

Health Effects of Wearable Devices

EE 786: Case Study Assignment



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Case Topic: Will fitness trackers (health watch/smart watch) change the health lifestyle?

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ABSTRACT

Fitness technology companies find an opportunity with every new invention in the field of non-invasive medicine to develop new features and incorporate them into their latest wearable fitness devices. However, a vital question to ask is whether these features, or the devices as a whole, positively impact the health, personal routine, and lifestyle of the user. We look into three research studies that deal with the impact of wearable fitness devices as well as the demand and popularity of such devices. These help us converge at a conclusion regarding the question at hand.

1. INTRODUCTION

In today's mesmerizing technological front, fitness devices are neither a sci-fi dream nor an archaic fad. Wearable devices that provide quantitative analyses of the wearer's health have struck the market as an exoskeletal element of the Internet of Things [1], and they improve in quality and quantity with every release. However, despite their popularity and success, there remains the vital need to examine if these devices are really useful and how far they have gotten.

To answer these critical questions, we analyze the results of three research studies that investigate the effects of using fitness trackers, steps counters, etc. on the health and well-being of individuals. The first [2] is a systematic review and network meta-analysis that was conducted at the School of Kinesiology, University of Minnesota Twin Cities, Minneapolis. On the other hand, the second study [3] is a randomized clinical trial that was conducted at the University of Pittsburgh. Finally, the third study [4] at the Anschutz Medical Campus, University of Colorado, involves a systematic review of studies that engaged people in the use of smart watches. These studies help us analyze the popularity of wearable fitness devices as well as their impacts on the health lifestyle of the users.

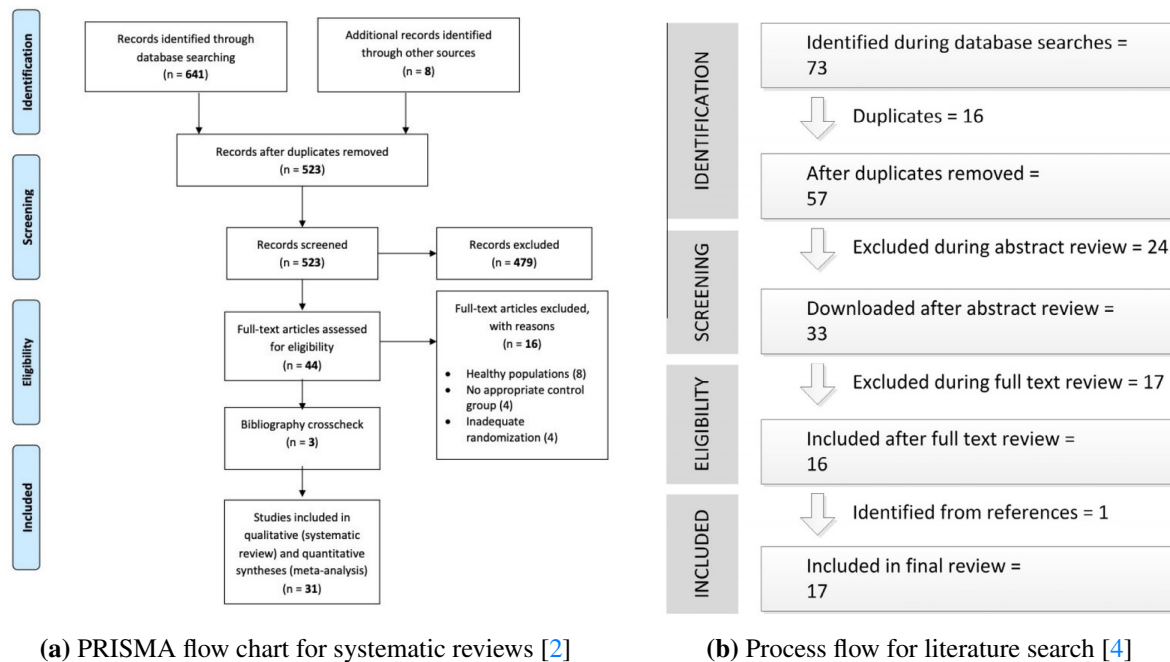
2. METHODS

The first study involved a systematic literature review to identify randomized controlled trials (RCTs) that investigated the effects of health wearable-based physical activity interventions of individuals with overweight/obesity and chronic comorbidities. This was followed by a statistical analysis of multiple treatments. This analyzed direct and indirect comparisons of interventions, and helped synthesize the



