Abstract

Tracking the Trackers: Fitbit in Research, 2011-Present

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Abstract

Background: Newer consumer mHealth devices have been gaining traction among researchers and health professionals in recent years. However, the extent of how these devices are being used in research settings is unknown.

Objective: This review aims to describe the current state of Fitbit use in published research. Trends across disciplines, study designs, and device use will be identified. Implications for continued use of consumer mHealth devices in research settings will also be discussed.

Methods: Numerous publication databases (PubMed, Google Scholar, IEEE, ACM) were searched on an ongoing basis from July 2016, to July 2017 for publications, conference proceedings, and other published and peer-reviewed content using the "Fitbit" keyword. Publications that included a mention of using a Fitbit device in their methodology were retained in the analysis. The lead author maintained a reference database and categorized each reference along four dimensions: 1) device(s) used; 2) data used; 3) primary study design; and 4) participant characteristics (current database is available at https://www.fitabase.com/research-library/).

Results: Since 2011, there have been 410 references that met the inclusion criteria for this review. The most frequent study designs were validation studies followed by interventions, measurement (observational), methods, and usability studies (33%, 23%, 16%, 12%, and 11%, respectively). All currently and previously available Fitbit devices were represented in the identified research literature with the most common devices used being the Flex (n=113) One (n=98), Zip (n=78), and Charge HR (n=61). Among available data types obtained from Fitbit devices steps were overwhelmingly represented in the identified studies (n=302). However, all available data types, including distance, energy expenditure (calories burned), food intake, goals, heart rate, activity intensity (categories and MET values), sleep (classic and sleep stages), and weight, were used in at least one study. The vast majority of studies were conducted with adult participants (n=319). Studies that included older adults (n=33, adolescents (n=32), and children (n=27) participants were less common. Over 100 studies identified participants as part of a clinical population (eg, post-surgical care, cancer survivor, congenital heart disease). Trends over time indicate that new devices, and their associated data capabilities, trigger research that includes new data sets (eg, heart rate and sleep). However, these trends lag behind device availability for consumers.

Conclusions: An examination of the literature for use of devices from a leading consumer mHealth company, Fitbit, indicates that the research community is finding value for these devices across disciplines and participant populations. While the most common design seeks to validate these devices/data, there are interesting trends towards using these devices as part of behavioral interventions and in clinical environments. Additionally, the lengthy time gap between device availability and published studies is highlighted. The identified and publicly available database may serve to help researchers and clinicians across disciplines better understand the state of using consumer activity tracking devices.

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