Development and evaluation of a nursing sports bra prototype

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Introduction

Postpartum exercise is highly encouraged to nursing moms for fast postnatal recovery. However, end-users have identified a market void for a nursing sports bra which meets their needs. Due to scheduling conflicts, both biological and occupational, nursing moms desire a nursing sports bra that allows breastfeeding before, during, or immediately following exercising (Cassil, 2009).The purpose of this study was to practice a methodical design process to guide the development and evaluation of a nursing sports bra.

Theoretical Background

This study employed the Collaborative Apparel Product Development (CAPD) model (Morris, Park, Sarkar, & Sparks, 2011), as the theoretical framework. The CAPD model is a synthesis of the FEA consumer needs model (Lamb & Kallal, 1992) and the three-stage design process (LaBat & Sokolowski, 1999). The CAPD model embraces end-users in all three stages of the product development process as collaborators. During the design process, which consists of problem definition/research, creative exploration, and implementation, the collaborators are expected to provide product developers with direct access to consumer information and reactions. The CAPD model encourages less iteration between design stages, resulting in a more efficient process and greater insight of end-user's needs. Also, the CAPD model identifies product modifications prior to production, reducing the risk of additional manufacturing costs.

Methods

The prototype was developed in sponsorship with a maternity apparel manufacturer, located in the Western region of the U.S. The sponsor company agreed to provide the researchers access to its social media for collaborator recruitment. Moreover, the company was interested in manufacturing the design outcome of this study. Five collaborators were recruited via the sponsor company's social media such as the company's blog, newsletter and Facebook page. Inclusion criteria for collaborators included: frequent participation in moderate to high impact exercise activities and that they plan to breastfeed throughout the entire design process.

In stage 1, a focus group discussion and survey questionnaire were administered to understand consumer perception of the performance and shortcomings of nursing sports bras available in the current market. Findings from this stage offered guidance to prototype development. Through stage 2, numerous design options were ideated, and a design idea was moved forward for prototyping. In this stage, collaborators were asked to evaluate the performance and fit of the prototype bra through wear trials. In stage 3, collaborators suggested design modifications of the prototype.

Results and Discussion

The resulting prototype was designed to resolve specific comfort issues reported by nursing moms who regularly participate in high-impact sports. Qualitative data collected from the focus group discussion identified user-needs. Needs were identified as physiological comfort: Specifically 'support' was the main design consideration. Collaborators reported wearing a sports bra over a nursing bra to provide enough support and ease of nursing. This concept inspired the development of a nursing bralette under a sports bra shell as a 'built-in nursing system' with additional support to minimize breast tissue movement. The bralette is a surplice design with easy one-hand nursing bra clips for ease of nursing. Padded adjustable straps allowed for customization of fit. Physical comfort was addressed by incorporating mesh fabrics and fabric with moisture-wicking finishes which aided in thermal comfort. The fit of the bra was cut with a higher neckline and longer side seams to provide additional coverage. Psychological comfort was identified by collaborators as feeling 'exposed' which was addressed by including removable bra cups for modesty. Aesthetic features included mesh trim at the neckline, feminine, styling, and faux underwire to provide breast definition.

Wear trials identified areas for prototype improvement. Data collected from the wear trials were analyzed on a 7-point Likert scale to compare evaluation ratings of the prototype bra during high and low impact activities. The wear trials found that the prototype bra performed positively in the following variables: support ($\bar{x}$=5.509), comfort ($\bar{x}$=6.076), aesthetics ($\bar{x}$=5.003), movement ($\bar{x}$=5.908), and fabric breathability ($\bar{x}$=6.415). However, the prototype bra needed further improvements in fit ($\bar{x}$=4.318), donning/doffing ($\bar{x}$=4.707), and ease of nursing ($\bar{x}$=4.274). Collaborators also addressed in the wear trial log that the straps crossed in the racerback orientation made the bra hard to don, doff, and nurse. These evaluations suggested future considerations for prototype modification.

Conclusion

The prototype was developed from criteria established from collaborators during stage 1 of the CAPD Model. The evaluation of the prototype through the wear trials provided insight into the success or failure of each design solution. Through testing the prototype bra with actual users, necessary improvements were identified for further prototype development before going into mass production of the nursing sports bra.

References

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