

# Poster: Understanding Long-Term Adoption of Wearable Activity Trackers Among Older Adults

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## ABSTRACT

Wearable activity trackers (WATs) can be powerful tools in monitoring and in improving older adults' health. The aim of this study is to understand older adults' reasons for use, continued use, and discontinued use of WATs, and to identify the differences between short-term and long-term users to guide the design for sustained use of WATs among older adults.

## Keywords

Activity tracker; older adults; wearable device

## 1. BACKGROUND AND OBJECTIVE

Physical activity is associated with decreased risks of chronic illnesses, improved mental health and well-being, reduced fall risks, and a longer independent life [1]. However, almost 84% of older adults aged 65 and older do not receive the recommended amount of exercise [2]. Consumer wearable activity trackers (WATs) that allow users to track daily physical activity (e.g., steps taken, calories burned), sleep, and other health-related metrics could serve as a tool for facilitating behavioral change and improved health by providing motivation and feedback, and creating self-awareness [3]. For example, Fitbit has been successfully used in interventions to improve different populations' physical activity [4].

However, few older adults take advantage of WATs to manage physical activity. Only 7% of older adults own WATs [5]. Another challenge is that most people discontinue using WATs within six months [5] due to various reasons [6]. Without sustained use of WATs, benefits cannot be fully achieved. Prior studies have primarily examined efficacy and barriers, missing the opportunity to identify successful strategies employed by long-term users. Older adults' reasons for starting, continuing, and stopping WAT use, their preferences for features, and types used could shed new light on the design of WATs as a powerful tool in the healthcare arena.

The purpose of this study is to determine 1) why adults aged 65 and older start using, continue using, and stop using WATs, 2) WAT features that are used, missing, and wanted, and 3) differences between WAT long-term and short-term users to guide the design of next generation WATs for sustained use among older adults.

## 2. METHODS

An online survey was distributed via the Qualtrics online panel to recruit a nationally representative sample of older adults aged 65 and older, with experience using WATs. Prior to completing the survey, participants were screened via online questions to ensure they met the inclusion criteria of being 65 and older and currently use or have used a WAT. The survey included questions on their current or previous WAT use, features used and desired, and reasons for use, continued use, or discontinued use. This study was approved by the Institutional Review Board of the university to which the authors are affiliated.

## 3. RESULTS

A total of 314 older adults (44% male) completed the survey (241 being current users and 73 being previous users). Among them, 4.15% were Asian, 8% were black, 86.58% were White, and 1.28% were Native American. Participants' ages ranged from 66 to 89 ( $M = 69.93$ ,  $SD = 3.57$ ). They resided in all 50 states, with the top three states being Florida (12.4%), California (8.3%), and Mississippi (7.6%). Seventy-four percent were married, 11.5% were divorced; more than half had at least a college level education (55.2%). The median income was \$50,000 to \$74,999. The average WATs length of use was about 5.3 months ( $SD = 2.0$ ), with 37.58% of the sample having used WATs for more than 12 months. Long-term users were considered those who had used a WAT for more than 6 months. For the 164 long-term users, average time of use was about 9 months. For the 150 short-term users, average time of use was about 4 months. Fitbit was the most often used WAT (69.93%), followed by Garmin (10.43%), Apple (6.44%), Jawbone (1.53%), Misfit (1.53%), Nike (0.92%), and Withings Pulse (0.31%). Nine percent of the participants selected "Others." The same pattern held true for both current and previous users.

*Reasons why users started using, continued using, or stopped using WATs.* Related items were factor analyzed using principal component analysis with Varimax (orthogonal) rotation. For reasons why users started using, the factor analyses yielded three factors explaining a total of 63.66% of the variance: regular monitoring ("To help me become more active"; "To lose weight"; "To monitor health"; "To monitor diet"), external stimuli ("To support a family member or friend"; "Someone I know has had great success using a tracker"; "Upon the recommendation of a doctor or a health care provider"), and chronic disease management ("To help me improve a chronic illness, disease, or health problem that I have"). Around 80% of the participants

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WearSys'17, June 19-19, 2017, Niagara Falls, NY, USA

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ACM ISBN 978-1-4503-4959-8/17/06.

<http://dx.doi.org/10.1145/3089351.3089360>

agreed with items related to daily monitoring, 16-43% agreed with items related to external stimulus, and 42% agreed with chronic disease management.

In terms of continued use, the analyses yielded three factors explaining a total of 83.46% of the variance: benefits of habitual monitoring (“I am more active with the tracker”; “I am used to wearing it”; “I saw progress in reaching my goals”; “tracker gives me immediate feedback through the tracker screen”; “tracker is easy to use”), enjoyment of competition (“I like to compete with family and friends”), and external stimulus (“upon the recommendation of a doctor or a health care provider”). Around 85% of the participants agreed with items related to the benefits of habitual monitoring, 37% agreed with enjoyment of competition, and 18% agreed with external stimulus.

As for why previous users stopped using, the analyses yielded four factors explaining a total of 62.39% of the variance: inconvenience in using (e.g., “forgetting to wear the tracker and using it was too time consuming”); hardware design (e.g., “tracker was ugly, too expensive, or not waterproof”); software design (e.g., “tracker did not have notifications I needed, lack of social comparison”); facilitating conditions (e.g., “tracker did not have smartphones to sync the data, hard to keep the tracker on”). Twenty-two to forty two percent of the participants agreed with items related to inconvenience, 12-26% agreed with items related to hardware design, 21-37% of the participants agreed with items related to software design, and 7-25% of the participants agreed with items related to facilitating conditions.

*WAT features that are used, missing, and wanted.* The most commonly used features were distance (91.08%), steps (87.90%), calories burned (65.61%), sleep time (61.78%), heart rate (57.64%), elevation/stairs (48.41%), sleep quality (47.13%), and waterproof (40.13%). The least commonly used features were calories consumed/eaten (28.34%) and mood (5.41%). When asked about features that participants would like to be included, the most commonly reported features were waterproof (37.58%) and heart rate (34.71%) for both long and short-term users. Mood (14.33%) was the least wanted and the least included feature in WATs.

*Differences between WAT long-term and short-term users.* Independent-samples t-tests demonstrated that long-term users ( $M = 3.26$ ,  $SD = .73$ ) tended to agree more with the statement “to help me become more active” than short-term users ( $M = 3.07$ ,  $SD = .76$ );  $t(312) = -2.324$ , two-tailed,  $p < .05$ . Chi-square tests show that short-term users were less likely to use heart rate ( $\chi^2(1) = 8.21$ ,  $p < .05$ ) and waterproof ( $\chi^2(1) = 10.13$ ,  $p < .05$ ) functions than long-term users, and they were more likely to indicate waterproof ( $\chi^2(1) = 4.78$ ,  $p < .05$ ) as a desirable function.

## 4. CONCLUSIONS

Waterproof and heart rate monitoring were the two most desired features. Based on this finding, including waterproof and heart rate features in more WAT models could help facilitate long term usage among older adults. Daily monitoring and external stimuli emerged as the two consistent factors encouraging older adults’ adoption and continued usage of WATs. For reasons to start using WATs, long-term users tended to be more committed to becoming active than short-term users. Inconveniences in using as well as hardware and software designs were top reasons older adults’ discontinued usage. In designing trackers for older adults, direct and simple designs should reduce practical obstacles older adults meet and help lower the attrition rate from practical difficulties posed by using a new technology.

## 5. ACKNOWLEDGMENTS

Funding obtained from the Michigan State University Science and Society at State (S3) program.

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