Sensory Sensitive |
| 9 | Female | Male | 10 | Asperger's Syndrome, Sensory Sensitive |
| 10 | Female | Male | 6 | ASD, SPD |
| 11 | Female | Male | 6 | ASD, SPD |

**Note. SPD = Sensory processing disorder; ADHD = Attention Deficit Hyperactivity Disorder; ASD = Autism Spectrum Disorder*

This study did not have a specific gender focus. Therefore, individuals with both male and female children were invited to participate, with careful attention to maintaining a gender-balanced representation. Out of the eleven participants, six had female children, and five had male children. There was an overwhelming response from participants with female children to participate. The researcher had to send out the invitation a second time on the Facebook groups to recruit parents with male children in order to balance the quota.

The study targeted participants with children with sensory overreactivity between the ages of three and thirteen as these are the ages where symptoms of sensory overreactivity present the most intensely (Güçlü *et al.*, 2007). This requirement was clearly stated in the invitation that the researcher sent out. There was no specific quota for the ages of the participants' children, only that they fell within these age parameters. The final sample of this study included parents with children 6-13 years old.

The participant's children experienced several conditions, as reported by the participants themselves. Ten children had been diagnosed with SPD, or was described as sensory or tactile

sensitive. This was expected to be the most prevalent condition of the participants. Six children were diagnosed with ASD (including those children described as having Asperger's syndrome, that now falls under the umbrella of ASD) (Woods, Mahdavi & Ryan, 2013), and two children with ADHD. One child was diagnosed with Hypermobility syndrome. Hypermobility syndrome is a heritable condition where the individual experiences extremely flexible joints, hyperextensibility of the skin, and fragile body tissues which can cause the individual pain (Snowdon & Dadla, 2023).

Participants were required to reside in or around the Pretoria and Centurion areas within the Gauteng province. This criterion was essential as the interviews were conducted in person, necessitating the researcher's ability to travel to the participants' homes or other suitable locations as preferred by the participants. A greater proportion of participants lived within the Centurion vicinity. While the researcher received numerous responses from Facebook groups, including individuals residing in different provinces across the country, logistical limitations related to transportation prevented interviews with these participants.

### 4.3.2 Findings

In the following section, the findings of the qualitative interviews will be discussed. As explained in Chapter 3, a sample file was used to conduct the semi-structured interviews along with accompanying questions. The samples that were used in the sample file are a selection of the samples that formed part of Phase 1 of the data collection process. In order for a sample to be chosen to appear in the file, the selection of underpants had to have a different variation of every element in order for the file to be an accurate representation of all the different options within the selection. Opposed to the three-digit number used during Phase 1, these samples were given a letter in every category of questions to identify them easily. In the discussion of findings, it is recommended to have the sample file at hand displaying the corresponding sample categories. At the beginning of each category, a table provides the corresponding letters and sample codes as they were displayed in the file to determine which sample the participants are referring to in their statements.

### 4.3.3 Fabric base

The first point of discussion was the fabric base of underpants. These samples are displayed on page 2 and 13 in the sample file. Table 4.4. provides the letter, fiber content and sample code of the samples in the file. Only the letter along with the sample was visible in the sample file. The sample code and fiber content of the samples were not disclosed to the participants.

**TABLE 4.4.: FABRIC BASE SAMPLE INFORMATION**

| Girls Fabric Base Samples (p.2 in sample file) | | |
|---|---|---|
| **Letter used in interview** | **Fiber content** | **Codes used in Phase 1** |
| A | 100% Cotton | 040 |
| B | 95% Cotton; 5% Elastane | 039 |
| C | 65% Polyester; 35% Cotton | 044 |
| D | 100% Combed cotton* | 038 |
| E | 62% Polyester; 33% Cotton; 5% Elastane | 058 |
| **Boys Fabric Base Samples (p.13 in sample file)** | | |
| A | 86% Nylon; 6% Polyester; 8% Elastane | 027 |
| B | 50% Nylon; 42% Polyester; 8% Elastane | 027 |
| C | 95% Cotton; 5% Elastane | 030 |
| D | 100% Cotton | 047 |
| E | 65% Polyester; 35% Cotton | 054 |
| F | 60% Cotton; 40% Polyester | 050 |
| G | 100% Combed cotton* | 051 |
| H | 90% Nylon; 10% Elastane | 028 |

**Note. Combed cotton is a higher-grade and more refined version of cotton*

The participants were asked if they would check the fiber content before purchasing underpants during the shopping process. Most participants stated that they would look for a fiber content of 100% cotton or a high percentage of cotton.

***"I always try to buy cotton like this [Girls Sample A]. I think this is cotton." (P5:19)***

***"I think cotton would be better." (P2:370)***

***"Otherwise, I definitely look for 100% cotton." (P4:103)***

***"I will usually check [the fiber content], especially that it is cotton also because he does suffer from eczema and so on." (P11:175)***

One participant explained that when the underpants pack cannot be opened to be examined in-store, the fiber content would be an indication of suitability.

***"Do you have a preference for fiber content? Do you check the fiber content before you buy?" (I:160) "Not usually, however if you can't open the packet like 100% cotton is a good guide." (P7:160)***

Some cotton blends were also accepted as long as the fabric of the underpants was still considered to be soft.

***"We go for cotton as far as possible…Or a cotton blend. As long as it's softer." (P8:211; 217)***

***"… but I see this content is the one that working for now is 65 polyester and 35 cotton." (P2:376)***

This participant stated that a high polyester content blend worked best for her child. This further demonstrates that the focus is placed on how the fabric feels rather than what the fiber content is. High quality polyester and cotton blends can have a soft hand (Kadolph, 2007:189).

Natural fibers cause less irritation due to their absorption of body moisture, soft hand, heat conductivity, and breathability (Kadolph, 2007:47). These characteristics were well-recognised and highly desired by the participants. However, when the fiber content included a higher proportion of synthetic fibers, the participants became more hesitant to make a purchase. The participants thought that synthetic fibers tend to be more irritating. One participant stated that she could identify synthetic fibers from the fabric hand.

***"…I know the specific panties that [I] will never even take out [are those] that looks like nylon or that looks like a poly something." (P6:232)***

### 4.3.4 Fabrication

For some of the participants, the hand of the fabric was more important than the fiber content. Most of the participants stated that it is important that the fabric has a soft hand.

***"…so the softer the better." (P1:1)***

***"…she likes soft material…" (P6:43)***

***"…as long as it's soft and breathable, okay. Stretchy, soft, breathable would be the three things [desired characteristics]. Stretchy meaning it can go any direction. But the breathable [is actually] more [important] I think." (P6:238)***

***"So, you would rather base your decision on how the fabric feels rather than if it is cotton?" (I:319) "Oh yeah. That explains me 100%. Like I'm a… if it feels fine. It's gonna be fine." (P3:320-322)***

In the case of the majority of children's underwear, the packaging frequently serves as a barrier that prevents customers from physically touching the product. Participants were asked if they opened the packaging to feel the fabric of the underpants before purchasing it. Six of the participants answered that they do try and open the packs to feel the fabric. Three of the participants mentioned that they would only do it sometimes or when a store allowed it.

***"Do you open the underwear packs to feel the fabric before you buy them?" (I:10) "I always do." (P5:13)***

***"I've tried if, if I can open it, I will try and see the size and also if there's any hard material I wouldn't buy it." (P2:13)***

One participant stated that she does feel the fabric, however, in some instances, she deems it inappropriate to open the packs.

***"…[I do] not often [open the packaging], it may be an ethical thing." (P7:10)***.

Another important aspect of the fabric base is printing. The majority of children's underpants have either an all-over print or a decorative placement print on the front of the garment. During

Phase 1, dyeing and printing was not considered as there was no reasonable way to accurately deterimine the dyes and printing methods used for every underpants. Placement prints were the only factor investigated. During the analysis, it became evident that the placement prints commonly consisted of popular cartoon and movie characters, generic prints such as stripes and spots, and specific interests, such as flowers, strawberries, dinosaurs, cars etc. Children enjoy wearing underpants with details and themes and are more likely to choose these underpants instead of other underpants which does not have any decorative elements (Oetojo, 2019). One participant revealed that the decorative prints are so important that her son would even wear underpants that he finds uncomfortable because he likes the prints.

***"His love for transport outshines the struggles with textures. So [if] the fabrics got a nice print on, he's not going to mind [the texture]…" (P3:31)***

The discussion regarding the fabric base concluded by requesting participants to identify which sample bases they believed best and least suited their child's preferences. Participants were allowed to choose more than one sample if multiple samples fit their child's personal preference. Table 4.5. and Table 4.6. shows the answers that the participants provided.

**TABLE 4.5.: MOST & LEAST SUITABLE GIRLS FABRIC BASES (n=6)**

| | | A | B | C | D | E |
|---|---|---|---|---|---|---|
| MOST SUITABLE | P2 | | | | | x |
| | P4 | | | x | | |
| | P5 | x | | | | |
| | P6 | | | | | x |
| | P7 | | | x | | x |
| | P8 | | | x | | x |
| | **Total** | **1** | **0** | **3** | **0** | **4** |
| LEAST SUITABLE | P2 | x | | | | |
| | P4 | x | | | | |
| | P5 | | | x | | x |
| | P6 | x | x | | | |
| | P7 | x | x | | | |
| | P8 | | x | | | |
| | **Total** | **4** | **3** | **1** | **0** | **1** |

Table 4.5. indicates that participants deemed samples C and E to be the most suitable out of all the girls' fabric base samples. Samples A and B were perceived to be the least suitable samples. This is interesting since most participants stated that they prefer 100% cotton. However, when looking back at Table 4.4., samples C and E, both mélange fabrics, had the highest synthetic fiber content. This indicates a mismatch between stated preferences from the consumer and what they actually choose. Participants were concerned with the print of sample B (See sample file). One participant expressed further concern with the print of sample B.

***"But it's about the inside of the fabric that's bothering [me about] this one [Girls sample B]. I don't know, it's a little bit harder. [I am not sure] if it's the ink or the print." (P8:31)***

The reasoning was that the thick prints had an effect on the fabric and influenced the way the fabric stretched and felt on the inside. The fabric hand and texture of the inside of the underpants are deemed more important than the outside since it is the inside that touches the skin.

In comparison to the girls, as can be seen in Table 4.6., the preferences of the boys (as perceived by their parents) are less consistent. The participants also had more samples to choose between.

**TABLE 4.6.: MOST & LEAST SUITABLE BOYS FABRIC BASES (n=5)**

| | | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|---|
| MOST SUITABLE | P1 | | | | X | | | | |
| | P3 | | | | | X | | | |
| | P9 | X | | | | | | | |
| | P10 | | | | X | | | | |
| | P11 | X | | | | | | X | |
| | **Total** | **2** | **0** | **0** | **2** | **1** | **0** | **1** | **0** |
| LEAST SUITABLE | P1 | | | | | | | X | |
| | P3 | | | | | | | | |
| | P9 | X | | | | | | | |
| | P10 | X | | | | | | | |
| | P11 | | | | | X | X | | |
| | **Total** | **2** | **0** | **0** | **0** | **1** | **1** | **0** | **0** |

Boys sample A received mixed reactions. One participant chose A to be the best suited to her child's preferences, however, she expressed concern about the technical back of the fabric.

***"I think A is soft, but then I'm just a bit worried with the back feeling like a bit of, yeah. It can be a bit irritating to him." (P11:25)***

This demonstrates that even when the fabric may feel soft to the touch, it could still irritate the skin when worn. This reinforces why it is important to be able to fit the underpants before making a purchase. However, that is not always possible, since the underpants are packaged in such a manner that they cannot be fitted.

### 4.3.5 Elastic

The next two questions in the topic guide asked the participants about their child's preferences for elastics. These samples are displayed on page 3 and 15 in the sample file. The samples file had a larger selection of waistband elastic samples than the fabric base samples. The girls' samples were more than the boys' due to a bigger variety of waistband elastic options. Table 4.7. provides the codes of each elastic sample.

**TABLE 4.7.: CODES OF GIRLS' AND BOYS' ELASTIC SAMPLES**

| CODES OF GIRLS ELASTIC SAMPLES | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Letter used in interview** | A | B | C | D | E | F | G | H | I | J | K | L | M |
| **Codes used in Phase 1** | 040* | 040* | 044 | 039 | 034 | 037 | 041 | 043 | 036 | 045 | 035 | 032 | 058 |

| CODES OF BOYS ELASTIC SAMPLES | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Letter used in interview** | A | B | C | D | E | F | G | H | I |
| **Codes used in Phase 1** | 027 | 030 | 047 | 054 | 033 | 060 | 026 | 053 | 048 |

**Note: Samples A and B of the girls' elastic samples have the same coding due to the different waistband elastic options available in the same underpants pack.*

The participants expressed that the type of elastic is also an important factor that they take into consideration when purchasing underpants for their children.

***"To be honest I don't really feel the fabric as much but I look at the elastic. That is, for me that must be soft." (P1:49)***

***"Yeah, because, you know, it's not so much with the fabric itself. It's also how they stitch it. So, the stitching is within [the underpants] and elastics that they use around [the waist and legs] that's a big issue." (P7:13)***

Most of the participants responded that they prefer underpants with a wider elastic at the waist as it helps to spread the pressure of the elastic on the body over a broader surface area. This in turn helped to relieve the sensory impact the underpants had on the child.

***"I like the big elastic. The bigger, broader elastic. I think it's better. Especially for my son." (P3:136)***

***"She tends to like the one within the bigger elastics more." (P6:43)***

***"So, if you have [Girl samples] F and M, the bigger the [elastic] the more the tactile [pressure] is spread evenly.." (P6:91)***

***"If I must choose an elastic, I would go for the broader one. Like number [Boy seams sample] L. Number L, because isn't that the pressure is more distributed." (P9:112-115)***

There were a few participants who had the opposite preference. Their children were more partial to the thinner elastics. This once again demonstrates that preferences vary and that the same set of underpants elements may work for one child, but may be uncomfortable for another child.

***"This is good. Ja, the thin elastic." (P2:97)***

***"I like number [Boy sample] G because it's quite thin it just feels like it might be more comfortable." (P9:46)***

Another factor that was prominent among some of the participants was the pressure applied by the elastic and how tight it fits around the body. If the waist circumference was much smaller than the child's waist, the pressure applied to their body would trigger their sensory overreactivity.

***"It's about the pressure. So, in the beginning, she liked this number [Girl sample] G the most because it's not so much pressure she's not aware of it so the back of the elastic is important." (P8:73)***

***"See this [elastic sample G] is not as strongly pulled in actually." (P6:139)***

***"No, we actually just stretch the elastic quite a bit." (P6:262)***

***"So, elastics are a big problem, because they are often too tight in the beginning. And when you wear them more often, they become less stretchy." (P8:43)***

***"So, they [the waistband elastic] don't put so much so much pressure on her body. Yes. Okay. Because this [all the elastic samples] looks like an underwear nightmare." (P8:49)***

During the evaluation of the different waistband elastic samples, the participants made numerous comments about aspects of certain samples and gave reasons as to why they preferred a specific sample to another. Table 4.8. provides the participants perceptions on the most and least suitable elastics for girls underpants.

**TABLE 4.8.: MOST AND LEAST SUITABLE GIRLS' ELASTICS SAMPLES (n=6)**

| | | A | B | C | D | E | F | G | H | I | J | K | L | M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MOST SUITABLE | P2 | | X | X | | | | | | | | | | |
| | P4 | | | | | X | | | | | | | | |
| | P5 | | | | | | | | | | | X | | |
| | P6 | | | | | | | | | | X | X | | X |
| | P7 | | | | | | | X | | | | X | | X |
| | P8 | | X | X | | | | | | | | | | X |
| | **Total** | **0** | **2** | **2** | **0** | **1** | **0** | **1** | **0** | **0** | **1** | **3** | **0** | **3** |
| LEAST SUITABLE | P2 | X | | | X | | | | | | | X | X | X |
| | P4 | X | | | | | | | | | | | | |
| | P5 | | | | X | | | | X | X | | | | |
| | P6 | X | | | | | | | X | X | | | | |
| | P7 | X | | | | X | | | X | X | | | | |
| | P8 | | | | X | | X | | X | | | | X | |
| | **Total** | **4** | **0** | **0** | **3** | **1** | **1** | **0** | **4** | **3** | **0** | **1** | **2** | **1** |

Table 4.8. illustrates that samples A, D, H and I, were identified by participants as being the least suitable, and samples K and M being more suitable to their children's preferences. All four samples that were deemed the least suitable options had lurex thread incorporated into their design, while samples K and M were both plain elastics. One of the concerns of the participants was the tightness and pressure of the elastics.

