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Luminosity: High Visibility Apparel for Runners

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Keywords: Functional design, user-centered design, visibility, running apparel

Measurements: Bust: 35”; Waist: 32”; Hip: 36.”

Context: The main objective of this design scholarship was to develop a running, coordinating tights, and vest to aid in visibility and safety during road runs in low light conditions. The running shirt concept was developed through a user-centered design process where local runners participated in a collaborative design session. Through the design session, runners identified safety during night road runs as a primary concern, and they recognized the need for garments that can help drivers see them in low light conditions. According to the World Health Organization (2004), a large number of pedestrian collisions occur around dusk, dawn or at night due to poor visibility. This research project aimed to address this problem by giving runners the opportunity to design their garments to meet their visibility and safety needs. The runners, or users, were regarded as experts in their lived experiences and believed to have the best knowledge to address this problem since safety is a concern which they encounter frequently. Known as User-Centered Design (UCD), this design process is well-known and used by functional clothing designers, albeit rarely included in publications as a named theory. UCD is a design framework in which the wants, needs, and boundaries of end users of a product are considered at each stage of the design process (Sanders, 2002). UCD methods have been used by apparel researchers, including Cramer (2011) to ensure the longevity of apparel products. In this project, this designs process was part of a larger research project, presented previously in Morris (2016).

Process, Technique, Execution: The study design had five main phases: 1) design sessions were runners developed design concepts; 2) online evaluation where runners evaluated the concepts developed in design sessions; 3) prototypes developed by the designer; 4) prototypes evaluated by runners in wear trials; and 5) the designer developed coordinating tights and vest based on findings from wear trials. Runners were eligible to participate in the design sessions if they ran over 30 miles per week. In total, 64 runners participated in phase 1, 108 runners participated in phase 2, and eight runners participated in step 4. Ages of the participants ranged from 18-75 years old. As much as possible, the same runners were used throughout the process. Qualitative data were collected at each phase.

Phase 1 Design Sessions: In the design session, the runners decided the key performance criteria of a highly visible running top. The criteria were that it reflects light from all angles, it is also highly visible in the daytime, wicks moisture, is breathable, protects from other environmental conditions, and maintains thermal comfort. As the runners noted, sometimes they start at dusk, but end in the dark and experience variations in environmental conditions as well as changes in lighting conditions. The team selected a polyester/spandex jacquard knit fabric in lime green with a moisture wicking finish for the main body fabric. They also desired to have a reflective mesh fabric that could double as vents at the upper back and armpits. They also included stretch reflective tapes on the front torso and around the arms, paying particular attention that the tape did not reduce mobility around the arms. The design included technical features like storage pockets on the back with reflective tape, thumbholes, and a zipper at the neck that could be unzipped to help with thermal management.
Phase 2 Online evaluation: This design was evaluated by runners in an online survey. Some of the feedback from the online survey included, “I Love the simple design, yet it has the core features needed,” and “there is too much mesh on the back it seems like it would be drafty.” Overall, the garment was well received from the runners.

Phase 3 Prototype development: After reviewing the results of the online vote, the garment was refined, and a prototype was produced. The designer sourced reflective mesh fabric from V-Can that uses micro glass beads to create the retro-reflective effect. The glass beads adhere to a polyester/spandex knit ground, so the fabric has some stretch. The material is perforated to encourage breathability. When in normal lighting conditions, the reflective fabric is light gray, and when illuminated, it glows bright white. Basic block patterns were developed by reviewing size measurements of competitor brands. Patterns were drafted by hand, digitized into Optitex PDS where they were further refined. Patterns were exported from Optitex PDS to Adobe Illustrator and cut using a laser cutter to ensure cutting accuracy and efficiency because nine prototypes were created; one for each of the wear trial participants, and one for the designer.

Phase 4 Wear trial evaluation: The design was tested by four women and four men in wear trials. Qualitative data from the wear trials were mostly favorable, except for some concerns that the collar was awkward when unzipped. And regarding visibility, a few participants shared the sentiment that the reflective material was sufficient, "Great look, and breathes well in armpits and back, reflective material suitable for being seen at dusk." The running top appears to meet the visibility needs of runners.

Phase 5 Tight and vest development: Insights learned from the development and testing the running top were used to create a coordinating running tight and a reflective running vest. The running tights have reflective zones on the legs where moving parts of the body to catch the eye of drivers. The vest as large reflective mesh panels on the front and back. Because the running top did not address thermal comfort and protection against environmental conditions, the designer added a silicone-impregnated ripstop nylon "shirt" under the vest. The shirt will retain some body heat but is loose enough to ventilate. It was important to the designer that the running shirt does not interfere with the breathability of the running top. The vest can be compressed and fits into the back pocket of the running shirt.

This running ensemble, which was developed with runners and further conceptualized by the designer, addresses runners concern for safety during runs in low light conditions. The running top, together with the vest meet the criteria outlined by runners in the initial design sessions. This running ensemble was designed to improve visibility while maintaining thermal comfort for the wearer. Two stages of evaluations by users further ensured that the product developed in this research meets needs of users.

References