Figure 1. Fitness Wearables from Samsung Electronics and Under Armour

effectiveness of each intervention strategy compared to other control conditions. Fig. 2a shows the PRISMA* diagram for the literature search process flow.



The second study conducted a clinical trial where 471 adult participants were enrolled between October 2010 and October 2012, and data collection was completed by December 2014. Participants were initially placed on a low-calorie diet, prescribed increases in physical activity, and had group counseling sessions. After 6 months, the interventions added telephone counseling sessions, text message prompts, and access to study materials on a website. At this point, participants randomized to the standard intervention group initiated self-monitoring of diet and physical activity using a website while those randomized to the enhanced intervention group were provided with a wearable device and accompanying web interface to monitor diet and physical activity. The flow of participants throughout the study is depicted in Fig. 3.

The third study involved a review of 17 clinical studies between 2014 and 2016, with the exception of one published in 2011. Participant demographics, device features, watch applications and methods, and technical challenges were abstracted from included studies. Most studies employed the use of consumer-grade smart watches and enrolled participants with few exclusion criteria to validate smart watch function. The studies focused on activity monitoring, heart rate monitoring, diabetes self-management, and detection of non-ideal medical behaviors. Fig. 2b represents the PRISMA flowchart followed by the authors in selecting and studying previous literature.

3. RESULTS

In general, the first study converges its conclusion upon the effectiveness of health wearable devices in reducing body weight. In particular, the study found commercial health wearable-only and accelerometer/pedometer-only physical activity (PA) interventions to be most effective for reduction in body weight in comparison to multicomponent accelerometer/pedometer interventions. Specifically, interventions which were over 12 weeks in duration were most effective for achieving this outcome.

*PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) is an evidence-based minimum set of items for reporting in systematic reviews and meta-analyses [5]

