The Influence of Fitness Wearable Technology on Healthy Lifestyles and Fitness Motivation

Author 1

Author 2

Abstract

Fitness wearable technologies are gaining popularity yearly with expectations of increasing physical activity and developing healthy lifestyles. This research investigates the relationships between interpersonal interactions, goal orientation and achievement, fitness wearable technology usage, and fitness habit formation. Users of fitness wearable technologies find they help to maintain a healthy lifestyle. Devices used with software apps on the same device or third-party apps provide additional functionality for self-monitoring and performance comparison across time. This study focuses on a fitness wearable technology device worn on the wrist, such as a Fitbit, Apple Watch, and Samsung Galaxy. Qualitative research employed multiple techniques, including interview laddering, means-end chain, and mental models.

Introduction

Fitness wearable technologies continue to increase in popularity with expectations of improving health and well-being. Toner (2018) characterizes fitness wearable technology as “small, lightweight technologies that can be easily placed on human bodies as they move around in time and space” (p. 75). Types of devices include fitness trackers and smartwatches, each with varying capabilities for monitoring heart rate, calories, steps, standing and sitting time, and sleep (Thompson, 2019; Paxton, 2020). Wearable technologies have been the top fitness trend for all but one year since 2016, according to the American College of Sports Medicine’s annual worldwide survey of fitness trends (Thompson, 2019). Consumer demand for fitness devices increased by 32% in 2019, and expected demand growth continues through 2024 (Paxton, 2020). Moreover, the COVID-19 pandemic has influenced the demand for wearable fitness devices through personal health monitoring (Paxton, 2020). With the potential to influence chronic

disease self-management, increase physical activity, and improve overall health, fitness wearables are increasingly important for health management and motivation (James et al., 2019; Jiang & Cameron, 2020).

Users of fitness wearable technologies find they help to maintain a healthy lifestyle (Segar, 2017). Devices used with software apps on the same device or third-party apps provide additional functionality for self-monitoring and performance comparison across time (Lyons & Swartz, 2017). Broad categories of fitness wearable technology feature defined by James et al. (2019) are Social Interaction Features (SIFs), Exercise Control Features (ECFs), and Data Management Features (DMFs). They have been used to examine device usage and exercise motivations. Research has explored fitness wearable technology, primarily in sports and medical literature. However, more recent investigations have emerged in the information systems discipline.

Literature Review

Recent studies have applied the Technology Acceptance Model (TAM) to fitness wearable technology exploring exercise self-efficacy (Huang & Ren, 2020) and health outcomes (Lunney et al., 2016). The Huang and Ren (2020) study found that exercise self-efficacy moderates the continued usage of fitness wearable technology and may be used by product designers to modify features. Similarly, the study by Barkley et al. (2020) explored the relationship between fitness app use and behavior as mediated by exercise identity. Individuals with more exercise identity, defined as an individual's self-image as an exerciser, were more likely to use fitness apps and engage in greater physical activity. However, the Barkley et al. (2020) study focused on mobile phones as the fitness app technology of interest. This study focuses on a wearable fitness device worn on the wrist.

Research gaps noted in recent literature include understanding the impact of interpersonal interactions (i.e., family and friends) on fitness wearable usage, goal setting, and motivation on fitness habit formation (James et al., 2019; Jiang & Cameron, 2020). Furthermore, many researchers have investigated selected gender or age samples rather than a broader user demographic representative of the general US population to understand potential influences on fitness wearable usage patterns (Huang &

Ren, 2020; Jiang & Cameron, 2020). Currently, there is scant research from the perspectives of interpersonal interactions, fitness wearable technology usage, and fitness habit formation.

This study explores the relationships between interpersonal interactions, goal orientation and achievement, fitness wearable technology usage, and fitness habit formation. These interactions potentially influence feature set use and goal achievement (Jiang & Cameron, 2019). Fitness motivations and wearable technology usage often involve family members and friends Interpersonal interactions may also be a significant influencer of goal orientation, further influencing technology feature set usage and goal achievement (Jiang & Cameron, 2019). Including users' perspectives may help shape future technology development (Tran et al., 2019).

Methods

This research explores interpersonal interactions and fitness motivations through wearable fitness technology, utilizing a qualitative study design encompassing interviews and a pre-interview survey. According to the Means-End Chain theory, the laddering technique for interviewing is particularly relevant to this study to elicit fitness wearable user's belief structures and personal values (Veludo-de-Oliveira et al., 2006) and technology usage and values (Saaka et al., 2004). Following the means-end chain, technology users organize usage preferences and actions in a chain, or ladder, from attributes to consequences to values. Laddering originated in psychology and is appropriate for studies on human behavior relative to understanding goals and values (Veludo-de-Oliveira et al., 2006). This study's laddering technique elicits relationships among the central concepts of interpersonal interactions, goal orientation and achievement, fitness wearable technology usage, and fitness habit formation.

Additionally, the hierarchical value map (HVM) applied in this research is a qualitative technique to develop mental models representing the relationships between attributes, consequences, and values (Saaka et al., 2004). Lines on an HVM map represent these relationships, and a graphical representation of the mental model illustrates the ladders and analysis of interviews.

Analysis

First, a pre-interview survey was distributed via email to identify potential participants aged18 and above and fitness wearable technology users from a broad demographic spectrum across two southern US universities and a social community of retired professionals. Participants represented both a convenience sample and snowballing referrals. A total of 283 faculty, students, and retired professionals aged 18 and above received the survey. An 80% response rate resulted in 226 completed surveys. Interview participants were then selected based on fitness wearable technology use and US Census population distributions. Of that number, 114 wear a fitness device representing 51% of the survey respondents. The social community solicitation was necessary to complete the targeted US population demographics, specifically for the baby boomer generation. In total, 21 respondents participated in interviews, with two subsequently removed from the analysis due to technical issues, resulting in 19 completed interviews. The sample included ten females (53%) and nine males (47%).

