



3D Apparel Design for Female Boomer Activewear: A Sequential Exploratory Mixed Methods Study

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Keywords: Activewear, baby boomer, product development, virtual prototyping

Background and Problem. The increasing awareness of the benefit of physical fitness has motivated female boomers to join exercise classes and created a demand for activewear over the years (Zhang, 2004). However, the attributes of activewear are usually targeted for younger generations with skin-tight and body revealing designs, thus sparking complaints by female boomers in online communities. Consumers in this age group are frustrated in their search for “apparel that is designed for their bodies, expressive of their style, and functional for their needs” (Borcherding, & Bubonia, 2015, p.77). Thus, a holistic in-depth research is necessary to investigate female boomers’ demands on activewear that are distinguished from younger generations, reflecting their body changes and preferences.

Purpose and Theoretical Framework. The purpose of this study was to explore and analyze design requirements and virtually develop prototypes for female boomer activewear for indoor fitness through a sequential exploratory mixed methods research process. The researcher adopted Generational Cohort Theory and Functional, Expressive, Aesthetic (FEA) Consumer Needs Model (Lamb & Kallal, 1992). Both 2D and 3D virtual prototyping technology was used to aid the design assessment and design processes. Specific research questions included: RQ1. What are FEA needs for female boomer activewear?; RQ2. What are the design attributes of activewear for female boomer market and how do they differ from younger generations?; and RQ3. How do consumers evaluate and perceive activewear that are designed for female boomers?

Method. The primary focus of the sequential exploratory mixed methods research is to initially explore a phenomenon and expand on the qualitative findings (Creswell, 2009). Thus, the method consists of three phases: (a) face-to-face in-depth interviews (N=15) were used to identify and define design attributes of activewear using MaxQDA, (b) 3D virtual prototypes were generated for online survey stimuli, and (c) an online survey (N=321) was used to examine how consumers evaluated and perceived the activewear for female boomers. Specific design process for phase two included: (a) 3D comparison of female boomer and missy figures based on ASTM D5586/D5586M-10 and D5585, (b) 3D tension map testing, (c) interaction matrix and design problem-approach analysis, (d) design sketches, (e) 2D virtual pattern making through Optitex, and (f) 3D simulation of virtual try-on. 3D tension map testing was conducted to examine fit differences between missy and female boomer figures.

Results and Discussions. Five themes were identified as functional needs for female boomer activewear: *comfortable fit, thermal comfort, covering imperfections, smart functions* and

athleisure attributes. Sub-themes that emerged under *comfortable fit* related to sports bras, desired compression and support for the lower torso, crotch length for bottoms, excessive compression and short length for tops. Two sub-themes, *age appropriateness* and *body consciousness* emerged for expressive needs, and three sub-themes emerged as aesthetic needs: *simplicity in design attributes*, *slimming effects*, and *fashion consciousness*. Based on the interview data from the Phase 1 and the interaction matrix of garment specifications, design problems and approaches for female boomer activewear were identified. As shown in Figure 1, a total of four items were examined and developed. When female boomers were asked to evaluate the prototypes in phase three through an online survey, the results showed that the prototypes were perceived to be comfortable (M ranging from 4.44 to 4.95), age appropriate (M ranging from 4.58 to 5.35), and aesthetically appealing (M ranging from 4.69 to 5.27). A significant regression equation was found for the model predicting wearing intention ($F(3,287)=193.16, p<.00$) with an R^2 of .67. All of the three FEA constructs, Perceived Comfort ($\beta=.17, t=4.00, p<.00$), Age Appropriateness ($\beta=.18, t=3.90, p<.00$), and Perceived Aesthetic Attributes ($\beta=.50, t=12.00, p<.00$), had positive effects on female boomers' wearing intention.



Figure 1. 3D Virtual Prototypes

Contribution and Implications. The research explored multiple dimensions of female boomers needs and the proposed framework provides a satisfactory end-product that help to collect direct information about their specific demands for activewear. This study also contributes to bring increased conceptual clarity to the concepts of age appropriateness and further confirms the applicability of using mixed methods research in the discipline of textiles and clothing. Moreover, this study has practical implications for product developers and retailers on product development and commercialization strategies for female boomer consumers. Future studies may employ wear testing to examine any discrepancies between 3D visualized fit and actual fit of the prototypes.

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