***"So, the least favourite, it's the one with the most pressure. So, the tighter the elastic, the more uncomfortable. [such as sample K]" (P8:82)***

The issue of metallic yarns used in the stitching of the band of elastic was also prevalent. If a sample contained such yarns, it was immediately eliminated and was chosen as the least suitable option out of the selection.

***"But anything - like anything - with these like A has got, these little silver goodies on them, and H, they start scratching quickly." (P7:31)***

***"Anything with silver and glittery yarns. They become scratchy." (P7:46)***

The main culprits of the girls' samples were the decorative elements and the tightness around the waist. The texture of the elastic also proved to be bothersome. Elastic samples with ruffles and textured edges were not favoured over those that had plain and smooth edgings.

As the boys' samples are discussed, there is a big difference in the concerns that were being mentioned. Table 4.9. provides the perceptions of the participants who evaluated the boys' waistband elastic samples.

**TABLE 4.9.: MOST AND LEAST SUITABLE BOYS ELASTICS SAMPLES (n=5)**

| | | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|---|
| MOST SUITABLE | P1 | X | | | | | X | X | | |
| | P3 | X | | | | | | | | |
| | P9 | | | X | | | | | | X |
| | P10 | | | | | | | X | | |
| | P11 | | | | | | | X | | |
| | **Total** | **2** | **0** | **1** | **0** | **0** | **1** | **3** | **0** | **1** |
| LEAST SUITABLE | P1 | | | X | X | | | | | X |
| | P3 | | | | | | | | | X |
| | P9 | X | X | X | X | X | X | X | X | X |
| | P10 | | | | | | | | | X |
| | P11 | | X | X | X | X | X | | | |
| | **Total** | **1** | **2** | **3** | **3** | **2** | **2** | **1** | **1** | **4** |

Table 4.9. does not demonstrate the same consistency among the participants with boys in comparison to those with girls. This could be due to the lack of decorative elements that proved to be bothersome to the girls such as the metallic yarns and ruffles. Thus, there were no obvious eliminations and perceptions were based on the functionality factors of the elastics. Only one participant stated that none of the available options were suitable according to her son's preferences as he currently does not wear underpants at all. Samples C, D and I were the most objectionable of the selection. All three of these samples had thick elastics with many gathers in the fabric, adding to the bulkiness. These results align with the finding of Jordaan (2021) as the ruffle effect is bothersome to the child wearing the underpants. The rest of the participants were able to identify suitable samples. The biggest concern that most of the participants had was the texture of the waist elastic and how it was joined to the underpants.

***"I think this one [Boy sample C] will be a problem this is going to irritate him. But yeah, number B with the seams. I think D as well when you can see the stitching quite a lot." (P11:37)***

Similar to the girls, the pressure of the elastic on the body was also mentioned.

***"[Boy sample] B is tight." (P3:73) "And this just feels a little more bulky and restraining." (P3:100)***

Across both genders, the smaller waist circumference as well as the rough textures of the elastic proved to be culprits in triggering sensory overreactivity. The majority of the participants preferred broader elastics to thinner elastics. The samples with broader elastics were girls samples D, E and M and boys samples A, E and G.

The next page in the sample file contained the leg opening elastic samples. These samples is displayed on page 5 and 17. The participants were also asked to identify the sample/s which are most suitable and least suitable to their children's preferences. Bear in mind that not all the samples had elastic finishings. Some of the samples were only finished with hems. Table 4.10. provides the codes for each sample.

**TABLE 4.10.: CODES FOR LEG OPENING ELASTICS**

| CODES OF GIRLS' LEG OPENING ELASTIC SAMPLES | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Letter used in interview** | A | B | C | D | E | F | G | H |
| **Codes used in Phase 1** | 039 | 035 | 058 | 057 | 038 | 041 | 034 | 036 |
| **CODES OF BOYS LEG OPENING ELASTIC SAMPLES** | | | | | | | | |
| **Letter used in interview** | A | B | C | D | E | F | G | |
| **Codes used in Phase 1** | 027 | 030 | 047 | 054 | 029 | 033 | 059 | |

Similarly to the waistband elastics, the participants also had strong opinions about the leg opening elastics. They provided valuable insight into the concerns and preferences they have. The majority of the participants preferred to have hems around the legs, rather than elastics. The hems cause less irritation than the elastics as it is easier to achieve a softer and smoother surface area around the legs. Many of the girls' leg openings had picot top elastics which caused great discomfort.

Table 4.11. provides perceptions of the participants on the girls' leg opening elastic samples. Take note that the samples that do not have a leg opening elastic finish have been indicated at the bottom of the table.

**TABLE 4.11.: MOST AND LEAST SUITABLE GIRLS' LEG OPENING SAMPLES (n=6)**

| | | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|---|
| MOST SUITABLE | P2 | | | | | X | | | |
| | P4 | X | | | | | | X | |
| | P5 | X | | X | | | | | |
| | P6 | | | | | | | | X |
| | P7 | | X | | X | | | | X |
| | P8 | X | | | | X | X | | |
| | **Total** | **3** | **1** | **1** | **1** | **2** | **1** | **1** | **2** |
| LEAST SUITABLE | P2 | X | X | X | | | X | | |
| | P4 | | | | | | X | | |
| | P5 | | | | X | X | X | | |
| | P6 | X | | | X | X | X | | |
| | P7 | X | | | | | | X | |
| | P8 | | X | | | | | | |
| | **Total** | **3** | **2** | **1** | **2** | **2** | **4** | **1** | **0** |

* Samples A, C, and G are not elastics but hems.

Aside from the majority disapproval of sample F, this table demonstrates the differences in personal preference. There is no strong connection between the answers. Similar to the concerns brought up from the waistband elastics, the pressure and tightness of the leg opening elastics were mentioned.

***"She'll wear another one that's not so tight to the elastics around the legs." (P6:139)***

***"So [it] depends on how tight it is around the legs." (P8:91)***

One participant stated that they would prefer leg openings without elastic as it would feel more comfortable.

***"I always look for something like this [Girl sample C] that's edged like this. So, these [Girl sample A and C] are what I am looking for." (P5:115) "So you rather want another kind of edge finishing than an elastic?" (I:118) "Yes." (P5:121)***

The use of metallic yarns, lurex, was mentioned again and how the participants would avoid underpants containing these threads at all costs.

***"[She likes underpants] that's not got that silver lining things in. So, no silver threads or scratchy threads." (P6:43)***

***"Anything with silver and glittery yarns - they become scratchy." (P7:46)***

The answers to the boys' samples were much more consistent. Table 4.12. provides the perceptions of the participants of the most and least suitable samples to their children's preferences.

**TABLE 4.12.: MOST AND LEAST SUITABLE BOYS' LEG OPENING SAMPLES (n=5)**

| | | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|
| MOST SUITABLE | P1 | X | | | | | | X |
| | P3 | | | | | | | X |
| | P9 | X | | | | | | |
| | P10 | | | | | | X | X |
| | P11 | X | | | | | X | X |
| | **Total** | **3** | **0** | **0** | **0** | **0** | **2** | **4** |
| LEAST SUITABLE | P1 | | | X | X | | | |
| | P3 | | | | | X | | |
| | P9 | | | X | X | X | | |
| | P10 | | | | | X | | |
| | P11 | | | X | X | X | | |
| | **Total** | **0** | **0** | **3** | **3** | **4** | **0** | **0** |

*Samples B, F, and G are not elastics but hems

Table 4.12. demonstrates a much stronger consistency among the preferences of the participants' children. If a sample has been chosen as the most suitable by participants, it was not chosen as the least suitable sample and vice versa. The sample either elicited strong objections or was highly favoured. It is interesting to note that all the samples that were chosen as the least suitable options, were the samples that had the elastics enclosed in the fabric which created a thick edge finish.

***"I've noticed with him the one with the elastic at the bottom [around the legs] he will often complain that it scratches him and then he will always be busy pulling it. So for example, [Boy] sample numbers C, D and E." (P11:55)***

It can be concluded that these samples cause more discomfort than the samples that have a flatter dimension. One participant mentioned that the thick elastic finishes even cause discomfort after the underpants have been taken off.

***"I don't like this [Boy sample E], because I can see with my son as well every time just before he gets into the bath [he's] got marks and stuff." (P3:106)***

Boy Samples F and G do not have an elastic finish and sample A was a seamless sample. The high favour of these samples indicates that non-elastic finishes might be more comfortable around the legs for boys.

Across both genders, common factors about the comfortability of elastics were identified. Elastics that fit too tightly around the body are uncomfortable. An elastic that gathers the fabric too much also causes discomfort as the fabric creates bumpy pleats around the tight elastic. Wider elastics are more comfortable than narrow elastics as they spread the pressure evenly across a bigger area, thus the elastic feels more comfortable on the body. Bulky and textured elastics cause extra discomfort. Elastics with smoother surfaces cause less friction to the skin. Thus, the determining factors of whether an elastic will be comfortable or not are the tightness, the width, and the texture of the elastic.

### 4.3.6 Design/Fit

The sample file also contained entire garments. These samples are placed inside an envelope with their respective codes displayed on page 7 and 19. The participants were asked to evaluate different samples according to their children's design/fit preferences. Whole underpants were placed inside an envelope that the participants could take out to evaluate. Together with the samples, a table with the codes of the samples was visibly displayed. Table 4.13. provides the respective codes.

**TABLE 4.13.: CODES OF DESIGN/FIT SAMPLES**

| CODES OF GIRLS DESIGN/FIT SAMPLES | | | | | |
|---|---|---|---|---|---|
| **Letter used in interview** | | A | B | C | D |
| **Codes used in Phase 1** | | 038 | 035 | 037 | 034 |
| **CODES OF BOYS DESIGN/FIT SAMPLES** | | | | | |
| **Letter used in interview** | A | B | C | D | E |
| **Codes used in Phase 1** | 029 | 047 | 033 | 027 | 059 |

The participants were asked to explain what design/cut of underpants their child prefers. The two options for the girls were bikini or boyleg cuts, and the two options for the boys were briefs or trunks. Four of the six participants stated that their girls preferred the bikini cut while the other two preferred the boyleg cut. Girl Samples A and B were bikini cuts and samples C and D were boy leg cuts. Out of the four underpants samples, three participants stated that sample A was the sample that most resembled the underpants that their children are currently wearing.

***"A bikini shape is the best choice." (P2:82)***

***"However, she doesn't like the boy cut. She likes a nice bikini cut." (P7:64)***

***"She'll rather take to trunks [boy leg?] if we buy new panties and it must be a size bigger." (P6:43)***

While evaluating the different samples, the participants made comments about their child's preferences. The comments were quite diverse and differed from participant to participant. A few of the comments included coverage, hip rise, and size.

***"So, it must go over your bum at the back. Yeah, it must. It must cover your whole bum. It mustn't go like, like, here [medium coverage fit]. It mustn't go like [through the middle] they must go around [full coverage fit]." (P2:115)***

***"You don't what it to be too loose, you wanted to be a bit more snug-fit. I think she likes to feel that she's wearing it." (P5:151)***

***"She enjoys something that's low on the hips." (P7:91)***

It was evident that the level of comfort was higher for underpants fitting at the hips, compared to underpants fitting around the waist. This could be due to the sensitivity of the skin in the area around the navel (Jordaan, 2021; Datta & Seal, 2022). However, only two participants

mentioned this out of all the participants, thus this factor can only be counted as personal preference or that they have not yet observed it so intensely.

Out of the five participants, three stated that their boys prefer briefs over trunks. Boy Samples A and B were briefs while samples C, D, and E were trunks. All three participants chose sample B as the sample that most resembles the underpants that they are currently buying their children. The other two participants chose sample D. One participant mentioned that her child does not currently wear any underwear and that no sample would be suitable for her son. Sample D was chosen as the least objectionable option out of the selection.

***"Also, it should be briefs, more a fuller [more bottom coverage] type of underpants." (P1:49)***

One concern that was brought up was the leg length of the boxer underpants. Since it is shorter, the school pants would irritate her child and they would resort to having him wear ski pants underneath so the school pants would not rub against his thighs.

***"It's more or less this [boy sample D] that he is currently wearing and he's not complaining about anything. The only thing is that it's still a bit too short so the pants are still bothering him." (P11:61)***

***"I think with him the big thing is that it's to do with the elastic and the [seam] between the legs and it [the legs] must be longer for the school pants. Sometimes we see it can be like a little ski pants from the girls." (P11:157)***

One of the main concerns from both genders was how the underpants would ride up as the children would move. It would cause great discomfort and would need to be adjusted multiple times. This could be due to the size of the underpants or the texture of the layered clothing.

***"Yes, it rolls up [around the legs]. If you want to put your pants [on] and then it just rolls over and then it creates that bulky thing." (P2:85-91)***

***"It's nice and soft however I think it [the back] will run up and anything that runs up in the bum is like no. So, I think that [girls sample C] will probably run up." (P7:58)***

***"Like I say it's a pressure thing. Alright, so if it is too tight or too scratchy, then it's irritating. But if it's too big so that it can be less pressure, it would like scrunch up under the clothes, so then it's bothersome. And if it's too small, it's too tight." (P8:109)***

Later in the interview, the participants were asked if they size up or down, or buy their child's true size. Four participants said they are currently buying true to size.

***"I can't buy shirts that are too big for him or underpants that's too big for him because it's like irritating." (P1:220)***

***"No. I wish I could buy a size bigger because I would save a lot of money. But it needs to fit my son." (P1:220)***

***"He's not particularly [fond of] the loose fits. No, he wants true to size. Not too tight. Not too loose." (P3:337)***

***"So, depends on how tight it is around the legs." (P8:91)***

Six participants said that they are sizing up. This could be due to the rapid growth of the children and the participants wanting to save money. Or it could be that they prefer to have a bigger size rather than having a size that fits too tightly.

One participant size down. This participant mentioned that the reason she sizes down, is not that her child prefers a tighter fit, but that the lower age category fits better.

***"Actually, she's a slim build so with panties it's always not her age." (P5:367)***

Half of the participants have chosen bikini cuts and briefs as their preferred cuts. It could be possible that these cuts are preferred because the legs of the boyleg and trunks tend to roll up and cause irritation, yet as stated previously, it could help to create a barrier between the skin and unpleasant fabrics. Aside from this, the design and style of underpants are subject to the personal preference of each child.

### 4.3.7 Construction

Seams, which are a well-known culprit, evoked much discussion. The samples is displayed on page 8 and 20 in the sample file. The participants were asked to evaluate the different seams samples according to their children's preferences and choose which samples were the most and least suitable to those preferences. Two of the participants had very passionate reactions upon seeing the seam samples.

***"Seams! Like the most hated things ever!" (P4:193)***

***"It's all the seams! It doesn't matter where it is." (P1:130)***

All the samples in this selection, except girls sample H, were superimposed seams that were located on the sides of the underpants. Girls sample H was a flat seam that joined the two edges of the waistband elastic. It was important to include this sample as it also has the potential to cause discomfort. Table 4.14. provides the codes of each sample.

**TABLE 4.14.: CODES OF SEAMS SAMPLES**

| **CODES OF GIRLS SEAMS SAMPLES** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Letter used in interview** | A | B | C | D | E | F | G | H* |
| **Codes used in Phase 1** | 039 | 034 | 035 | 041 | 058 | 032 | 043 | 037 |

| **CODES OF BOYS SEAMS SAMPLES** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Letter used in interview** | A** | B** | C** | D** | E** | F | G | H | I | J | K* | L* | M* |
| **Codes used in Phase 1** | 027 | 030 | 047 | 033 | 059 | 030 | 047 | 054 | 051 | 033 | 060 | 059 | 030 |

*Note: *Flat seams. **Lapped seams*

During the selection process, most of the participants stated that they always prefer softer seams. They would also choose designs that do not have excessive seams. The more simplistic the design of the underpants is, the more it is deemed suitable. If there are too many decorative elements fastened to the underpants, it is considered uncomfortable.

