Validation of the Wearable Acceptability Range Scale for Smart Apparel

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Wearable technology, referring to body mounted networked devices capable through computer technology of collecting data, tracking activities, and customizing experiences in accordance with users' needs and desires (Mann, 2014), has been rapidly applied to various industry sectors including the fashion industry. Smart apparel, one distinctive type of wearable technology, is wearables that integrate information technologies and/or wearable computing devices, which are suitable for and comfortably worn on the body (Kelly, 2016; McCann & Bryson, 2009). These wearables can be failed in the apparel market if not socially acceptable. As a part of the innovative smart apparel development and evaluation process, it is urge to examine its social acceptability. Although some articles describing wearables have noted the importance of social acceptability (e.g. Adapa et al., 2018; Rauschnabel et al., 2016), the Wearable Acceptability Range (WEAR) Scale, introduced by Kelly (2016), has been the first known measure used in consumer behavior and product development research to better identify the social acceptance of wearable devices (e.g., Apple watch, Google glass, Bluetooth headset).

To date, no studies have empirically applied this scale determining the social acceptance of smart apparel. Considering that the WEAR Scale was originally developed to be applicable to various types of wearable technology, it is worth validating the scale, specifically for smart apparel. Therefore, the purpose of this study was to introduce an extended WEAR Scale to the apparel field by (a) refining measurement items of Kelly's (2016) WEAR Scale, developed originally for wearable devices and (b) validating this scale for use with smart apparel.

Kelly's (2016) WEAR Scale constructed from statements derived from literature reviews, expert reviews, and consumer interviews. This scale originally included multiple sub-dimensions (i.e., aesthetics, available/ordinary, consequences, ergonomics, functionality, judgement, norms, others' reactions, others' thoughts, self-identity, qualities of the device or the wearer) with 97 items, but the scale with 14 items in two redefined dimensions – fulfillment of aspirational desires and absence of social fears – was validated for the use of wearable devices. None of the items related with aesthetics or functional attributes, which are important when people wear clothing or its related items on the body, were included in this 14-item scale. Personal communication with the author of the WEAR Scale resulted to revalidate the scale starting with the extended 57 items in 11 sub-dimensions.

Online survey was conducted with the 711 sample, whose age was 18 years and over,

administered through Amazon Mechanical Turk, an online survey marketplace. The survey questionnaire, adapted and modified from Kelly's (2016) study, consisted of two sections: (a) demographic information and (b) measurement items of wearables' social acceptability, consisting of 11 sub-dimensions with 57 items. A five-point Likert-type scale, ranging from "Strongly disagree (1) to "Strongly agree" (5), was used to measure each item. In administering the WEAR Scale items to the study sample, two existing wearables, smart clothing and smart footwear, were presented so that the participants could respond to the scale questions in relation to the particular wearables. Two wearables were randomly assigned to the study participants. SPSS 23 and AMOS 11, one of structural equation modeling programs, were used for the data analyses. Maximum likelihood estimation method was used to evaluate model fit since none of assumptions were violated to run exploratory and confirmatory factor analyses (EFA and CFA).

The usable sample of 663 (332 for smart clothing and 331 for smart footwear) was used for data analyses. The respondent's age range was from 19 to 75 years old with a mean age of 37. Thirty-nine percent was males and 61% were females. Around 90% had education higher than some college degree. The majority was Caucasian/European American (72.4%), followed by African American (8.1%), Asian (5.4%), Hispanic American/Latino (5.3%), and other (8.8%). The participants were employed in various fields such as education, technology-related industry, hospitality, manufacturing, retail, and health care.

Among 57 items, EFA resulted to eliminate 36 items, factor loading lower than .60. CFA with 4-factor, 21-item WEAR Scale resulted to an unacceptable model fit with chi-square of 989.33 (df=183), GFI (.86), and RMSEA (.08). Based on factor loadings, model modification indices, and theoretical considerations, additional six items were eliminated to reach a good model fit. Consequently, this process resulted in creation of a 4-factor, 15-item WEAR Scale with demonstrated construct validity and reliability for consumers' social acceptance of smart apparel. The fit of this modified model was favorable with chi-square of 253.70 (df=84, p<.001), GFI (.95), IFI (.97), TLI (.97), CFI (.97), RMSEA (.05), and SRMR (.03). The four WEAR dimensions are smart apparel in relation to: (a) design and aesthetics (four items); (b) self-expression (four items); (c) consequences (three items); and (d) reflection (four items; combined dimension of others' reactions and thoughts). Further analyses were performed with two separate groups to examine the overall model's fit for each product (smart clothing and smart footwear), which resulted a good model fit to the overall proposed model.

Kelly's (2016) WEAR Scale with a 2-factor, 14-items was not confirmed with the use of smart apparel. It appears that consumers consider more diverse attributes for the social acceptance of smart apparel than that of wearable devices. The modified, 4-factor, 15-item WEAR Scale would be a useful tool to evaluate wearers' social acceptance of smart apparel. This modified WEAR Scale will be useful for the practical application in the fashion industry by providing better understanding of various aspects that smart apparel should consider (i.e., design and aesthetics,

self-expression, consequence, reflection) during the product design and development stage. In addition, the scale can be integrated with other consumer behavioral concepts to develop an emerging theoretical framework for the studies on smart apparel. Although the 4-factor, 15-item WEAR Scale for smart apparel resulted from using two different wearables (smart clothing and smart footwear), another independent test of the scale is suggested on a different smart apparel category. If this proposed scale is confirmed again, then this 4-factor, 15-item WEAR Scale could be used with considerable confidence in its validity and reliability in the fashion discipline.

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