Compressive sportswear for strength training of consumers in the U.S.: Wear experience comparisons between men and women

Youngsook Kim and Fatma Baytar, Cornell University, USA

Keywords: consumer evaluation, gender differences, compression garments

Introduction: In theory, compression garments should improve workout performance by stabilizing muscle vibration, increasing blood circulation, and squeezing out unnecessary byproducts such as de-oxygenated substances from muscles (Florian & Sperlich, 2016; Graham, 2018). Although there were some controversial opinions about the positive impact of compression sportswear on athletic competence, mainly due to a Nike-funded study that showed no significant differences in jump height or strength in running while wearing compression garments (Mantor, 2017), several studies have proven the otherwise. These studies found that the compression sportswear could help relieve muscle fatigue in comparison with regular sports apparels (Hsu et al., 2020), and were beneficial in supporting the adductor muscles at hip by reducing strain and gaining recovery from them (Graham, 2018; Sissons & Bubnis, 2021).

Men and women have different physical characteristics in shape, muscularity, and anatomy. Therefore, functional garments such as compressive sportswear must be designed to accommodate gender differences. A few commercial designs of compression shorts were found to have distinctive features for each gender, such as more contoured and high-waist compression shorts for women and comfortable compression shorts that cater to men's physique (Thermajohn, 2020). If these distinguishable aspects in gender are not properly reflected on garment patterns, consumers would complain about extreme tightness that leaves wearers breathless when exercising, or inconsistency in pressure fit, e.g., too loose at chest or too tight at waist (Sissons, 2021; Thermajohn, 2020). Moreover, too much pressure can damage skin and trigger numbness, especially for older adults (Sissons & Bubnis, 2021). In this regard, appropriate design in pressure fit can optimize exercising effectiveness and boost consumer satisfaction after purchase. Accordingly, consumer reviews would be an essential part for profitable expectations in industry and academy. For this reason, the main purpose of this survey research was to identify the differences of consumer evaluations between male and female on compressive sportswear based on their wear experiences for strength training.

Methods: The survey was created in Qualtrics and distributed via MTurk from January to February in 2021 upon receiving an IRB approval. A total of 404 responses from 195 male and 209 female consumers in the U.S. were collected. The questionnaire consisted of 32 questions including demographics, height, weight, body type, garment size, strength training period and frequency, preferred sportswear brands, and user evaluations based on wear experiences in strength training. Users answered questions based on their experiences with the compression sportswear they own, and assessed vertical fit (garment lengths in top, pants, and sleeve), overall fit to body size, compression level, and satisfaction level. A five-point Likert-type scale was used for user evaluations, labeled from 1 (very loose, very short, and very dissatisfied) to 5 (very tight, very long, and very satisfied). Adult Body Mass Index (BMI = kg/m2) was computed from a

person's weight and stature. Statistical Package for Social Science (SPSS) 27.0 was used to analyze descriptive statistics, Pearson correlation, Chi-square test, independent-sample t-test, and one-way ANOVA with Duncan multiple test.

Results and Discussion: The participants were from California (14.9%), Texas (14.6%), Florida (10.9%), New York (9.4%), Georgia (5.2%), Pennsylvania (3.7%), Illinois (3.2%), Indiana (3%), and the other forty-two states (0.2-2.2%). The ethnic distribution was Caucasian (55.9%), Asian (27.7%), American Indian or Alaska native (7.9%), African American (5.2%), Native Hawaiian or other Pacific Islanders (1.2%), and others (2%). The age ranges were 18-25 (27%), 26-35 (50.2%), 36-45 (12.9%), 46 and older (9.9%). The periods of strength training for men and women were 1-3 years (36.4% each), 6 months-1 year (21.5%, 24.9%), more than five years (21%, 11.5%), 3-5 years (10.8%, 14.8%), and less than 6 months (12.4% each). Regarding weekly strength training frequencies, 72.8% of men responded three to five times per week whereas 72.2% of women answered two to four times per week. Most of the men (87.7%) and women (87.1%) reported to have one to four pieces of top or bottom of compressive sportswear, while 9.7% of men and 11.5% of women participants had more than five pieces of top or bottom of compressive sportswear. Both groups listed products from Nike (68.9%-70.8%) and Adidas (58.4%-58.5%) as the best compressive sportswear. Both groups' preferences were low for other brands such as 2XU (2.4%-7.2%), Lecaf (3.3%-4.1%), and Columbia Sportswear (6.2%-9.6%) in purchase.

