

Flashy flamingo: Girl's sun protective apparel with sensory-friendly features

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Contextual review and concept. Eighty percent of an individual's lifetime sun exposure occurs during childhood (Preston & Stern, 1992; Venosa, 2018). The Centers for Disease Control and Prevention (CDC, n.a.) recommends children wear long-sleeved shirts, long pants, skirts, and hats along with sunscreen as the best protection against ultraviolet rays. Yet, sun protective apparel is used 16% or less of the time and only one-third of parents apply sunscreen to their children (Venosa, 2018). Additionally, if a child suffers from a sensory disorder, such as Autism Spectrum Disorder (ASD) or Sensory Processing Disorders (SPD), clothing can cause tactile sensitivity leaving the child anxious, agitated, or developing clothing avoidance behaviors due to textures, seams, closures, or inability to regulate body temperature (Kabel, 2016; Triantafyllopoulou, 2021). For a child suffering from sensory disorders, apparel can be a barrier that leaves them unable to participate in normal activities, such as playing in the sun or water (Kabel, 2016).

Children's sun protective apparel research reported both psychological and apparel-related barriers (Fatima & Paul, 2015; Kabel et al., 2016; Kanellis, 2020; Reddy-Best & Harmon, 2015; Wu et al., 2019). Psychological barrier research indicates children preferred activewear that is familiar to them and comfortable (Kanellis, 2020; Wu et al., 2019). Apparel barrier research in children's activewear focused on fit and comfort which were impacted by fabric textures, seam comfort, and sizing (Fatima & Paul, 2015; Kabel et al., 2016; Reddy-Best & Harmon, 2015). Childrenswear apparel for sensory disorders recommends tight-fitting garments with soft textures, flat non-irritating seams, and no tags (Kabel, 2016; Kanellis, 2020). Additionally, childrenswear design scholarship specific to activewear, sun protection, and sensory disorders is highly lacking (DeNey & Green, 2020; Kabel, 2016). Sensory disorder childrenswear design scholarship in the last ten years has focused mainly on therapy garments but not on activewear or sun protective apparel (Koo, 2014; Shin et al., 2015; Vitullo & Benitex, 2019; Zhang & Cobb, 2019). Therefore, the purpose of this garment was to design a more inclusive girl's sun protective assemble that addressed sensory disorders, psychological, and apparel-related barriers reported in childrenswear sun protective research.

Aesthetic and functional properties along with visual impacts. Familiarity and peer acceptance are important in childrenswear apparel so athletic and swimwear styling was referenced in the design process. Flamingos are the inspiration for this ensemble as it symbolizes fun and relaxation. The ensemble, based on CDC guidelines, includes a long-sleeve SPF 50 shirt, long tights, and a swim skirt (CDC, n.a.). The ensemble provides sun protection for girls in various sun-related activities from water to land. Styling includes elongating the sleeves to mid-hand with a thumb opening and a high-low neckband. The back neckband protects the neck from sun while the low front provides less constriction which is important for children with sensory

disorders (Kabel, 2016). The shirt and tights have a 3-inch vertical insert on the sides made of a soft small-holed mesh to increase ventilation and not provide negative tactile sensitivity. The swim bottom skirt is made of all three fabrics. The skirt mesh coordinates with the shirt, provide ventilation, and has quick drying finishes as wet clothing is avoided by children with sensory disorders (Kanellis, 2020). The skirt hem is bound with flamingo fabric and the swim bottom is made with coral spandex. Seam comfort is critical for those suffering from sensory disorders (Kabel, 2016). Merrow's ActiveSeam™, newly introduced to apparel manufacturing in 2017, was used for all structural seams to provide increased seam stretch and comfort due to its flat-like butted seam, see Figure 1 (Merrow, 2017). ActiveSeam™ also provides a visual impact due to the visible floating threads on the exterior of the seam, see Figure 1.



Figure 1. ActiveSeam™ seam joining areas (exterior and interior).

Process, technique, and execution. Stretch knit patterns were drafted based on Alvanon's extended child size standards for North America measurements for updated sizing and improved fit (Alvanon Inc., 2019). The shirt has raglan sleeves for mobility and comfort. The neckband was lowered neckline to be less constricting for the sensory sensitive child. The back neckband covers the majority of the neck then gradually shortens starting at the high shoulder point until it was flush at the center front. Longer sleeves cover to mid-palm with a thumb slot to help keep coverage on hand while playing. The underside of sleeves and torso sides are made from soft small-holed mesh to allow for ventilation and better water drainage to alleviate "ballooning" of apparel in the water. The side areas of the body receive less sun exposure, so it is an ideal place to place the mesh. The flamingo 4-way stretch compression fabric is UV SPF 50+ with aloe vera encapsulates to allow for sun protection, mobility, and improved comfort for children with sensory disorders. The coordinating 4-way stretch coral fabric is a high-performance nylon-spandex tricot with SPF 30+ protection. Structural seams were executed on an ActiveSeam™ and hems were coverstitched, so all seams were flat or flat-like and non-irritating. Threads were Sabatex® continuous polyester textured filament to provide strength and comfort to all seams.

Design contribution and innovation. Research has shown children experience sun overexposure continually every year after year, the need for sun protective apparel is needed to promote the protection of children from possible future cancer (CDC, n.a.). Additionally, children with sensory disorders lack sensory-friendly sun protective apparel options. This inclusive ensemble provides girls, with or without sensory disorders, with sun protective apparel options – pant, skirt, and coordinating shirt – featuring soft protective fabrics, novel seam options, along with better fit, comfort, and mobility. It expands on existing apparel design scholarship to include children’s sun protection and alternative sensory-friendly apparel options which are currently lacking. The marketplace needs more sensory-friendly apparel options to provide a preponderant platform for research into apparel sensory experiences. Lastly, the inclusive design of this ensemble provides an aesthetically pleasing option for children to dress similarly to their peers and be protected from the sun whether or not they have a sensory disorder. A disability should not stop a child from playing in the sun or the water.

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