The analysis of the interview data followed five steps. First, reviews of the interview data produced ladders comprising the attributes (A), consequences (C), and values (V) representing a means-end chain. One to nine ladders were generated per interview. Second, a content analysis of elicited A, C, and V's resulted in a preliminary table of 50 codes. Subsequently it summarized to 23 based on codes with similar meanings and responses fewer than three. A combination of NVivo and excel captured the sequences and frequency of codes. Third, the sequencing of A, C, and V's for each respondent's ladders were examined to understand the relationships between A, C, and V's. Fourth, six HVMs were created from the ladders and summary codes. Each HVM diagram represents an originating attribute with lines denoting A, C, and V linkages. The fifth and final step developed a frequency of themes to understand respondents' frequency of A, C, and V occurrences.

Summar Results

Findings indicate that health is the dominant end chain, or value, among interview participants at 84%, and accomplishment is the second highest at 74%. For example, one participant indicated that maintaining a routine of daily activity, whether steps or biking, was important to her as she ages and

prepares for retirement. Respondents indicated that fitness motivations for health (84%) were driven by being active (94%), avoiding sickness (79%), obtaining rewards (56%), and motivating activities (74%).

Furthermore, from the perspective of interpersonal interactions, the weakest end value, socialization (37%) and competition (37%), are the primary linkages to love and belonging (21%). However, findings reveal a strong linkage between activities that help achieve goals (58%), bringing participants a sense of accomplishment (74%). Habit formation (26%) indicated the weakest linkage to accomplishments. Respondents using an wearable fitness device for interpersonal interactions identified "connecting" and "sharing" as instrumental linkages to belonging to a group, friend, or family.

Conclusion

Understanding the means-end chain of fitness wearable technology usage reveals the relationships between wearable fitness device features, consequences, and values of more importance to respondents. Health was the single most crucial value elicited from interview participants indicating that it is a significant motivator for wearable fitness device usage. Accomplishment was the second most crucial value derived from wearable fitness device usage providing fitness motivation through achieving simple daily goals.

This study demonstrates that fitness wearable technology is a fitness motivator through the emotional, psychological, and social connections of device features, consequences, and values. Although weaker in linkages, interpersonal interactions were essential to many participants who value social connectedness and belonging. Accomplishing daily goals represented as circles or rewards on a wearable fitness device was an impetus that sparked many participants to remain active.

References

Barkley, J. E., Lepp, A., Santo, A., Glickman, E., & Dowdell, B. (2020). The relationship between fitness app use and physical activity behavior is mediated by exercise identity. *Computers in Human Behavior, 108*, 106313.

Huang, G., & Ren, Y. (2020). Linking technological functions of fitness mobile apps with continuance usage among Chinese users: Moderating role of exercise self-efficacy. *Computers in Human Behavior*, *103*, 151–160.

James, T. L., Wallace, L., & Deane, J. K. (2019). Using Organismic Integration Theory to Explore the Associations Between Users' Exercise Motivations and Fitness Technology Feature Set Use. *MIS Quarterly*, *43*(1), 287–312.

Jiang, J., & Cameron, A.-F. (2020). IT-Enabled Self-Monitoring for Chronic Disease Self-Management: An Interdisciplinary Review. *MIS Quarterly*, *44*(1).

Lunney, A., Cunningham, N. R., & Eastin, M. S. (2016). Wearable fitness technology: A structural investigation into acceptance and perceived fitness outcomes. *Computers in Human Behavior*, *65*, 114–120.

Lyons, E. J., & Swartz, M. C. (2017). MOTIVATIONAL DYNAMICS OF WEARABLE ACTIVITY MONITORS. ACSM's Health & Fitness Journal, 21(5), 21–26.

Paxton, M. (2020). Wearable Tech Fitness trackers on the rebound. S&P Global Market Intelligence. Retrieved from https://www.spglobal.com/marketintelligence/en/news-insights/blog/wearable-tech-fitness-trackers-on-the-rebound

Saaka, A., Sidon, C., & Blake, B. F. (2004). Laddering. A "how to do it" manual–With a note of caution. Research reports in consumer behavior: How to series. Ohio: Cleveland State University. Retrieved from https://academic.csuohio.edu/cbresearch/papers/Good%20PDFs/Laddering_A%20How%20to%20do%20it%20manual.pdf

Segar, M. L. (2017). ACTIVITY TRACKING + MOTIVATION SCIENCE: Allies to Keep People Moving for a Lifetime. *ACSM's Health & Fitness Journal, 21*(4), 8–17.

Thompson, W. R. (2019). Worldwide Survey of Fitness Trends for 2020. *ACSM's Health & Fitness Journal*, *23*(6), 10–18.

Toner, J. (2018). Exploring the dark-side of fitness trackers: Normalization, objectification and the anaesthetisation of human experience. *Performance Enhancement & Health, 6*(2), 75–81.

Tran, V.-T., Riveros, C., & Ravaud, P. (2019). Patients' views of wearable devices and AI in healthcare: Findings from the ComPaRe e-cohort. *npj Digital Medicine*, *2*(1). Retrieved from http://www.nature.com/articles/s41746-019-0132-y

Veludo-de-Oliveira, T. M., Ikeda, A. A., & Campomar, C. (2006). Discussing Laddering Application by the Means-End Chain Theory. *The Qualitative Report*, *11*(4), 626-642.