***"So, the same principle [applies] - the simpler the better." (P8:67)***

***"So, I would say I also buy socks and panties with as little as [possible] prints and frills and all these glittery yarns that they use. As little as possible of that." (P7:13)***

***"Yeah, because, you know, it's not so much with the fabric itself, it's also how they stitch it." (P7:13)***

The next few paragraphs will discuss the preferences that the participants had while evaluating the different seam samples in the file. Table 4.15. provides an overview of the participant's perception of the most and least suitable seam samples present in girls' underpants.

**TABLE 4.15.: MOST AND LEAST SUITABLE GIRLS' SEAM SAMPLES (n=6)**

| | | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|---|
| MOST SUITABLE | P2 | | X | | | | X | X | |
| | P4 | | | | | | | X | |
| | P5 | X | X | | | | | | |
| | P6 | | | | | X | | | X |
| | P7 | | | | | | X | | |
| | P8 | | X | | | X | | | |
| | **Total** | **1** | **3** | **0** | **0** | **2** | **2** | **2** | **1** |
| LEAST SUITABLE | P2 | | X | | | X | | | X |
| | P4 | | | X | | | | | |
| | P5 | | | | | | X | | |
| | P6 | X | | X | | | | | |
| | P7 | X | | | | X | | | |
| | P8 | | | X | | | | | |
| | **Total** | **2** | **1** | **3** | **0** | **2** | **1** | **0** | **1** |

Table 4.15. demonstrates that the response was quite varied. This could be due to almost all the samples consisting of superimposed seams. Aside from the thread, there were little differences among the samples. Sample B was chosen three times as the most suitable, and samples E, F, and G were chosen twice. The main criteria for the seams were the bulkiness and the softness. If the seam allowances had bulk, it would cause irritation and painful imprints on the skin. It was clear that a softer thread was more desirable. If the threads were rough and created a rough surface as seen in girls sample C, they were immediately deemed unsuitable.

***"So the one that she would like is this [girl sample] E one because it's not set tightly knit together. You see? So if it's loosely knit together and it does this actually is not scratching so much. This one This one is the best for the panties." (P6:160)***

***"Most probably [girl sample] number C will be the most bothersome because it's the thickest." (P4:211)***

One participant made an interesting mention of a feature that is often overlooked but that also causes irritation. The gusset that is inserted at the bottom of girls' underpants consists of about three to four layers of fabric that produces bulky seams. It is worth making a note of this concern as it could be shared by many individuals.

***"Are we talking about the seams because I'll tell you exactly where the issue sits. It's here, with the gusset. If they [could] wear panties without any gussets in, that would be the best option." (P7:94)***

The boys' selection of seams samples was bigger than that of the girls. This is due to the fact that the variety of the seams was much more. The underpants frequently had additional seams at the side front for functional and design purposes. The seams samples were categorised into three types; lapped seams, superimposed seams, and flat seams. In a similar fashion to the girls, the participants preferred simplicity concerning the seams. The seams had to also be soft without excessive bulk.

***"Seams, the seams... I always look at the seams. The softer the seams the better. The less seams the better." (P1:25)***

When asked to evaluate the selection of seam samples, some participants stated that they always struggle with the seams while other participants mentioned that it usually is not a problem. The concern regarding the softness of the seams was brought up.

***"I wouldn't have my son wear this at all. [boy Sample] L. Yes, because it's gonna make him, it's [bulky flat seams] gonna leave these [inprints] and it's gonna, it's gonna itch him" (P3:220-223)***

***"I've noticed with him the one with the elastic at the bottom he will often complain that it scratches him and then he will always be busy pulling it. So, for example, sample numbers C, D and E [have scratchy leg opening seams]." (P11:55)***

***"I can just feel that this one [boy sample C] is going to irritating him with the elastic or the seams." (P11:76)***

It is important to mention that sample A of the leg openings and seams samples were seamless underpants that were produced with circular knitting. These underpants had no distinct seams apart from the seams joining the gusset with the legs at the front and the back. Much favour was shown to this pair of underpants due to this factor.

***"Number A feels quite comfortable because there is not a definite stitch. It feels actually smooth if you compare it to the rest so I would definitely choose [boy sample] number A." (P9:58)***

***"I like the feel of number [boy sample] A because it feels quite smooth also [boy sample ] D because the seam is almost covered with material on the outside not on the inside." (P9:106)***

For this age group, at the major brick-and-mortar retailers in South Africa, the seamless underpants were only available to the boys. Due to the positive reaction, it has received from

the participants, the question can be asked as to why it is not also used for girls. A strong hypothesis can be formed that the seamless underpants would also be well received by the girls and may eliminate many of the sensory irritations that they experience regarding the waistband elastics, leg opening elastics and seams.

Participants with children from both genders shared similar concerns regarding the softness and bulkiness of the seams. Their requirements had many similarities. No rough or textured yarns had to be used and the seam allowances had to be soft and smooth. If it was too textured, it would feel scratchy and if it was too bulky, it would leave painful imprints on the skin that would still cause discomfort after the underpants have been taken off. Simplicity was the key. No excess seams on the underpants and minimal soft finishes of the seam allowances were deemed the best options. It was not necessarily the seam class that would determine the comfortability of the seam, but rather the thread that was used.

### 4.3.8 Labelling

The next pages, 10 and 22 in the sample file contained the selection of label samples. As soon as the page was turned, many participants responded passionately that they always removed the label. The dislike towards labels was made abundantly clear.

***"No labels! Ever!" (P4:229)***

***"No labels." (P8:166)***

***"Ooh the labels, that is normally a big problem, so we have to cut them off normally." (P9:118)***

The participants were once again asked to evaluate the selection of label samples according to their children's personal preferences. Table 4.16. provides the respective codes of the girls' and boys' label samples. Note that all the samples were sewn-in labels except for sample A of the boys' samples. The necessary information was knitted into the waist edge finish in the inside of the garment. Both genders also had a printed label option available underneath "Prints & Others" and "Prints".

**TABLE 4.16.: CODES OF LABEL SAMPLES**

| **CODES OF GIRLS LABELLING SAMPLES** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Letter used in interview** | A | B | C | D | E | F | G |
| **Codes used in Phase 1** | 040 | 040 | 034 | 032 | 042 | 039 | 041 |

| **CODES OF BOYS LABELLING SAMPLES** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Letter used in interview** | A | B | C | D | E | F | G | H | I | J | K | L |
| **Codes used in Phase 1** | 027 | 053 | 047 | 054 | 048 | 051 | 033 | 029 | 060 | 024 | 050 | 030 |

These samples were chosen to represent the variety of available labels among the underpants selection. The response to these labels was overwhelmingly negative. Some participants did not even evaluate the samples in a similar way to the rest of the file's samples. They just glanced at the selection briefly and stated that not one of the samples would work. They stated that no matter the size or texture of the label, it irritates. One participant evaluated each sample and rejected one sample after the other.

***"Well, this [Girls sample C] is too big." (P2:211)***

***"Just maybe it'll like itch." (P2:217)***

***"This one's too scrubby. [ Girls] Number B is scrubby." (P2:241)***

***"Too huge. And it's [girls sample C] got a little book [label] like 123 [pages]." (P2:253)***

The following table provides the answers that the participants have given. This table shows that many more labels were unsuitable than those that were suitable to their children's preferences.

**TABLE 4.17.: MOST AND LEAST SUITABLE GIRLS SEWN-IN LABEL SAMPLES (n=6)**

| | | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|
| MOST SUITABLE | P2 | | | | | X | | |
| | P4 | | | | | | | |
| | P5 | X | X | | | | | |
| | P6 | | | | | | | |
| | P7 | | | | | | | |
| | P8 | | | | | | | |
| | **Total** | **1** | **1** | **0** | **0** | **1** | **0** | **0** |
| LEAST SUITABLE | P2 | X | | X | X | | | |
| | P4 | X | X | X | X | X | X | X |
| | P5 | | | | | X | X | |
| | P6 | X | X | X | X | X | X | X |
| | P7 | X | X | X | X | X | X | X |
| | P8 | X | X | X | X | X | X | X |
| | **Total** | **5** | **4** | **5** | **5** | **5** | **5** | **4** |

Four out of the six participants stated that none of the label samples would be suitable. All the samples would cause discomfort. The participants complained particularly about samples C and D. These labels were much bigger in comparison to the other samples and they had many pages. Thus, they were also thicker than the rest.

***"I don't like these ones that are double." (P5:265)***

***"It's too bulky. You don't like it. Especially if there is like an edge. Especially this one is [very scratchy]. It [girl sample E] is very, very scratchy" (P5:274-277)***

A conclusion can be drawn that sewn-in labels cause discomfort to the majority of children with sensory overreactivity. None of the sewn-in labels in the sample selection would suffice. These

types of labels are found in all underpants across all the major brick-and-mortar stores. This indicates a gap to rethink types of labels other than conventional sewn-in fabric labels.

The reaction to the boys' selection was not much different than the girls. The boys' selection consisted of a few more samples than the girls' due to a bigger variety of different types of labels. Similarly, to the girls, the participants stated that many of the samples would not be suitable to their children's preferences.

***"None of these [labels] work for him." (P3:235)***

The participants also showed much dislike for samples B and C. These samples were also much bigger than the rest of the samples and had multiple pages. These samples were immediately rejected and deemed unsuitable.

***"And I also found the bigger the label, the more it bothers him." (P9:124)***

***"And all honesty, there's not a big difference between all of them. You understand? I'm saying like, size. This [the large label] is silly. This is really silly to me, the big ones. Yes. [ ] B and C [are the worst]. If you have to have a label, obviously, the smaller ones are the better choice especially like [sample F]. But I mean, like, they all feel very much the same. And the split labels [boys samples B & C] also, this is a bad idea. The little booklets. So much. That's [the booklet labels] so irritate[ing]." (P3:265)***

Similarly, to the girls, during the evaluation of the samples, many more were deemed unsuitable than suitable to their children's personal preferences. Table 4.18. provides the perceptions of the participant.

**TABLE 4.18.: MOST AND LEAST SUITABLE BOYS SEWN-IN LABEL SAMPLES (n=5)**

| | | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MOST SUITABLE | P1 | X | | | | X | | | | | | | |
| | P3 | X | | | | | | | | | | | |
| | P9 | X | | | | | | | | | | | |
| | P10 | X | | | | | | | | | | | |
| | P11 | X | | | | X | X | | | | X | X | X |
| | **Total** | **5** | **0** | **0** | **0** | **2** | **1** | **0** | **0** | **0** | **1** | **1** | **1** |
| LEAST SUITABLE | P1 | | | X | | | | | | X | | X | |
| | P3 | | X | X | X | X | X | X | X | X | X | X | X |
| | P9 | | X | X | | | | | | | | | |
| | P10 | | X | X | X | X | X | X | X | X | X | X | X |
| | P11 | | X | X | | | | | X | X | | | |
| | **Total** | **0** | **4** | **5** | **2** | **2** | **2** | **2** | **3** | **4** | **2** | **3** | **2** |

The one sample that was chosen by every participant as suitable was boy sample A. As mentioned earlier, this sample forms part of the seamless underpants. It had an opposite reaction to all the other samples. For two participants, it was the only sample out of the whole selection that would work for their children.

***"I like this. This is really smart. I love the idea of [boys sample] A because he's prone to being agitated by labels which I've been cutting off and burning lighters and stuff since, since I can remember." (P3:226)***

***"Like this label, like [boys sample] A would be ideal because then it's in the elastic is not a separate thing." (P9:124)***

***"This one [boy sample A] is perfect for him." (P10:217)***

This sample received a positive response from the participants. It is the only sample out of the entire sample file that was chosen by all the participants as the most suitable. Seamless underpants might therefore alleviate many of the sensory irritation experienced by the children.

The participants were then asked if their child would be interested in a printed label instead of a sewn-in fabric label. Eight out of the eleven participants stated that they would always prefer a printed label over a fabric label. When they turned to the next page in the sample file, an example of a printed label was cut and placed among the decorative prints' selection. The sample was met with much enthusiasm by the majority of the participants.

***"Oh, that's [girls sample C] the best!" (P5:301)***

***"So, they print them like on the elastic and it's so soft, it's like [they] don't even exist." (P7:133)***

A few participants, however, were more reserved and had a few doubts about whether the printed label would work better than the fabric labels.

***"[Girls sample C. It] depends on the ink." (P8:184)***

***"Those are actually a bit problematic as well, because if it's really new, then the printed label is still quite hard and scratchy. And that was on the inside. [Retailer F], put it in their T-shirts, but after a few washes, it becomes okay. But she will tolerate them rather than a [separate sewn-in label]. (P4:247)***

Aside from the samples, the participants were also asked if they made any modifications to their children's underpants. Nine out of the eleven participants answered that they always make modifications by cutting out the labels. Two participants stated that they only sometimes cut the labels out when their child complains.

***"I cut them off." (P1:169)***

***"Cut off immediately." (P6:190)***

***"I've cut those off." (P7:115)***

From the interviews, it was evident that the labels of the underpants are the biggest culprit in causing irritation and discomfort. Most of the labels are cut out the moment the underpants are brought home after purchase. If a label is tolerated, it must be as small as possible and it must not have any rough edges. The big multi-page labels that many of the brands use, are not considered suitable and cause sensory discomfort. Printed labels are generally preferred over

fabric labels by both genders. Boy Sample A elicited the most positive response. If seamless underwear was readily available for girls, it may likely generate a similar, favourable response.

### 4.3.9 Other

The last point of discussion that was aided by the sample file, was the decorative elements selection. These samples are displayed on page 11 and 23 in the sample file. This page consisted mainly of decorative prints. The participants were first asked if their child became irritated with exterior decorative elements. Secondly, they were asked to evaluate the selection of decorative samples and choose the most and least suitable sample according to their child's preference. The following table provides the respective codes of the samples.

**TABLE 4.19.: CODES OF DECORATIVE ELEMENTS SAMPLES**

| **CODES OF GIRLS DECORATIVE ELEMENTS SAMPLES** | | | | | |
|---|---|---|---|---|---|
| **Letter used in interview** | A | $A^1$ | B | C | D |
| **Codes used in Phase 1** | 044 | 042* | 046 | 037 | 057 |
| **CODES OF BOYS DECORATIVE ELEMENTS SAMPLES** | | | | | |
| **Letter used in interview** | A | B | C | D | E | F |
| **Codes used in Phase 1** | 027 | 030 | 047 | 029 | 059 | 055 |

**Sample 042 was a decorative bow.*

The boys' samples were slightly more than the girls' and consisted completely of decorative prints as this was the primary method of decorating their underpants. Sample C from both genders had printed labels on the inside. This sample was placed with the prints rather than with the labels as the sample is a print and can still be evaluated according to the same requirements as the exterior prints. Sample $A^1$ from the girls' selection was a ribbon bow that many of the girl underpants have at the center front on the waistband elastic.

Across the board, the participants did not have a strong reaction towards the decorative elements. Some participants did not mind them, while others said that even the exterior decorative prints can irritate.

***"It wouldn't irritate him if it doesn't affect the inside [of the garment], but some prints makes it hard." (P1:187)***

***"Ribbons - if it's on the outside, it's fine. Okay, but nothing on the inside." (P8:199)***

***"Well, not if she can't feel them on the inside. So and often prints feel cold [against the skin] when you put the shirt [with a print] on." (P4:265)***

This category of prints and other decorative elements received mixed reactions from the participants with girls. However, prints that did not have a lot of texture, were smaller, and flatter were considered to be suitable.

***"It [girl or boy sample D] is also not as solid. Solid prints [such as girl or boy sample A] are more problematic." (P4:283)***

***"And they [the prints] still make the fabric stiff. Yeah. So even on the inside. So even outside ones [prints] will itch her." (P4:268)***

The following table provides the perceptions of the participants regarding the boys' selection. Their reaction was similar to the girls' where there was an obvious best choice.

**TABLE 4.20.: MOST AND LEAST SUITABLE BOYS' DECORATIVE SAMPLES (n=5)**

| | | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|
| MOST SUITABLE | P1 | | | | | X | |
| | P3 | | X | X | | | X |
| | P9 | | | X | | | |
| | P10 | | | X | | | |
| | P11 | | | X | | | |
| | **Total** | **0** | **1** | **4** | **0** | **1** | **1** |
| LEAST SUITABLE | P1 | | X | | | | |
| | P3 | | | | | | |
| | P9 | | | | | | |
| | P10 | | X | | | | |
| | P11 | X | | | | | X |
| | **Total** | **1** | **2** | **0** | **0** | **0** | **1** |

Boy Sample C was chosen by almost every participant as the most suitable sample. Similar to the girls, the texture and size of the print was important. If it was too large and excessively textured the participants would reject the sample.