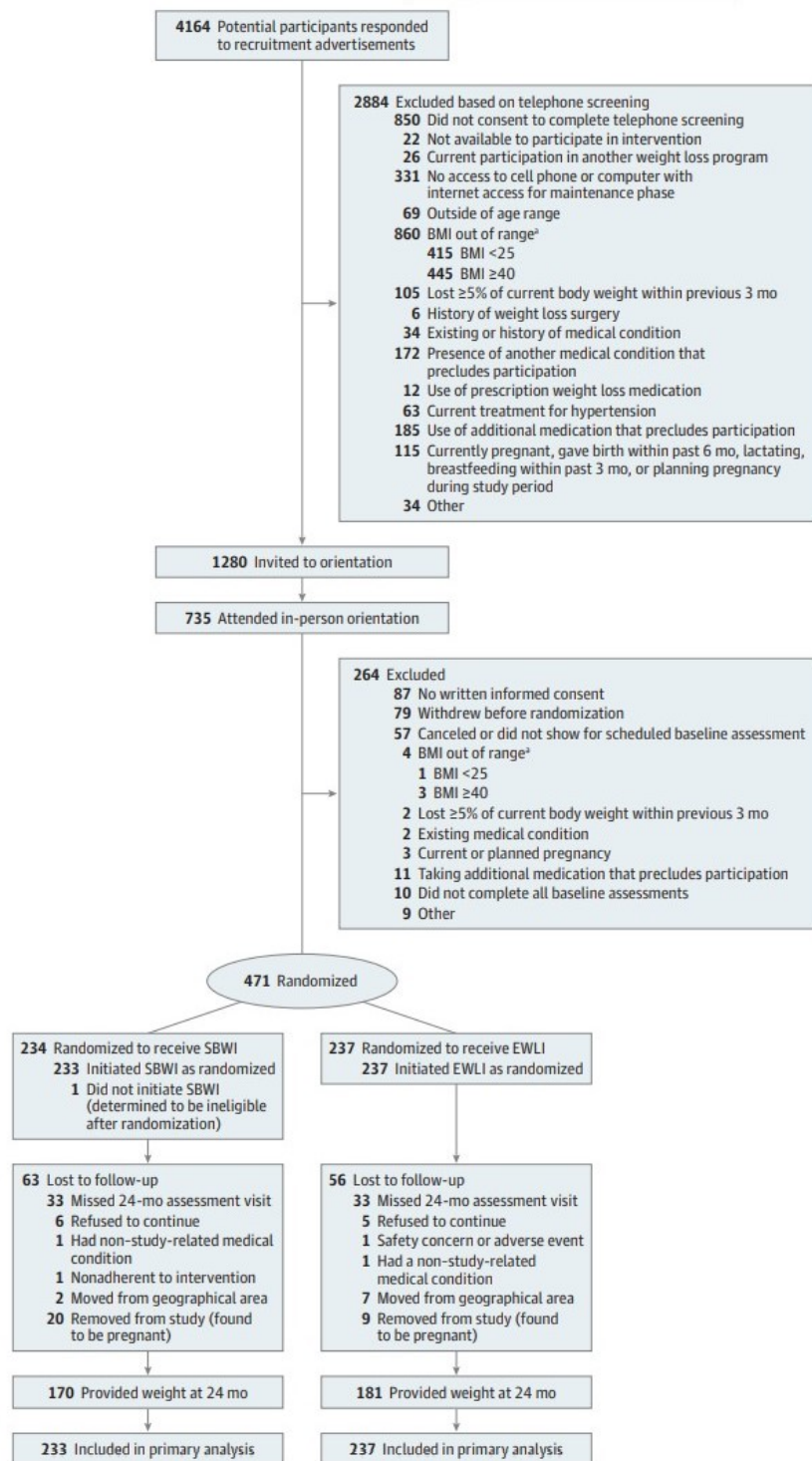


Figure 3. Flow of Participants in the IDEA Study [3]

Interestingly, the second study noted that, among young adults with a body mass index (BMI) between 25 and less than 40, the addition of a wearable technology device to a standard behavioral intervention resulted in a decline in weight loss over 24 months. This decrease in the rate of weight loss makes the second study critical about using fitness trackers. The results of this study however do not lie in contradiction to the first study since the first case concluded in the loss of weight while this study concluded in the decrease of loss of weight.

As noted earlier, the third study deals with the question of wearable fitness device usage. It suggests that consumer-grade smart watches have penetrated the health research space rapidly since 2014. However, smart watch technical function, acceptability, and effectiveness in supporting health must be validated in larger field studies that enroll actual participants living with the conditions these devices target.

4. CONCLUSION

The case at hand deals with the health effects of wearable devices. While the first study is positive about their impacts, the second study concludes that devices that monitor and provide feedback on physical activity may not offer an advantage over standard behavioral weight loss approaches. John Jakicic, the lead author of this study, says that “these findings don’t mean that fitness trackers don’t work. They just don’t work for everybody. They’re marketed on the premise that if you see how little you’re doing physically, you’ll be motivated to do more, but that’s a very simplistic way to think about changing behavior. Many people need a lot more than that.” On the positive side, he continues that “if you’re very committed to working out, and you’re really into numbers, these devices may be a big help.” [6]

In general, according to John Hopkins Medicine [7], any user of wearable fitness devices should consider five vital points to see their efforts come into fruition: use the tracker daily and consistently; set a goal probably recommended by a doctor; find enjoyable activities that also fit into daily life and can be sustained over the long-term; recruit friends and family to use trackers as well; be accountable by reporting health data and similar information to a responsible individual such as a doctor.

5. REFERENCES

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