For the specific body locations necessary for intensive pressure for compression sportswear in strength training, there was a significant difference between men and women at $p <$ .05 (t = -2.462). Men reported chest (54.4%) and shoulder (47.2%) whereas women reported abdomen (53.6%) and waist (48.8%) as the most important areas to be supported. As for the compression level perceived in torso (shoulder to hip) and legs (thigh to ankle) while wearing their own compression sportswear in strength training, there was no significant differences between the two genders resulting in M = 3.2-3.7 and SD = 0.84-0.97. However, in the bicep and lower arm, men (M = 3.4-3.5, SD = 0.86-0.97) significantly perceived stronger compression than women (M = 3.2-3.3, SD = 0.86-0.92) at $p <$. 05 (t = 2.354, 2.152). For the satisfaction levels on these compression amounts, the means were 3.6-3.8 (SD = 0.87-1.01), which was on the satisfied side. Correlations between age and gender showed that especially for bust, only the female group significantly sensed weaker compression as their ages increased at $p < .01$ (*Pearson correlation*: -.190), and the mean of compression level from the age group 18-35 (76.6%) was 3.5-3.7 whereas the mean of 36 and older (23.3%) was 3.3 ($p = .038$, $F = 3.316$). Also, only for the female group, there were significant correlations between muscularity and overall fit status to body size at $p < .05$ (*Chi-square* = 16.478). Eighty nine percent of the participants who self-reported as being either somewhat muscular (63%) or very muscular (26%) evaluated the overall fit of their compressive sportswear significantly as either somewhat satisfied (40%) or very satisfied (30%). Also, the satisfaction of compression level at hip and crotch indicated significant correlations with muscularity in the female group at $p < .01$ (*Pearson chi-square* = 22.970, 45.042). Fifty six percent of the muscular women significantly assessed the lower body garment

fit as either somewhat satisfied (36%) or very satisfied (19%). In contrast, for the male group, muscularity did not significantly present any correlation with fit status to body size. For the length fit in torso, pants, and arm, the significant difference in gender was not found while both genders significantly evaluated more satisfied with longer (17.1%-33.7%) than shorter lengths (0.7%-4.7%) at $p < .01$ (*Pearson chi-square* = 71.288-71.931). Meanwhile, there was no significant correlation between BMI and gender difference, while the both groups indicated negative correlations between BMI and the compression levels in chest/bust, back, wrist, and ankle at $p < .05$ (*Pearson correlation* = -.252--.140). This indicated that compression level slightly increased based on the decrease in BMI.

Conclusion: In conclusion, particular body locations for intensive pressure were different as men needed at chest and shoulder while women wanted at abdomen and waist. Additionally, men satisfied more with stronger compression at arms compared with women. Only women sensed significantly weaker compression at bust as age increases. Also, muscularity affected only on women positively in satisfaction levels about both overall fit status and compression levels at hip and crotch. This study implies that the gender differences in designing compression sportswear must be considered in terms of age, particular body locations for different compression levels, and muscularity, rather than BMI and vertical length fit.

References

Florian, E., & Sperlich, B. (2016). *Compression Garments in Sports: Athletic Performance and Recovery*. Springer.

Graham, D. (2018, August 7). What is compression wear, and how does it work? *220 Triathlon.* Retrieved from https://www.220triathlon.com/gear/what-is-compression-wear-and-how-does-it-work/

Hsu, W., Tseng, L., Chen, F., Wang, L., Yang, W., Lin, Y., & Liu, C. (2020). Effects of compression garments on surface EMG and physiological responses during and after distance running. *Journal of Sport and Health Science*, *9*(6), 685–691.

Leighton, M. (2017, August 25). These are the compression leggings I think every serious runner should own. *Insider*. Retrieved from https://www.businessinsider.com/2xu-compression-leggings-review-2017-6

Mantor, C. (2017, June 5). Nike-funded study reveals compression apparel does not improve performance. *Fashion Network*. Retrieved from https://uk.fashionnetwork.com/news/Nike-funded-study-reveals-compression-apparel-does-not-improve-performance,835115.html

Sissons, B. & Bubnis, D. (2021, January 6). 5 options for compression shorts. *Medical News Today*. Retrieved from https://www.medicalnewstoday.com/articles/compression-shorts#_noHeaderPrefixedContent

Thermajohn. (2020, August 28). Can men wear women's compression shorts? Retrieved from https://thermajohn.com/blogs/news/can-men-wear-womens-compression-shorts