***"Something like this [boy sample A and F] can be [uncomfortable] with a bit of texture or a bit rough." (P11:142)***

Contrary to popular belief, the participants with boys were much more concerned about the aesthetics of the underpants than the girls were. The participants with girls did not make any noteworthy comments about the themes or aesthetics of the samples. Several of the participants with boy children made mention of the themes and how their children have specific preferences. The participants mentioned that these aesthetic preferences would often times overrule other functional preferences.

***"I don't know. I think like I said, if he's gonna choose, he's gonna choose according to the picture." (P3:154)***

***"Transport. Yeah, Transport anything, if there's a tractor or an aeroplane or yellow machines like diggers and stuff like that." (P3:277)***

***"and it must be his favourite [cartoon characters]. But if this is the one [cartoon character] that he does not like he's not gonna wear it [the underpants], … so I ensure that either I'm buying plain one [underpants] plain or else if we spot cartoon, I have to find his cartoons [on the underpants]." (P10:241)***

Aside from the functional aspects of the decorative elements such as texture and size, no other requirements were mentioned by the participants that the prints should have. This was to be expected as décor is deeply rooted in personal preference. As long as the print is smooth with minimal texture and not an excessively large size, any decorative element will suffice. Prints not touching the skin is not as big of a trigger than other elements such as seams and labels that touches the body. The personal preferences of the children will always draw them to their themes and designs.

### 4.2.10 Perceived Risk

After discussing the physical aspects of underpants, the participants were asked about their experiences when shopping for underpants for their children. The researcher inquired about any difficulties they encountered during this process. This open-ended question allowed the participants to provide answers that contained multiple perceived risks. The perceived risks that came to the fore correlate with consumer behaviour literature. The data was coded using the types of perceived risks as a priori codes. It was clear that parents experience functional risk, social risk, time and effort risk and financial risk.

#### *4.2.10.1 Perceived Functional Risk*

Out of the eleven participants, ten participants stated that they find it challenging to purchase underpants for their children. One of the big concerns was the inconsistency between sizes across different retailers, as well as inconsistencies in construction. A few participants mentioned that they would find underpants that work, but when they would go back to purchase another pack at the same retailer (even the same size), it would often differ in one way or another from the original pack. In addition, there might be a slight variation of fit between the different items in the same pack. This would lead to frustration from both the child and the parent.

***"And like I said, So I buy exactly the same number [size], exactly the same picture at the same shop. Identical, but this [second] pack doesn't work. There's three panties in a packet, but only two of them works because this one's picture is weird. Or the elastic is weird. [It] scratches… so it's the same packet, but only two out of the three works or one out of the three works." (P2:511)***

***"And I have bought too small or too tight. Like it was exactly the same size. But somehow the elastics like the elasticity of the elastics on the new pair was slightly tighter than the previous pair that she used to wear." (P4:91)***

***"Because you get frustrated because, shame poor girl, you fight with her sometimes. Why? [I will tell her:] 'It's good! Can you see it's the broad band?' [She will reply:] 'But Mommy, this feels funny.' So even if you aren't mixing everything [different designs and***

***styles], just the right [characteristics] and then somewhere there's a mistake in the things [different elements], it's out. That's why I say from the pack, maybe two out of the four will be worn." (P6:304)***

Another concern that was frequently mentioned was the fitting of the underpants in the store. Some of the participants stated that it can be a challenge to fit the underpants in the store. In most cases, the underpants are packaged in packets containing more than one underpants. These packets also pose a functional risk to the parents as they cannot be fitted without breaking the packaging. In other cases, the underpants may have price tags and other pieces of wrapping or packaging on them and some of the underpants will even have a plastic protective sticker placed inside on the gusset of the underpants for hygienic purposes. All these elements can trigger their children's sensory overreactivity and cause intense irritation. This can defeat the purpose of fitting the underpants to see if they will be suitable according to their children's preferences.

***"If we fit clothes, I need to tell her: remember, there's a label but as soon as we get home, we can cut it out, otherwise she completely freaks and would not wear it." (P4:244)***

***"Yes, because she must come with me [to the stores]. So it must first look comfortable. And then we get to feel [the fabric]." (P8:259)***

Many times, the children would not be able to fit the underpants, either due to their sensory overreactivity or because the underpants are packaged in a manner that cannot be opened without ruining the packaging. In such a case, several participants said that they would have to experiment by buying the underpants and see whether their children would wear them or not. Many participants have said that they end up with a big selection of underpants where only a few would be worn. This increases the risk of functionality because the participants were not able to examine the underpants thoroughly to determine if their child would wear them or not. The participants are forced to purchase the underpants and hope it will work.

***"Now it's better, but when it was at the worst, that was a few years ago, knowing she was grade R or even younger, that was a year I had like a stack of more than 30 panties that was not working. So, my friends and my family got free panties that were never used before." (P2:445)***

***"So, it's always a guessing game." (P4:85)***

***"Knowing that she would not fit it on if it's got the plastic [the protective hygiene sticker on the gusset]. So you can't pull it off so yeah, she won't fit it. So we'll just buy the packs and eliminate the ones at home and pass it on to the cousin. That's our system." (P6:313-322)***

***"Well, it's trial and error. Because like with [Retailer E], for example, they have it on this hangers with the pegs. So, it's open so we can walk through the shelves and feel it. But if it's closed in a packet and you can't open the plastic, then it's trial and error." (P8:265)***

***"No, I just bought different ones to experiment and see which ones he chooses. I didn't look at the label or the type of material, no." (P9:178)***

The problem with underwear specifically is that most of the time it can't be returned. If the underpants are impossible to fit, due to limiting packaging or hygiene concerns, and the item cannot be returned, it places a lot of risk and stress on the parent. In this instance the prevalence of a physical/safety risk can also influence the parents' experience negatively.

***"I kept on buying different ones, different sizes and he refused to wear any of them so they are just lying around and I haven't even tried returning them because I know it can be difficult so I stopped trying." (P9:220)***

Newly bought underpants are not as comfortable as older worn underpants. Through the continuous cycle of wear and laundering, the older underpants' fabric has become softer and the elastics have been stretched out. When a parent cannot open the underpants packs to feel the fabric of the underpants, it creates a problem. The goal of the parent is to find new underpants with the softest possible fabric and elastics.

***"… she prefers the underwear that has been washed." (P6:37)***

***"Yes, we will buy two or three packets of the same thing. But if she wears one more than the others, it gets washed more so, so it gets softer and more comfortable. It's like it gets worn in if it's too new. It's quite crispy, quite crispy. Yes. And it depends on the day. Okay. I mean, it's a day she can tolerate but on more challenging days. She would want the washed-out one the most." (P8:277)***

Another factor that influences the perceived functional risk is the sensory overreactivity of their children. Some participants have mentioned that because of the nature of their children's sensitivity, underpants that work one day, may not work the next day. The sensitivity is ever-changing. Sometimes underpants that work in the morning, may not even work that evening. Thus, many times if underpants work the first time, it is not guaranteed to work for the rest of their use period.

***"I've tried many [different underpants]. I've got a whole bunch in a cabinet that I bought that just lying there that have never been worn. Or it's comfortable for a day and then the next one or after one wash, it's not as comfortable anymore. Some fabrics also tend to wash better and like from one wash to another one, yeah, they change." (P7:10)***

Two participants have stated that their children cannot communicate their frustrations to them. Thus, they are unaware of what element causes the problem. One participant mentioned that her child is non-verbal and can thus not explain what exactly is irritating him. This can complicate the process even further as the participants do not know the culprit of the sensory irritation.

***"it's difficult to say because my son just says it's uncomfortable. He doesn't really specifically say what it is that is bothering him." (P9:112)***

***"I wouldn't know exactly. Remember his non-verbal. Yeah, so I just see his reaction and just think okay, this is maybe [a problem]." (P10:175)***

All these factors add to the complexity of the process of shopping for underpants and determining if it will meet their children's preferences. Because of these factors, many parents are left with no other choice than to purchase a variety of different underpants based on trial and error. Until they find a suitable option, they are forced to keep experimenting.

#### *4.2.10.2 Perceived Social Risk*

The second perceived risk that the participants were interviewed about was a social risk. The participants were asked how their child would react and what they would do when they are wearing underpants that they find uncomfortable. A few of the participants answered that their child does not or at a stage did not wear underpants at all. They would get dressed without underpants and go about their day. This was a big concern to these participants as it could have social implications for their children in certain settings.

***"Do you find it challenging to buy underwear for him?" (I:205) "Extremely challenging. At the moment he doesn't wear any [underwear] and that's a big concern for me." (P9:208)***

***"Well, initially, she didn't wear underwear. So, then she was more comfortable with the boy cut as opposed to ski pants, so they wear ski pants to school. And but if it was for a social thing, like underneath dresses or whatever, she would rather choose ski pants than underwear." (P8:97)***

***"Remember he does not want underwear at all. As soon as he gets home that's the first thing he takes off. Yes, all the time. So last two weeks back I decided to not put the underwear on for two days maybe a week because it's irritating him." (P10:31)***

The majority of the participants answered that their child would verbally inform them that they were feeling uncomfortable. Some of them stated that their child would attempt to remove the underpants either before leaving the house or when in the company of strangers, they will find a private area to take them off. If they are unable to take the underpants off, their body language would show that they are feeling uncomfortable.

***"[When his underpants irritate him, he will] get fidgety. Yeah, he moves around a lot where normally he would sit still." (P1:268)***

***"[When his underpants irritate him, he] immediately want to remove it. But in front of the people, definitely, he won't… you will see that it's uncomfortable [for him] and whatnot. But then he would have no choice, because there are all these people." (P10:301)***

***"Well, she will secretly sometimes take it off and go without it. Or she will just tell me: 'I can't wear this, I just can't'…" (P7:175)***

A few of the other participants stated that their child would immediately take the underpants off, regardless of where they were and who was present. The participants explained that they would feel extremely concerned about their child and try to rectify the situation as soon as possible. This type of reaction sharply increases the perceived social risk for the parents as they know that the possibility exists that their child would attempt to remove their underpants immediately, even in public settings.

***"He'll take it [his underpants] off. He takes it off. He doesn't care where he is. Who's watching, those days it's like [he] sort of leaves it [the underpants] there and he keeps walking." (P3:370)***

***"He will take it [his underpants] off, you will find him walking around in his birth suit because it's irritating him. And there's still no concept of what is appropriate and not appropriate. So you will be outside and 'it's bothering me' then he will take it off." (P11:310)***

The parents are always weary of the reaction towards their children. They know that the public may not have any context of the situation and may react negatively and avoidant towards them and their child. One participant mentioned that it is difficult to navigate these situations and to avoid any gender-specific stigmas where an innocent act may not be perceived as innocent by outside individuals.

***"He will become fidgety, he, you know, his hand will be in and then I will say take out your hand and then he will say but it's irritating me. And then it's sort of like okay I know it is irritating you but I mean, for other people, it's disturbing for a boy sitting with his hand in front of the pants." (P11:316)***

Two participants insinuated that they would to some extent feel ashamed if someone else would see the condition of their child's underpants. It has already been established that children with sensory overreactivity would prefer clothes that have been through a few laundry cycles. This is no different to underpants. Once it's been laundered a few times, the material and other elements become softer and more stretchy.

***"She wants to throw them [uncomfortable new underpants] away. I give it to the cousin. So sometimes it comes back [the underpants] when the elastic has been worn and the print has been washed." (P6:292)***

***"She will take one of the torn ones out of the cupboard that's the comfortable ones that she knows are the comfortable ones even if they are a little bit ripped. She will go back to those that she knows and then they look a little skiffy. Looks like I'm a bad mother." (P7:175)***

Later in the interview, the participants were asked if they could take their children with them when shopping for underpants. Almost all the participants answered that they could. Some mentioned that it would depend on their child's school schedule. Other participants answered that most of the time it would not be possible because their children become overwhelmed because of the environment and the amount of other people. One participant with an autistic

child mentioned that her child would have meltdowns. These meltdowns would put her in a difficult situation as the surrounding individuals may not always understand what is happening.

***"I do try and make him used to people and shopping centres. And it's just really busy. It's very overwhelming. …and then he falls to the floor, wherever you're standing. And it's just the meltdowns. Oh, my heart breaks every time. So we try and avoid it. If it's a weekday and it's like today during the day I will take him with me because everyone's working." (P3:394-400)***

From the interviews, it was clear that almost every participant has experienced perceived social risk of some sort due to underpants. Some parents, to a much larger extent than others. This is also caused by the lack of awareness and understanding from the public. Many parents face judgement from the public and avoid public environments partly because of it.

#### *4.2.10.3 Time and Effort Risk*

Time and effort risk were also very prominent. The majority of the participants have mentioned that shopping for underpants for their children can become a time-consuming process. Especially when a retailer does not carry the correct size or brand and the parents are forced to shop around.

***"I'm a single mom. So, I'm really, really limited with time and stuff. Like 'yes, this, let's go!'" (P3:316)***

***"It is agony because you look [for] and you find [underpants], and you look and you can't find [underpants], and then you don't find the [right] size, and then you go to the next store and they don't have the size or… It's just a never-ending agony operation so if you find and you want to get two packs [there's] always only one bag [underpants pack] of the same size left." (P7:193)***

***"Would you say it takes you a long time to find something that works?" [I:211] "Yes" (P9:212)***

***"I think the challenge is now that he is starting with grade one because… it's like… and I think just to get the time to go to shops and see which briefs will [work] or trunks will work for him. I think with preschool it was easy, you know, he would put these [underpants] on that had the Spiderman on. He's very happy with it and there he went because he was so busy. This [uncomfortable underpants] didn't irritate him but now sitting still all day. Now he's realizing it [is uncomfortable]. And yeah you need to find time to go and look for…" (P11:271)***

Some participants make sure to do research beforehand and have a clear idea of what they are looking for. One participant mentioned how unplanned trips would be made to the store and they would buy the correct size and brand to collect the underpants for future needs.

***"Actually, I don't [spend a lot of time searching] because for me, I walk in, like I told you, I know what I need. I get it then I leave." (P3:382)***

***"Yeah, well underwear shopping happens in the spur of the moment. So, every now and again when you pass [a store] or at least you just go [in] and look [if] they have the size and if they got any, kind of stock up." (P7:205)***

Some participants have mentioned that they have started to shop for underpants and other clothing articles online. This enables them to purchase the correct size in a shorter amount of time rather than visiting store-by-store.

***"Or like the [Retailer E] ones [underpants] because they never have stock. [They only] stock the higher sizes. Yes, yeah, I am constantly online." (P7:205)***

***"And thank goodness for COVID in a sense because it made me realise that I can buy online. Because most of the times some of his sizes are not there [in store] and then I actually get quite nervous, because 'where am I gonna find his size?' and now I buy online where I can just find the [right] size and they just deliver now." (P1:26)***

Online stores also have a larger variety than in-stores and provide parents with more selections in one place. Online shopping is an excellent option if the parents already know what type and size of underpants their child prefers. If the parents are still experimenting, it can become a long and costly process.

#### *4.2.10.4 Perceived Financial Risk*

The final perceived risk that came to the fore was financial risk. During the interviews, many of the participants mentioned that purchasing underpants for a child with sensory overreactivity is expensive. The biggest problem that the majority of the participants experience, and which have been discussed earlier in this chapter, is that they spend a lot of money on different underpants and end up with a large selection of underpants while their child only wears a select few. Many of the participants said that they give the extra underpants away to family members or friends. This is seen as their only option as most stores do not allow underpants to be returned or exchanged.

