Development of Wearable Tracking Systems: Preferences in Tracking Dimensions

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Introduction. The wearable technology market in the U.S. is expected to increase from $8.9 billion in 2016 to $12.6 billion in 2018 (Statista, 2016). While wearable tracking systems represent the forefront of the mass-consumerization of wearable computing research and promise a broad range of benefits for ordinary people in terms of self-knowledge, there are still obstacles to getting consumers to use this technology long-term (Alrige & Chatterjee, 2015). To design and develop successful wearable technology, particularly lifestyle devices rather than medically necessary devices, it is key to understand people's preferences and expectations on design, function, and privacy (Sun & Rau, 2015). Thus, the purpose of this research is to understand what dimensions consumers prefer to track using wearable technology to achieve a healthier lifestyle and how these tracking dimensions are related. This research will guide fashion and wearable technology industry professionals in the development process of wearable technology to benefit consumers by helping them be more self-aware.

Methods. After getting an IRB approval, an online survey was conducted with potential consumers in the U.S. and a series of Pearson's Correlation and Regression analysis, and multiple regressions were conducted. The survey questionnaire was developed based on the literature review and consisted of 15 questions including: a) demographics such as gender, age, occupation, place of residence, income, marital status, and number of children; and b) preferred tracking dimensions of wearable technology and willingness to purchase wearable technology; The closed-ended questions were measured through nominal, ordinal, interval, and ratio scales; a 10-point Likert scale (1=strongly disagree to 10=strongly agree) was used for interval scales. The internal consistency of scales was measured through Cronbach's alpha reliability coefficient using SPSS, and all showed between .848 and .960, that are over .70 indicating good internal consistency (George & Mallery, 2003). A total 302 participants aged 18 years and older living in the U.S. answered the questionnaire, and 247 (81.8%) usable responses were analyzed for the study. The mean age of respondents was 33.8 (SD=11.5) with a range from 18 to 68. There were more female respondents (59.5%) and in their 20s (41.3%) or 30s (31.2%). This group of participants represents a major group of target customers for the future wearable technology market since consumers in the ages of 25-44 buy more wearable technology products than other age groups (Salah, Macintosh, & Rajakulendra, 2014).

Results and discussion. A large number (89.6%) of respondents indicated that they would purchase wearable technology products in the future. Participants reported that their most preferred self-tracking dimensions were fitness (m=7.60, SD=2.29) and pose and posture (m=7.50, SD=2.37). This finding was similar to other studies, which found that most people in the U.S. were interested in buying health monitoring wearable technology (Accenture, 2014). In general, participants were more interested in tracking mental health aspects such as mood/feeling

(m=5.00, SD=2.96) and stress level (m=4.97, SD=2.97) rather than physical aspects. Compared to self-tracking for individual use, participants gave lower scores to tracking others or sharing self-tracked data with others. Interestingly, the least preferred dimension for self-tracking was location (m=4.86, SD=2.75); this finding may indicate that location is highly perceived as a posing a privacy risk (m=7.38, SD=2.91). However, location was selected as one of the top five preferred dimensions (m=4.75, SD=2.93) for tracking others. It appears people are interested in knowing where their friends, but not necessarily in tracking or sharing this information about themselves. A series of Pearson correlations was computed to investigate the relations among the preferences for tracking dimensions with r-value ranges between .405 and .645. The results of this study showed positive relationships overall among similar types of tracking dimensions, such as among dimensions of physical health condition (disease and disorder symptoms, and general vital signs) ($p \leq .001$), mental health condition (stress level, and mood/feeling) ($p \leq .001$), healthy lifestyle (fitness, and pose and posture) ($p \leq .001$), and productivity and task management (work productivity, location, and time management) ($p \leq .001$).

Conclusion. According to the results of this study, designers and wearable technology industry professionals are developing wearable technology products with self-tracking functionality focused on fitness, pose and posture, general vital signs, sleep pattern, weight and diet, stress level, disease and disorder symptoms, time management skills, work productivity, mood/feeling, or location. When developing wearable technology products, designers can focus on applying the top three most preferred tracking dimensions on family members and friends, and they are disease and disorder symptoms, mood/feeling, and stress level. Tracking personal location may not be attractive but might be more attractive for tracking others such as children or family members with special needs. These wearable tracking technology products can be developed into smart watches or wristbands that display the tracked data themselves or send the data to smartphones. Designers are encouraged to make wearable technology products that are durable, easy to care for, attractive in design, comfortable to wear and use, able to track preferred dimensions, appropriate for various consumers, unobtrusive, portable, and small.

References

Alrige, M., & Chatterjee, S. (2015). Toward a taxonomy of wearable technologies in Healthcare. In Donnellan, B. & Helfert, M., Kenneally, J., VanderMeer, D., Rothenberger, M., & Winger, R. (Eds.), *New horizons in design science: broadening the research agenda* (pp. 496-504). Springer International Publishing.

George, D., & Mallery, P. (2003). SPSS for Windows step by step: A Simple Guide and Reference. Allyn & Bacon, Boston.

Salah, H., MacIntosh, E., & Rajakulendran, N. (2014). Wearable tech: leveraging Canadian innovation to improve health. Retrieved from https://www.marsdd.com/wp-content/uploads/2015/02/MaRSReport-WearableTech.pdf.

Statista (2016). Facts and statistics on wearable technology. Retrieved http://www.statista.com/topics/1556/wearable-technology/

Sun, N., & Rau, P. L. P. (2015). The acceptance of personal health devices among patients with chronic conditions. International journal of medical informatics, 84(4), 288-297.