***"Yeah, [I'm] not even gonna lie. Definitely. We end up buying six packs from which she will only wear two and out of the two packs she'll pick two [individual undergarments] for her. That's really quite expensive." (P6:286)***

***"And the thing with underpants is that you can't try it on in the shop. So, if you buy it, you buy it. So yeah, it is challenging, but at least I found that shop now which I know is... he wears that underpants. So [Retailer I] is the only place where I buy. I don't say that other places don't have maybe better underpants, I just haven't tried it. Yeah, because I don't want to waste more money I'm sticking to what he wears you know. But it is challenging." (P1:244)***

***"Yeah, luckily we have friends of smaller children [to whom we can give the extra underpants], but still it's quite expensive." (P4:97)***

***"Yes, she has lots of options that she's not using and she's rather putting them on her dolls than on herself." (P8:271)***

Lastly, the participants were asked if they felt that they were getting value for their money with underpants. The majority of the participants answered that they do feel they get value for their money. Many have stated that they would not mind paying extra for a quality product to have the peace of mind that their children would wear it.

***"I do the same with his school shoes. I ordered it from Durban online because that's the same thing and I pay quite… while it's not that expensive, but it's more expensive than you would buy at any other school. So I'd rather buy [more expensive products] a bit more and I know he'll wear it." (P1:262)***

***"Yeah, most of them are good value for money." (P7:211)***

***"I never looked at it that way. I think I would just be happy if I found ones that work. I wouldn't even look for value as a value for money side of it." (P9:232)***

***"So I know no one is seeing it. But still, it's for me, it's like I paid money and I want quality." (P11:289)***

***"It [value for money] does [matter]. I mean, obviously the price difference between these and these, there is a price difference. And then also you want to buy sort of quantity because it gets washed every day. (P11:283)***

Other participants have expressed that they do consider the price when purchasing underpants. They would prefer to have cheaper options available on the market that would still be suitable for their children.

***"So options are quite limited. So pricing plays a big role. So usually when we buy it's quite expensive. So it's not like you can find something at your cheapest shops." (P4:67)***

***"Yes. It would be nice to have a cheaper option." (P4:79)***

***"I buy the cheapest. I don't buy expensive underwear." (P10:313)***

The situation where many underpants are packaged in such a manner that they cannot be closely examined or fitted also increases the perceived financial risks. Some of the participants have mentioned that they become hesitant to purchase underpants packs that cannot be fitted or even touched because the potential of wasting money on a product that won't be worn becomes more evident. Some participants have stated that they would rather not purchase an underpants pack if it cannot be opened or fitted and would rather opt for underpants that are not packaged and can be fitted.

***"[The problem is] you can't fit a panty, or you can't bring it back." (P2:451)***

***"[if the underpants are in a closed pack] I'm just going to waste more money because you can't fit it and she likes to feel it with me" (P6:310)***

***"Well, it's trial and error. Because like with Retailer E, for example, they have it on these hangers with the pegs. So it's open. So we can walk through the shelves and feel it. But if it's closed in a packet and you can't open the plastic, then it's trial and error." (P8:265)***

Purchasing clothes and underpants for children is already an expensive process. It can become even more expensive if there are many contributing factors towards the acceptability of the clothing piece, as mentioned throughout this chapter. Purchasing underpants especially, comes with various perceived risks for the parents. The findings further explain how and why parents find it challenging, as well as recommendations to retailers and parents themselves about how the underpants shopping experience can be improved.

## 4.4 GUIDELINES FOR PARENTS

The final objective aims to provide a guideline to parents to assist them in their underpants shopping experience and reduce their perceived risk, by taking the findings of both phases into consideration. When shopping for underpants, the parents can ensure that they have done as much research and product browsing as possible so they are familiar with what is available on the market, what different retailers have on offer and at which price point. This can reduce the time spent searching from retailer to retailer while shopping. Knowing the product offerings can also reduce frustration among parents. Gaining a proper understanding of their child's preferences can help eliminate underpants options and make it easier to make a decision.

Opting for fiber contents that include blends can be beneficial to finding suitable underpants. While 100% cotton may be a popular choice, cotton blends may perform better and feel more comfortable to wear. Underpants with high cotton percentages blended with polyester and elastane would still have all the desirable characteristics of cotton, but will also have the durability and strength of polyester (Kadolph, 2007:132). There is a high possibility that children would have the same or a more positive reaction towards underpants containing blended fibers.

When browsing the available merchandise, parents can identify underpants containing broader elastics. These waistbands are more comfortable to wear than the thinner elastics as they distribute the pressure over a larger area (Jordaan, 2021). Parents can also look for elastics that do not have many decorative elements. The girls' underpants merchandise has more decorative elements and textures added on the waistband elastics. Opting for underpants with smoother textures and no decorative edges would greatly reduce their irritability. For example, opting for knitted, braided, or plush-back elastics would be more comfortable to wear than encased elastics or decorative and lingerie elastics.

Parents should avoid underpants that contain thick and bulky seams as they will have the potential to irritate the skin. Coarse and thick threads can also add to the irritation. Parents can opt for underpants with finer seams which use finer threads. The edge finishing of the seams should also be uniform and have a relatively smooth surface. Seams with large seam allowances and edge finishings could cause irritation while wearing and leave imprints on the skin. Underpants with finer seams that lay flat against the skin would be more suitable options than underpants with many bulky and textured seams. Parents of boys could choose the seamless underpants options as they only have the flat seams connecting the leg panels. Seamless options are not yet available to girls, however, when available in the future, parents of girls can opt for those options.

Labelling is a difficult element to assess when the underpants have been packaged in packets. In this case, parents may try to open the packets to examine the interior of the underpants. Underpants with the smallest labelling possible would be the most suitable options as smaller labels cause less irritation. Labels with smooth textures and edges would feel more comfortable when worn against the skin. If an option with a printed label instead of a fabric label is available, parents can opt for the printed label as it wears more comfortably. The seamless underpants from the boys' selection had the label knitted into the waistband. This is the best option for the boys as this label, other than its visual appearance, has no evidence of existence when worn on the body. In the case where desired underpants have unfavourable labelling, parents can attempt to remove the stitching holding the label in place. When the label has been removed, that small area can be restitched with a sewing machine, or with hand stitches if the parents do not have access to a sewing machine. This method of label removal is more effective than just cutting the label out because when unpicking the stitches, the label can be removed entirely while only cutting it can still leave some of the label in the seam which can create a scratchy sensation to the skin.

In terms of other decorative elements, parents can opt for underpants with smaller placement prints. Opting for smaller placement prints with less texture and a glossier finish would reduce irritation and would alter the hand of the fabric area it is printed on to a lesser extent. Large and bulky placement prints could form a rigid area that may still be felt despite it being on the outside of the garment. Plain underpants with no decorative details would be a more suitable option as it eliminates any potential for irritation from all prints. However, children have their preferences and may want a specific themed underpants containing a beloved cartoon character (Gaines *et al.*, 2014). In this instance, opting for underpants with limited and small decorative features will be the best option. For highly sensitive girls, avoiding underpants with the decorative ribbon bow on the elastic. It could avoid additional pressure and irritation on that specific area as there will not be additional bulk from the ribbon. If desired underpants

have this decorative ribbon bow on the waistband, it can easily be removed at home by unpicking the stitches holding it in place.

As previously mentioned in this chapter, the girls' selection of underpants focuses much more on aesthetic appearance, normally at the cost of comfort and functionality. Parents of girls may consider shopping for underpants from the boys' merchandise instead of the girls, as their selection places less focus on aesthetics and are often made from more comfortable fabric, seams and labelling. These parents could also be able to purchase and trial the seamless underpants in the hopes of finding a suitable pair for their daughters until seamless options are also available to the girls.

## 4.5 CONCLUSION

This chapter presented the findings gained from the artefact analysis in Phase 1, which were used to construct the sample file and interview questions for Phase 2. Thereafter, the findings from Phase 2 were discussed according to the research objectives stipulated in Chapter 1. The following chapter will present the interpretation of the findings according to the research objectives and conclude the study.

# Chapter 5

# CONCLUSION, RECOMMENDATIONS & LIMITATIONS

## 5.1 INTRODUCTION

This chapter serves as the final chapter of the study. It starts with a short overview of the study. Thereafter, the findings of the research are discussed per the objectives of this study. Furthermore, it includes the implications of the study, namely the theoretical, retail, and occupational therapy implications. Following the implications, the limitations of the study and recommendations for future studies are presented. The chapter draws to a close with concluding remarks on the study as a whole.

## 5.2 OVERVIEW OF THE STUDY

Numerous children exhibit heightened sensitivity to sensory stimuli, leading to the possibility of them experiencing sensory overreactivity (also known as hypersensitivity) in response to such stimuli (Ilić-Savić, Petrović-Lazić & Resimić, 2021). While this is frequently associated with children with special needs, it is also prevalent among typically developing children. In situations where a child encounters sensory discomfort or agitation, the nervous system can react with either a "fight" response, evident through actions like tantrums, or a "flight" response, characterized by withdrawal. Clothing, that remains in close contact with the body, consistently delivers sensory input (Shin & Gaines, 2018). Underwear is often referred to as the "second skin," given its role as the initial clothing layer. Underwear contains elements such as seams and labels, which can be particularly distressing for children sensitive to touch (Roy *et al.*, 2018). If the individual wearing them struggles to redirect their focus from the discomforting sensation, they may react excessively. This heightened response significantly impacts their occupational performance in education, social participation, and activities of daily living (Kabel *et al.*, 2016).

The South African retail landscape is not yet equipped to satisfy the unique and diverse needs of these children for comfortable and sensory-friendly clothing (Pillay *et al.*, 2021). Currently,

parents and caregivers of children with sensory overreactivity might be struggling to find sensory-friendly underpants in the local market. South African retailers might not consider these special needs when designing and/or procuring their underpants collections or they do not see the endeavour as worthwhile. This interdisciplinary study aimed to get a better understanding of the elements that influence underpants shopping for children with sensory overreactivity in order to provide practical guidelines to parents of children with sensory overreactivity when purchasing underpants.

The study consisted of two phases. The first phase was an artefact analysis of a selection of girl and boy underpants from leading clothing retailers operating in South Africa. This phase involved an assessment of products, entailing a comparison of various attributes such as fibre composition, elastics, seams, and labelling. A total of thirty-six diverse samples were subjected to evaluation. The subsequent, main phase of the study followed a phenomenological investigative approach and comprised eleven individual interviews. The unit of analysis was parents of children aged between 4 and 13, who exhibited sensory overreactivity. Both phases are classified as qualitative research (Nieuwenhuis, 2019:102, 108).

## 5.3 SUMMARY OF FINDINGS

### 5.3.1 Objective 1

**To analyse a selection of underpants specifically in terms of fiber content, fabrication, elastic, design/fit, construction, labelling, and price.**

*5.3.1.1 Girls underpants*

The average price per unit for bikini underpants was R21.63, while the price for boyleg underpants was R44.78. In terms of packaging, the underpants were always sold in packets including two to five underpants. There were no single-packaged underpants. The fiber content of the girls' underpants mostly consisted of 100% cotton. A few of the bikini underpants consisted of polycotton blends. The boyleg underpants all consisted of cotton blended with a low percentage of elastane. Regarding the fabrication of the underpants, the entire selection's fabrication was made of single jersey knit.

A large variety of elastics were observed in the selection. These elastics included knitted elastics, lingerie and decorative edge elastics, bound and encased elastics, and plush-back elastics. These elastics came in a variety of different colours and decorative elements. Some of the knitted elastics had patterns knitted into the elastic. These patterns were in some cases knitted with lurex thread. The elastics used around the leg openings of the bikini underpants mostly consisted of the same elastic used around the waistline, such as the knitted and lingerie

elastics. In the case of the plush-back elastics, a bound elastic, encased elastic or elasticated thread was used around the legs.

In terms of the design and fit, the selection mostly consisted of bikini-cut underpants. The cut and style of the bikinis were mostly consistent throughout the selection with a few slight variations of the proportions and panels of the design. The boyleg underpants only made up a quarter of the selection and were not as widely available in stores as the bikini cuts. In a similar fashion to the bikinis, the boylegs' cut and style remained relatively the same with slight variations in the proportions of the design.

In terms of the construction, superimposed seams were found along the sides of the garment and connected the front and back panels. These seams were always edge-finished. The elastics were mostly attached to the garment through lapped seams. Instances of elastic inserted as a binding also occurred. The gusset of each underpant was mostly constructed and attached to the body of the garment through lapped seams.

The majority of the labels were printed satin labels. These labels varied in size, shape, texture, and placement. These labels were most commonly inserted either in the side seam of the garment or at the center back, held in place by the same seam that attaches the elastic to the waistband. Some underpants had more than one label. These center fold labels were always inserted at center back in front of the care label and mostly contained the brand logos of collaborative parties, such as Disney™. Although all the labels were printed satin labels, their textures and finishes varied among the selection. Some labels had a rougher edge texture than others and some had a glossier finish than others. One underpants sample had a printed label instead of a fabric label. This print was placed inside at center back and only displayed the size, retailer and country of origin.

*5.3.2.2 Boys underpants*

The average price for the briefs was R25.72, and for the trunks was R45.26. The briefs were found to be R4.09 more expensive on average than the girls' bikini cuts and the trunks were R0.48 more expensive than the girls' boylegs. It is interesting to note that the boys' underpants were more expensive than the girls' as they do not contain as many decorative elements, however, their fiber contents were more complex and their seams used more thread as many of the waistband and elastic seams were constructed using more than two needles.

A few of the underpants samples were packaged individually and were displayed on hangers instead of in packets. This was a significant difference between the two selections as all the samples of the girls were displayed in closed packets. The boys' selection also included seamless underpants which were not available to the girls.

The selection of boys' underpants had a larger variety of different fiber content. The main fibers were also cotton, polyester and elastane, with the addition of viscose and nylon fibers. Nylon was only used in the seamless underpants. Similarly to the girls', the boys' entire selection had a single jersey knit fabrication, except for the seamless underwear. The seamless underpants required larger magnification to identify their fabrication but it was identified to be double knits.

A variety of elastics were also observed among the selection but to a lesser extent than the girls'. The boys' selection mainly consisted of braided elastic bands for the trunks and braided elastics encased in fabric for the briefs. These elastics were measured to be broader than the elastics of the girls' underpants. These elastics also did not contain any metallic yarns and only had decorative patterns or motifs knitted into the elastic, which created no extra texture and bulk. The trunks did not have elastics around the leg openings and made use of elasticated thread. The majority of the briefs used elastics around the leg openings and mainly used a thinner version of the waistband elastic. These elastics were also encased in the fabric of the underpants.

In terms of construction, the boys' underpants were also mostly constructed using superimposed side seams with overlocked edges. However, a few of the underpants had extra panels inserted in the front which were secured to the side front panels with lapped seams. The seamless underpants had flat seams to attach the leg panels of the underpants. The waistband elastics were mostly attached to the garment with lapped seams where the raw edges were held in place by the stitches.

Similarly, to the girls' selection, the boys' selection also had printed satin labels, however, the seamless underpants had the label information knitted into their waistband elastic. The fabric labels came in a variety of different shapes, sizes, textures, and placements. These labels were either inserted in the side seams or at the center back in the same seam holding the elastic and raw edges in place. The same retailer that provided a printed label in the girls' selection, also provided one for the boys' selection. This label also only displayed the size, retailer, and country of origin.

### 5.3.2 Objective 2

**To explore and describe the sensory irritation of the different elements of underpants specifically in terms of fiber content, fabrication, elastic, design/fit, construction, labelling, and other elements.**

**Face-to-face interviews. Findings of both genders are reported simultaneously.**

The face-to-face interviews formed part of Phase 2 of the study and was the main source of data. The interviews aimed to gain insight and understanding from the participants on the sensory issues underpants cause. Some elements had more potential to cause sensory irritation than others. Two elements, namely elastics and labelling, were identified as causing the most sensory discomfort to the wearer. Elements such as construction, fabrication, and other decorative elements also caused discomfort but to a lesser extent than elastics and labelling. The rest of the elements were mostly based on the personal preferences of the participants.

Fiber content did not have a significant impact on causing discomfort to the wearer. Importance was placed on fabric hand in total, not specifically fiber content. The fabrication of the underpants also did not cause great concern. However, overall prints had the potential to cause discomfort. If the ink and fabric finishing that was used to print the patterns caused the fabric to have a rougher and more rigid hand, it would not be deemed as sensory-friendly as the underpants with no overall prints.

It was found that the elastics played a more significant role in the comfort of the underpants than originally anticipated. The elastics were an even bigger determining factor of comfort than fabrication and fiber content. Broader elastics were deemed more comfortable than narrower elastics as they distribute the pressure across a bigger surface area. Thus, decreasing the pressure on the body and making it more comfortable. The elastics also had to be as plain as possible. Especially in the girls' selection where many elastics had rough decorative features and elements such as lurex threads. Elastics that were smooth and plain were preferred over other elastics. The elastics of newly bought underpants also caused discomfort as they would not be as soft and comfortable as underpants that have been washed several times. The new elastics are stiffer and more rigid. The softer and stretched-out elastics of an older pair of underpants are preferred over a new pair of underpants.

Regarding the design and fit of underpants, a few issues were mentioned. Firstly, the rise of the underpants was considered to be more comfortable when fitting around the hips instead of fitting higher up and closer to the navel. Secondly, the legs of the boxer and boyleg underpants tend to roll up when wearing tighter clothing over it and when moving around. This is more common when the leg panels are cut to a longer length with more fabric to roll up on itself and create a bulky ridge which can be uncomfortable and difficult to readjust.

In terms of construction, bulky seams and rough threads caused discomfort to the wearer. The overlocked edges of the seams were deemed to be exceptionally uncomfortable as they had many rows of stitches creating a rough surface texture that would rub against the skin. If the underpants are also fitted tightly around the body, it would cause painful imprints on the skin that would cause pain and discomfort for an extended period even after the underpants have

been taken off. Seamless underpants were found to be significantly more comfortable than typically constructed underpants as they do not have many of the bothersome elements of the seams. Another identified problem was that currently there are no seamless underpants options for girls age 4 – 5 years available on the local market. This option was only available to the boys.

Labelling has previously been identified in sensory studies (Spies & Van Rensburg, 2012; Roy *et al.*, 2018; Jordaan, 2021) as being problematic, thus it was expected that it would have a significant impact on the comfortability of underpants. Large and chunky labels cause discomfort to the wearer as they would not lie flat against the skin and create folds and thicknesses that are bothersome. Labels with rough edges also irritate as they rub against the skin and cause uncomfortable sensations. In severe cases, no labels of any kind are tolerated and need to be removed. However, some methods of removal proved not to eliminate the problem as the labels are always inserted into the seams and can thus not be fully removed without breaking the seam stitches.

In terms of other elements, decorative elements such as placement prints and ribbon bows for the girls' underpants proved to also have an impact on the comfortability of the underpants. Placement prints with metallic embossing and glitter textures proved to be uncomfortable even when placed on the outside. The placement prints alter the hand of the fabric where it is placed and can feel different on the skin in comparison to the other parts of the underpants. This difference in texture can create uncomfortable sensations for the wearer. Large, thick and textured placement prints were considered to be more uncomfortable than smaller and smoother prints. In some cases, the decorative ribbons on the girls' underpants also need to be removed as they create added bulkiness on the waistband elastics.

### 5.3.3 Objective 3

**To identify and analyse the risks parents face when underpants shopping for children with sensory overreactivity.**

All the difficulties that the parents face can be categorised into four types of perceived risk, namely, functional, social, time & effort, and financial risk (Solomon *et al.*, 2004:361; Demirgüneş, 2015; Hoyer *et al.*, 2017:59). The first difficulty would be that the majority of underpants are packaged in plastic packets. These packets can be difficult to open or the parents may not feel comfortable opening the packet in the store. Not being able to open the packet to feel the fabric and other elements of the underpants increases the parents' perceived functional risk. Since these underpants can also not be fitted while in the pack, the parent would not have an accurate measure of the body fit of the underpants. If the parents cannot

open the packets to feel or try them on, they cannot fully assess if the underpants would be suitable for their children or not. If the item can be fitted, the hygiene concerns may stop the parents from encouraging their children to try the underpants on. This could also increase not only the functional risk the parents face, but also the physical/safety risk. Another factor that increases the perceived functional risk among parents is the misconception of fiber content. Through mainstream media, consumers have learnt that cotton is breathable, soft, and less irritating to the skin, thus making it the best material for underpants (Kyriacou *et al.*, 2021). However, during the interviews when the participants were asked to point out the softest fabric sample, it was always the blended fiber content fabrics that were chosen as opposed to 100% cotton fabrics.

Many parents have conveyed concerns about refraining from taking their children to stores due to the perceived social risk. Many children with special needs find it difficult to go to public places as all the different sensory stimuli can often trigger meltdowns (Roy *et al.*, 2018). Parents would not want their children to be unhappy and uncomfortable and would do what they can to improve the situation. Often, the anxiety of public disapproval and judgment, directed at both parent and child, intensifies the perceived social risk, prompting parents to avoid public places.

Several parents also mentioned that they perceive underpants shopping to have a high time & effort risk. Searching for the most suitable underpants takes a long time and is indeed difficult. Along with identifying a suitable pair of underpants, comes the factor of acquiring suitable underpants. Parents have mentioned that when they find a particular brand, style or fit of underpants, they have trouble purchasing more of the same kind of underpants. They reported that a specific retailer may have sold out of their child's size or brand, thus they would have to resort to travelling to another retail outlet or order the underpants from their online website.

Lastly, parents have mentioned that shopping for underpants can become a costly process. Along with the perceived functional risk, perceived financial risk can also trouble the parents. Within this study, it seemed that perceived functional risk and perceived financial risk have a direct influence on each other. When parents need to buy a variety of underpants because they are unsure of which pairs would be suitable for their children and which are not, they spend more money during the process. This is the case for many parents who struggle to find suitable underpants. Some parents have mentioned that they have multiple packets of brand-new underpants that have been rejected by their children. Since underpants are one of the clothing items that many retailers refuse to exchange and refund, the parents cannot get their money back and are left with the unused pairs. Some have resorted to giving them away to family and friends. Regarding the price of the individual underpants, most parents expressed that they would not mind paying a higher price if they knew for certain that the underpants

would be accepted by their child. However, if possible, more affordable options would be appreciated on the market.

Underpants shopping is a challenge for many parents. For the more inexperienced parents who still need to experiment and try different styles, this process can become a long, time-consuming, and expensive operation. It is only once the parents have identified suitable underpants, that they know what to look for and where to find it. Thus, experience decreases all the perceived risks associated with this process. The following objective will provide guidelines that parents and retailers can use to make this process more effective and reduce perceived risks.

### 5.3.4 Objective 4

**To develop underpants shopping guidelines for children with sensory overreactivity.**

The final objective aimed to provide guidelines for parents that will assist them through the process of purchasing underpants for their children, minimising perceived risks. An infographic of these guidelines was made that can be distributed to parents (see Figure 5.1.). Parents are advised to conduct thorough research and product browsing to familiarise themselves with market offerings, retailers, and prices, thereby reducing frustration. This can be done online and therefore can also save time. Understanding their child's preferences streamlines decision-making.

Choosing underpants with fiber blends, such as a cotton elastane blend, is recommended for enhanced comfort and durability. Blended fibers like polyester and elastane with high cotton percentages retain desirable characteristics while adding strength (Kadolph, 2007:132). Parents should search for underpants with broader elastics, offering better comfort by distributing pressure over a larger area (Jordaan, 2021). Opting for elastics without decorative elements, prevalent in girls' underpants, can reduce irritability. Smoother textures like knitted, braided, or plush-back elastics are preferable over encased or decorative counterparts. Parents should avoid underpants with thick and bulky seams, coarse threads, and large seam allowances, as they may irritate the skin. Finer seams with uniform edge finishing that lie flat against the skin are recommended. Boys can opt for seamless underpants, while girls may consider this option if available in the future. Examining labels, preferably small and smooth, is essential for comfort. Printed labels are preferable, and if unfavourable labels exist, parents can remove them by unpicking them, offering a more effective solution than cutting labels. In terms of decorative elements, underpants with smaller placement prints and limited decorative features are advised to reduce irritation. Plain underpants without decorative details are ideal,

but allowances can be made for specific themed preferences, ensuring limited and small decorative features.

Since girls' underpants prioritise aesthetics over comfort and functionality, parents may consider shopping from the boys' section. Boys' merchandise often features more comfortable fabric, seams, and labelling. Parents of girls can experiment with seamless boys' underpants until similar options are available for girls. Overall, the guidance aims to empower parents to navigate the underpants shopping experience with efficiency and sensitivity to their children's comfort preferences.

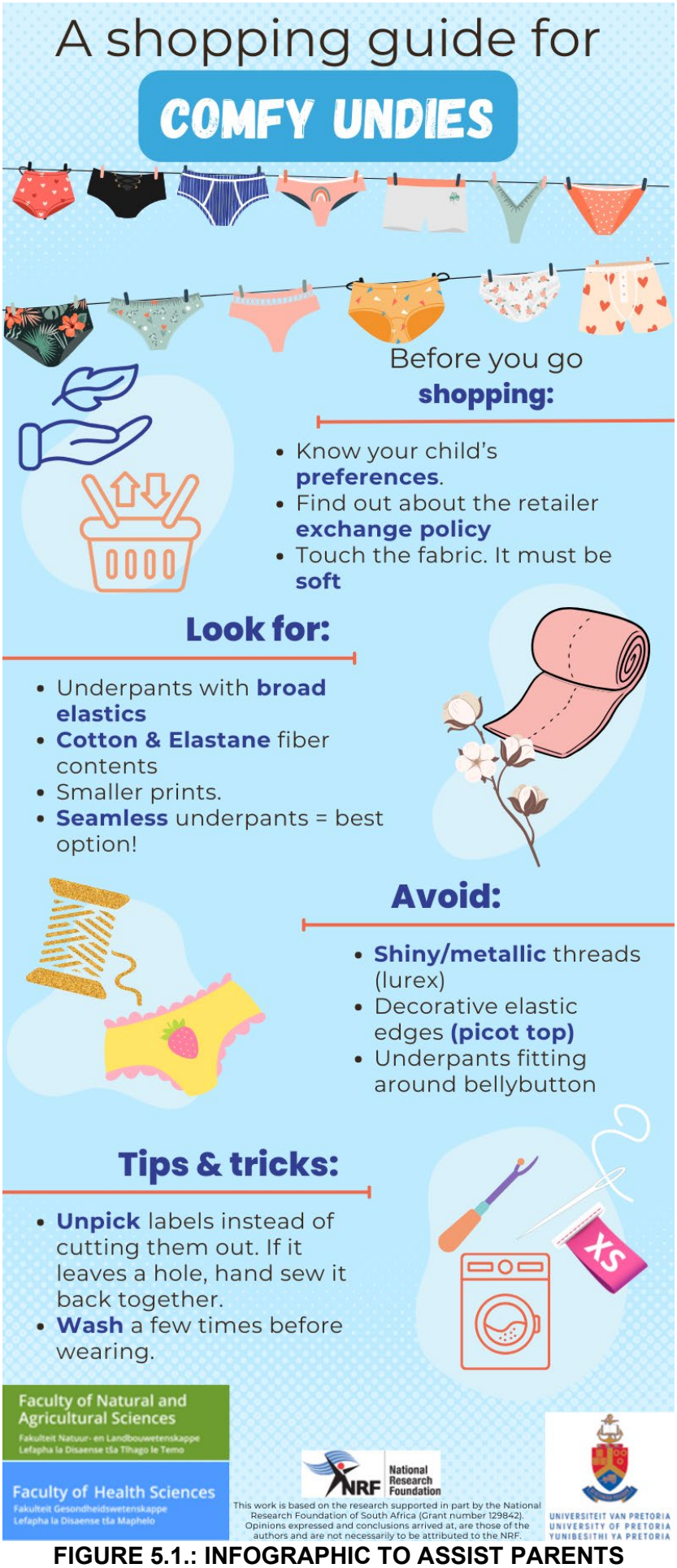



**FIGURE 5.1.: INFOGRAPHIC TO ASSIST PARENTS**

## 5.4 IMPLICATIONS OF THIS STUDY

The findings of this study reveal that this topic is still relatively under researched and provides a valuable contribution to multiple research fields as well as practical guidelines for solving the research problem. These guidelines will assist consumers who purchase underpants for children with sensory overreactivity, retailers who procure and sell underpants and occupational therapists who treat children with various sensory conditions.

### 5.4.1 Theoretical implications

Currently, existing research and data on the sensory effects of clothing items are limited and not widely explored (Jordaan, 2021). The available published literature becomes more limited and almost non-existent when the clothing items in question are underpants and their different elements. This study makes a valuable contribution to many fields of study such as consumer science by helping to fill the research gap and providing opportunities for further studies to be conducted, and occupational therapy as it gives occupational therapists more perspective on the problem from the apparel and textile industry viewpoint. This study explains how and why underpants characteristics can cause sensory irritation, as well as the perceived risks consumers face when shopping for underpants for children with sensory overreactivity. This study could be used as a stepping stone for future studies either to expand on the research topic or to form the basis for other similar studies.

### 5.4.2 Retail implications

The findings of this study can provide South African (and international) retailers with guidelines on how to make their product offerings, especially underpants more sensory-friendly and inclusive (Pillay *et al.*, 2021). Retailers can add an extra label to their packaging stating something like “best choice for sensory overreactive children” which can give them a competitive advantage over their competitors. Providing sensory-friendly underpants will not be a niche market. If the underpants are significantly more comfortable than the current product offering, all consumers may benefit from it and would want to purchase it. Thus, introducing these sensory-friendly underpants could lead to increased profit margins (Mugobo, 2013:247).

Retailers could also become aware of the fact that the parents must be able to closely evaluate the underpants. By making small changes to their packaging, they can allow consumers to tactilely evaluate the product by either packaging the underpants separately and displaying

them on hangers or incorporating cut-outs in their packaging to allow consumers to feel the fabric without having to open the packets. This will greatly assist in decreasing the perceived functional risk that the consumers may associate with the product (Demirgüneş, 2015).

Retailers can also consider making small changes to their return and refund policies on underpants. For example, when a parent can prove that the pair of underpants is still unused and in the same condition as when it was purchased, retailers may be more lenient in granting returns and refunds. This could encourage more parents to shop at this specific retailer as there is a chance that they would be accommodated if the underpants are rejected by their child (Gam *et al.*, 2010).

Retailers can also consider adapting their store layouts. For example, they can incorporate sectioned-off “safe rooms” for parents and children who easily become overwhelmed in public settings (Gaines *et al.*, 2014). This will allow parents more freedom when shopping and provide them with peace of mind knowing that if their child becomes overwhelmed, there will be a safe space for their child to relax. This would enable parents to extend their visit to the retailer and spend more time in-store which in turn could increase sales (Mugobo, 2013:247).

Most of these guidelines and recommendations mentioned do not require extensive research and technological advancements and can be implemented without much difficulty. These guidelines could have the potential to benefit both the consumer and retailer greatly as an improved shopping experience can result in the return of satisfied customers and positive word-of-mouth. This will have a positive influence on sales and therefore the profit of the retailer.

### 5.4.3 Occupational therapy implications

The contributions of this study can be used in practice by occupational therapists. They can use the study results to spread awareness among parents of their clients with sensory overreactivity about the influence underpants may have on their children’s daily routines. The results will also enable occupational therapists to provide guidelines to parents for shopping for a suitable pair of underpants according to the child’s needs and preferences. This will reduce the perceived risks the parents may face and will contribute to the well-being of both the child and the parents (Spies & Van Rensburg, 2012; Demirgüneş, 2015).

## 5.6 LIMITATIONS

The Phase 1 artefact analysis of the underpants selections faced multiple limitations. Due to time and effort constraints, it was not feasible to collect underpants from every retailer, online or in store, in the South African market. The selections would have become too large to analyse in a timely and accurate manner since artefact analysis requires a significant amount of time and attention to detail (Nieuwenhuis, 2019:102). Access to more advanced equipment also placed a limitation on the artefact analysis. More advanced equipment would have allowed the researcher to analyse the selections in a deeper and more thorough manner and explore other characteristics such as fabric gauge and weight.

Due to the nature of the personal interviews, the interviewer was geographically bound to Pretoria and Centurion. The participants had to be interviewed face-to-face as they had to examine the sample file. There was only one sample file which travelled with the interviewer. This prevented the interviewer from reaching possible participants in other cities or provinces. While personal interviews can provide valuable data and better insights (Quinlan *et al.*, 2019), they can be difficult to execute. Recruiting participants to partake in the study posed a challenge. Special-needs schools were contacted and given an invitation to participate in the study, to distribute to parents who would fit the requirements. Due to the POPI Act 2013, the participants could not be reached directly. One school responded and provided the information of a willing participant with their permission to the interviewer. However, no reply was received when attempts were made to schedule an interview. The invitation was also posted on different Facebook support groups. Multiple possible participants responded to the invitation and provided their details, but no response was received when they were contacted to arrange an interview. This limited the number of participants that could be interviewed and resulted in a relatively small sample size.

## 5.7 CONCLUDING REMARKS

Most individuals take wearing comfortable underpants for granted. Underpants are often a big enemy to the child living with sensory overreactivity as it is typically the first layer of clothing next to their skin. This study was conducted, firstly to analyse a selection of available underpants in the local market, and secondly to identify and gain deeper insight into the sensory irritation that the different elements could cause. This study also explored solutions and concluded by providing guidelines to parents to assist them in solving the problem and to make finding comfortable underpants easier.

This study has provided guidelines to retailers on how they can make their merchandise more inclusive and cater towards the needs of children with sensory overreactivity. These guidelines also included recommendations on making their stores more accessible and accommodating to children with special needs who may need a safe space to calm down when in public spaces.

This study will also equip parents with knowledge and understanding of different elements of underpants that can cause irritation, as well as guidelines and recommendations on what to look for when buying new underpants to ensure they have an improved shopping experience and better meet the needs of their child with sensory overreactivity.

Occupational therapists can also make use of the findings and guidelines of this study to bring awareness of this problem to their clients and their families as well as provide them with recommendations on how to alleviate sensory overreactivity caused by uncomfortable underpants.

Lastly, the children themselves can be encouraged to express their needs regarding comfortable underpants as well as explain what about a pair of underpants is causing them discomfort. If the children are encouraged to express themselves, they will be able to assist their parents in solving the problem. When the parents have a clear idea of what specifically irritates their child, they may be able to make more informed decisions and be better equipped to solve their problem. Thus, this study will not only assist the child with sensory overreactivity, but also the parents to better curb the negative effect uncomfortable underpants can cause.

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## ADDENDUM A: ETHICS 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

19 October 2022

ETHICS SUBMISSION: LETTER OF APPROVAL - AMENDMENT

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

**Reference number: NAS239/2022 Line 1**
**Project title: Influential factors that contribute to consumers' choice of children's underwear in an effort to alleviate sensory overreactivity**

Dear Dr L Diedericks,

We are pleased to inform you that the **Amendment** 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 (NAS239/2022) 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.
• **If 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.
• **If 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: PLAGIARISM FORM**

DECLARATION OF ORIGINALITY

UNIVERSITY OF PRETORIA

The Department of **Consumer & Food Sciences** places great emphasis upon integrity and ethical conduct in the preparation of all written work submitted for academic evaluation. Academics teach you about referencing techniques and how to avoid plagiarism; it is your responsibility to act on this knowledge. 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. 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 & Food Sciences**. No written work will be accepted unless the declaration has been completed and submitted.

Full names and surname of student: **Leoné Gouws u04594658**

Topic of work: **Children with sensory overreactivity and underwear: A consumer-centric approach**

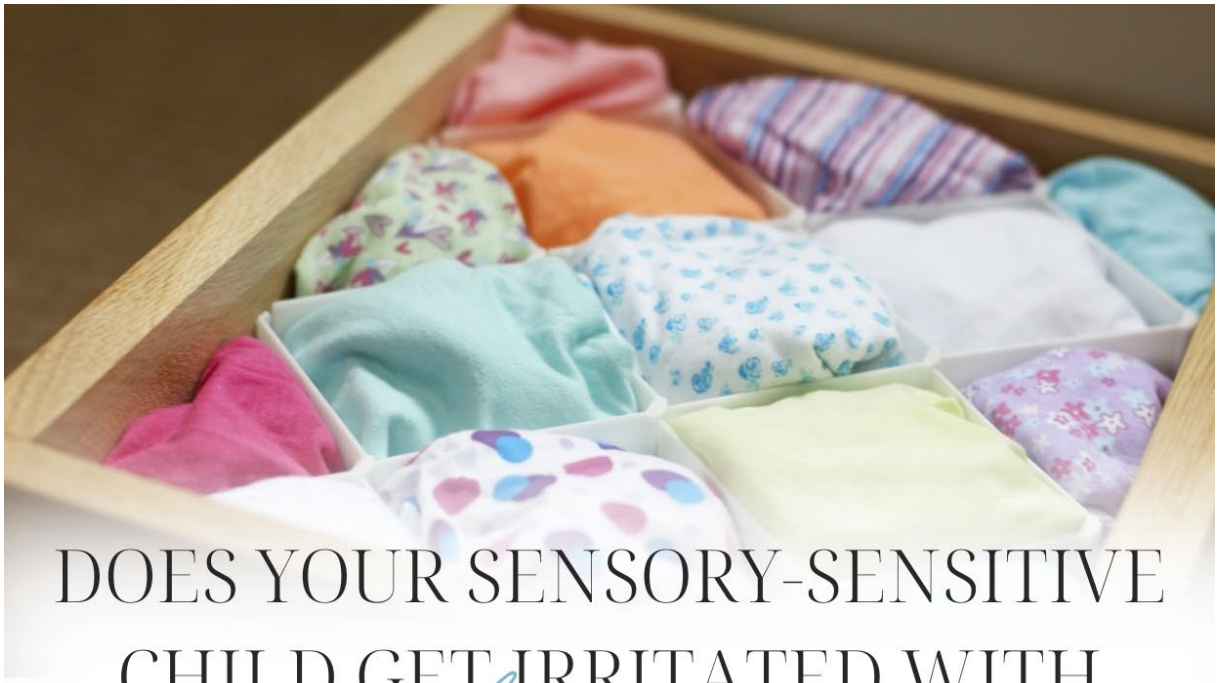
Declaration 1. I understand what plagiarism is and am aware of the University's policy in this regard. 2. I declare that this **research proposal** (e.g. essay, report, project, assignment, dissertation, thesis, etc) is my own original work. Where other people's work has been used (either from a printed source, Internet or any other source), this has been properly acknowledged and referenced in accordance with departmental requirements.

SIGNATURE

**10/12/2023**

DATE

**ADDENDUM C: INTERVIEW INVITATION**



# DOES YOUR SENSORY-SENSITIVE CHILD GET IRRITATED WITH *Underwear ?*

**We want to help our children!**
**We believe that small changes can make a big difference.**

If you have a child (between the ages of 3- to 12-years old) that finds underwear intolerable due to sensory reasons (tactile defensiveness/ sensory processing disorder), please assist us in getting a better understanding of this issue. Please click on the Google Forms link below if you are willing to participate. We will contact you to arrange a personal interview at a convenient time.

**As an indication of our appreciation for your time and effort, you will receive an R250 Checkers voucher.**

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Leoné Gouws
u04594658@tuks.co.za

Lizette Diedericks
lizette.diedericks@up.ac.za

## ADDENDUM D: CONSENT FORM

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Faculty of Natural and Agricultural Sciences
Department of Consumer and Food Sciences
December 2022

# 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 overreactivity. This study will aim to get a better understanding of the factors that influence underpants shopping for children with sensory overreactivity to provide practical guidelines to parents of children with sensory overreactivity when purchasing underpants.

### RESEARCH PROCEDURE

You will be asked to engage in a personal interview about sensory-sensitive children and underpants. **Please note:** No prior preparation is needed to participate in this study. Participation is voluntary, with no penalty or loss of benefit if you decide not to take part. The interview will take approximately 60 minutes to complete.

### 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 access to your data.

### POTENTIAL BENEFITS

The findings derived from this research could assist parents when purchasing underwear for their children. In addition, it could also provide valuable findings that retailers can consider when developing their product offerings. 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 (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

As a gesture of appreciation, a voucher valued at R250 will be provided to each participant. Please sign that you have received a voucher.

_____

Signature

## ADDENDUM E: TOPIC GUIDE

1. Do you ever open the underwear packs to feel the fabric?
2. Please evaluate every **fabric base** sample according to your child's preferences.
3. Which sample would be best suited to your child's preferences and which one not?
4. Please evaluate every **elastic** sample according to your child's preferences.
5. Which samples would be best suited to your child's preferences and which not?
6. Please evaluate every **leg opening elastic** sample according to your child's preferences.
7. Which sample would be best suited to your child's preferences and which one not?
8. What type (**design**) of underpants does your child prefer? (Girls – Boyleg vs bikini; Boys brief vs boxer).
9. Which design do you normally purchase?
10. Please evaluate every **seams** sample according to your child's preferences.
11. Which samples would be best suited to your child's preferences and which not?
12. Please evaluate every **label** sample according to your child's preferences.
13. Which samples would be best suited to your child's preferences and which not?
14. Does your child have a preference for labels inserted at the back or in the side?
15. Would your child prefer **printed labels** over fabric labels?
16. Does your child become irritated with exterior **decorative elements**?
17. Which sample would your child prefer and which one not?

18. Do you look at the **fiber content** of the underpants before you purchase them?
19. When you purchase underpants, do you purchase the correct **size** according to body size? Explain your answer.
20. Does your child wear his/her underpants inside out? Explain why.
21. After purchasing the underpants, do you modify them in any way? (adaptations)
22. Do you find it challenging to buy underpants for your child? Explain why.
23. Do you take your child with you when shopping for underpants?
24. Do you feel you get value for money when purchasing underpants for your child?

**ADDENDUM F: SAMPLE FILE**

SAMPLE KIT

Underpants' Elements Samples

LEONÉ GOUWS
University of Pretoria

# Table of Contents

# GIRLS SAMPLES

# Fabric Base

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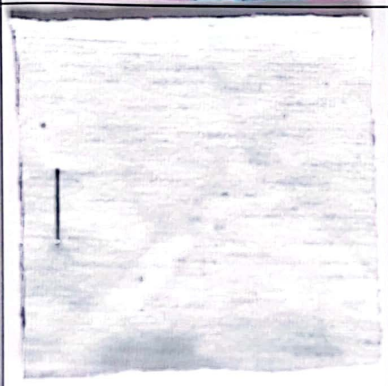
| A |  | B |  |
| C |  | D |  |
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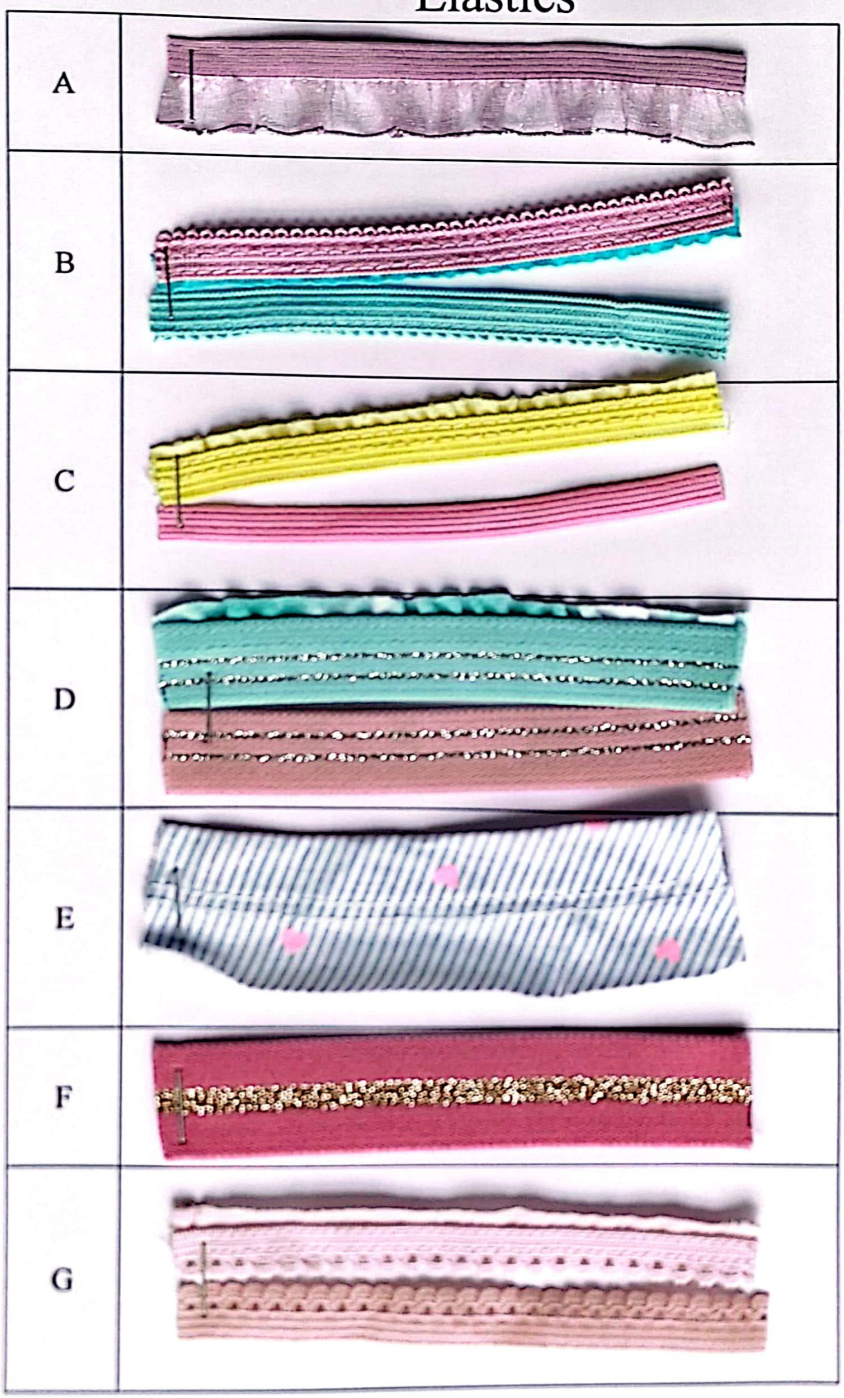
# Elastics

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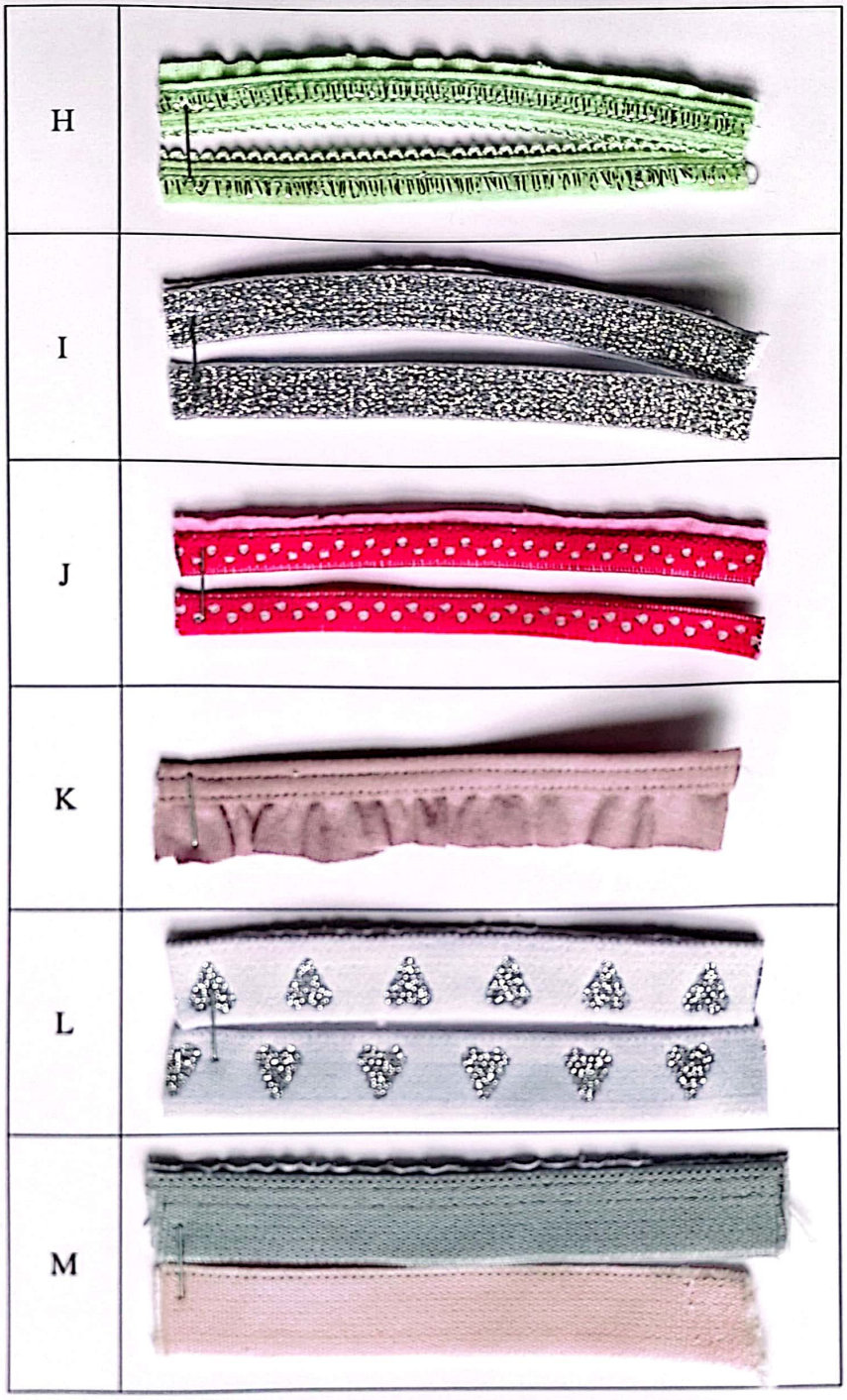


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# Leg Opening Elastics

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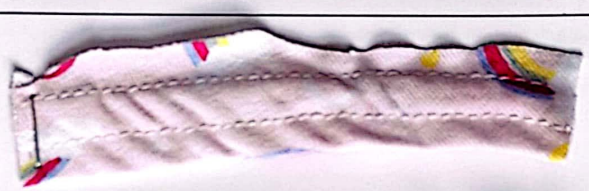
| C |  |
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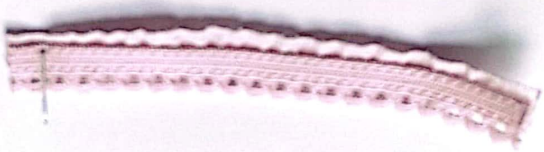
| F |  |

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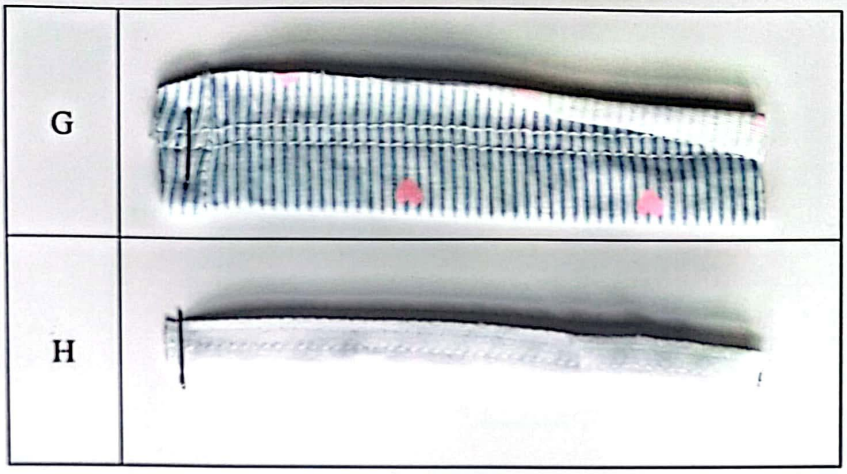

# Design/Fit

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# Seams

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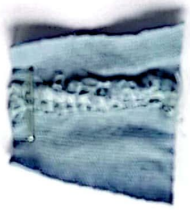
| D |  |
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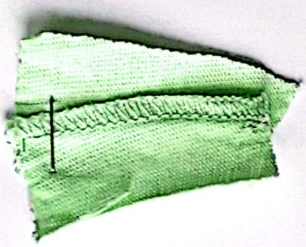
| G |  |
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# Labels

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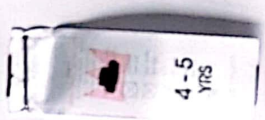
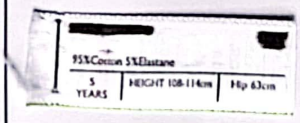
| E |   | F |   |
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# Prints & Others

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11

# BOYS SAMPLES

# Fabric Base

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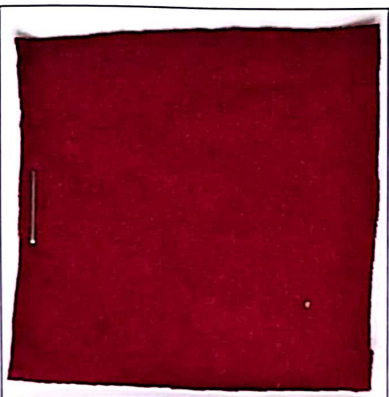
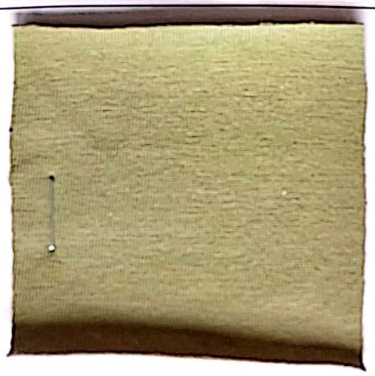
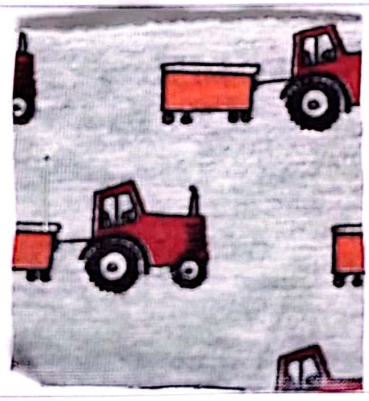
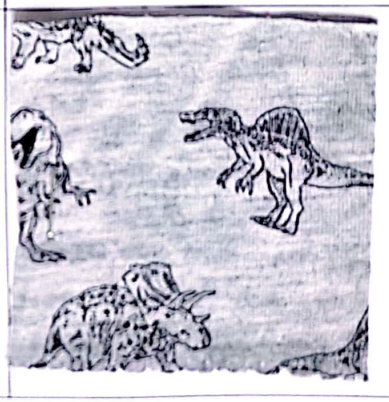
| A |  | B |  |
| C |  | D |  |
| E |  | F |  |

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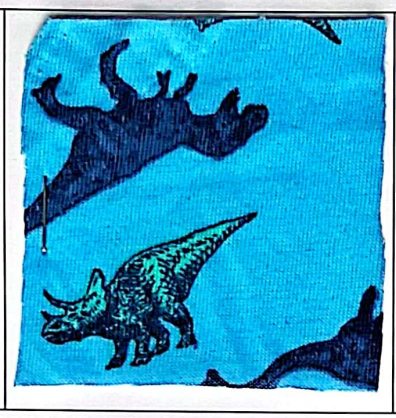
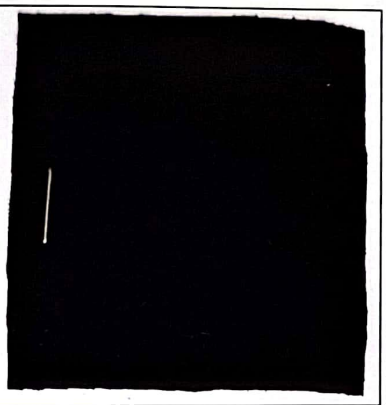
| G |  | H |  |

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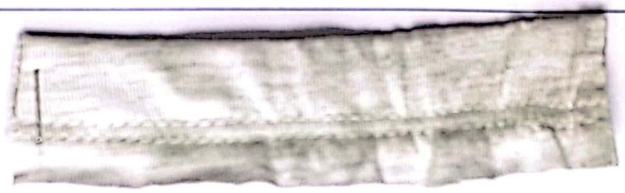
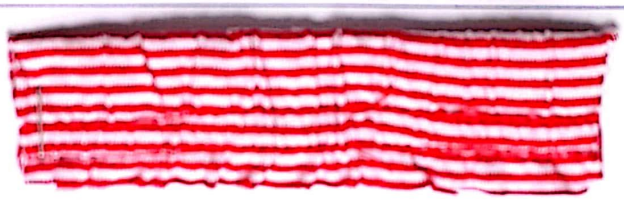
| C |  |
| D |  |
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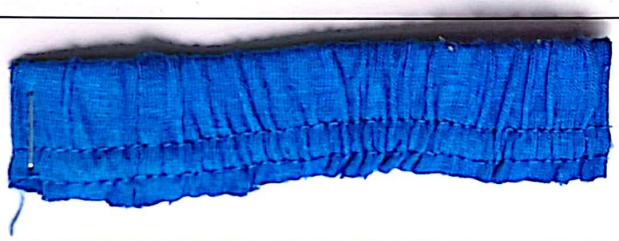
| I |  |

# Leg Opening Elastics

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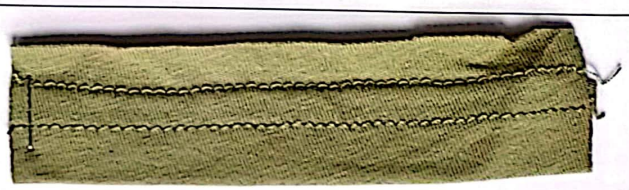
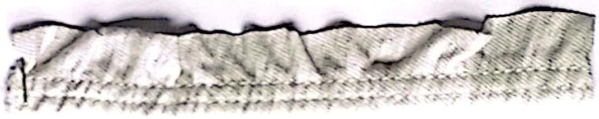
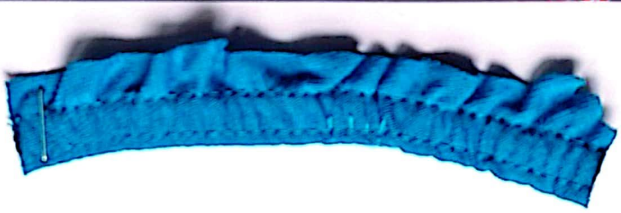
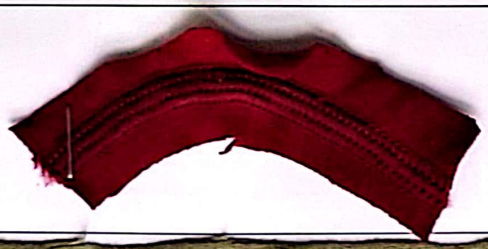
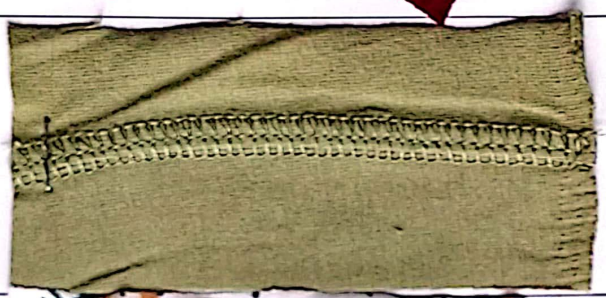
| B |  |
| C |  |
| D |  |
| E |  |
| F |  |

| | |
|---|---|
| G |  |

# Design/Fit

| |
|---|
| 029 |
| 047 |
| 033 |
| 027 |
| 059 |

# Seams

| | |
|---|---|
| A |  |
| B |  |
| C |  |
| D |  |
| E |  |
| F |  |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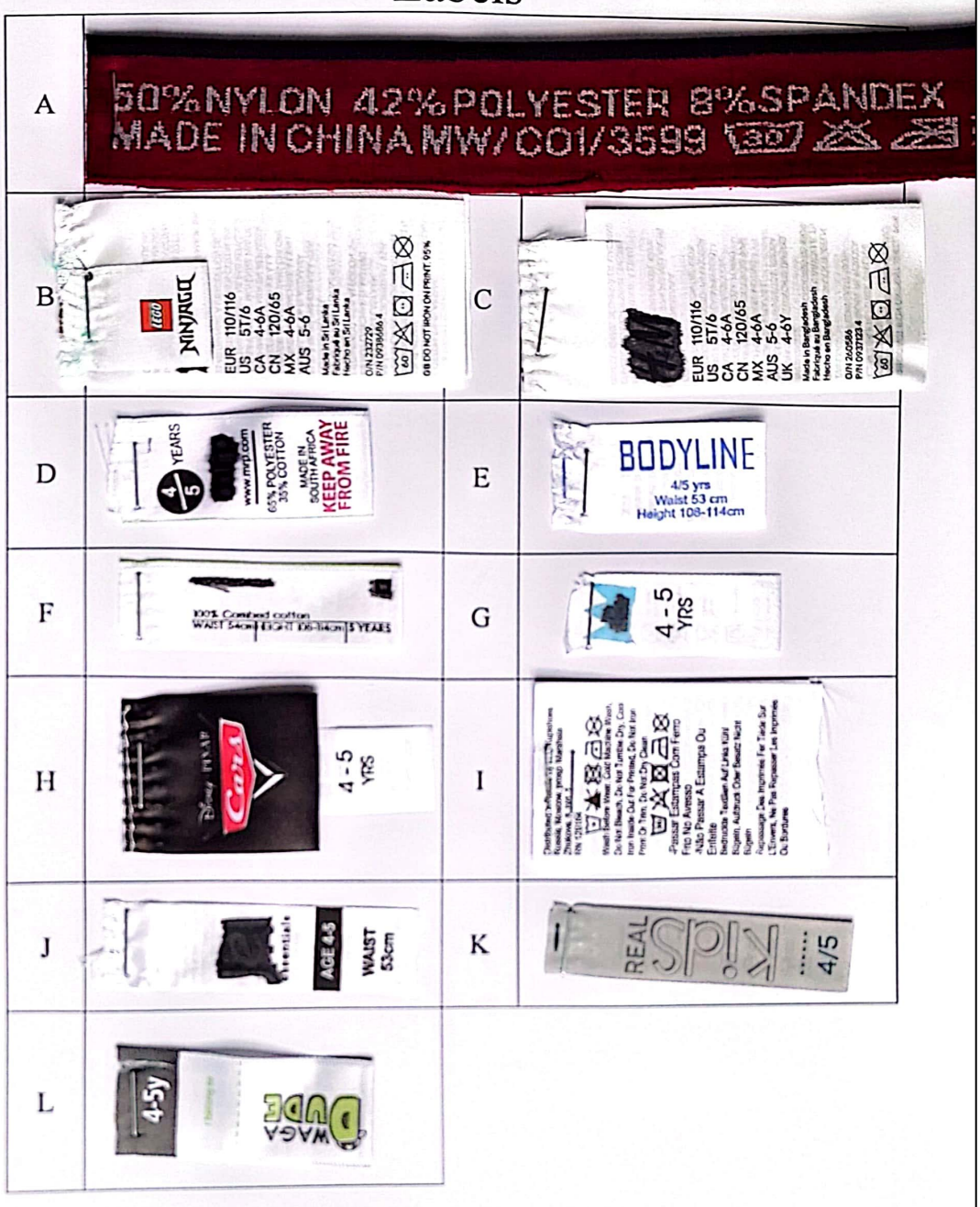
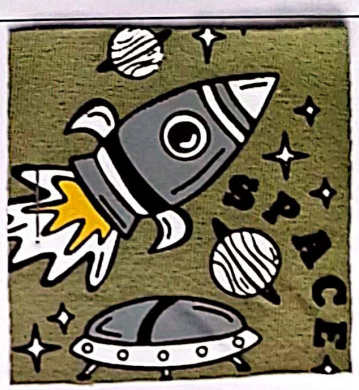
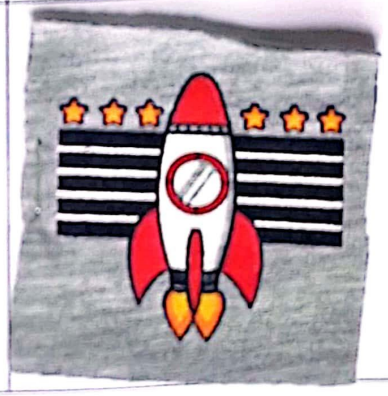
# Labels



# Prints

| | | | |
|---|---|---|---|
| A |   | B |   |
| C |   | D |   |
| E |   | F |  |

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