

Impact of Activity Tracker in the life of its users

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ABSTRACT

Activity Trackers or Fitness Trackers apparently succeeded on its arrival in the market of wearable technology. Activity tracker is more like a personal trainer which monitors the user's activities and helps them reach their fitness goals. It has been a while since the fitness trackers are in market, however, little is known about its effects on the user. The aim of this study is to investigate the impact of activity tracker.

In this paper, I study the impact of the activity trackers on the users' health outcome. To study and answer our questions: '*What are the effects and motivation behind using a fitness/activity tracker*' and '*the ways in which it affects user's lifestyle*', we are planning to conduct interviews on participants who have active users of any fitness/activity tracker. Based on the results and observation I would validate whether the hypothesis is supported or not.

INTRODUCTION

Activity trackers collect data on every move of its user and offer health insights by analyzing the collected data. In recent years, a wide-range of commercial fitness and health tracking products were available. These commercial products offer valuable health services like tracking distance walked or run, calorie consumption, heartbeat, and sleep.

In the current era, health consciousness and fitness has been taken to another level with the availability of such devices. As more people start using such devices, interest is being developed among many organizations to invest more resources to research more on these devices.

An activity tracker is a small, wearable, wireless sensor that tracks user's daily activity. The typical activities that most trackers can record are tracking the number of steps, walking distance, active and inactive state. Trackers are usually worn on the wrist by most users, but they are not restricted to be worn just on the wrist. They can be clipped on to the bag you wear, wear it around the neck or place it in your pockets. Regardless of how it's worn or used, the underlying technique device relies upon is an accelerometer. With help of accelerometer tracker analyses, the speed of movement with which it can calculate steps and the calories burnt.

All the information being displayed are stored in the cloud and can be accessed from anywhere. Recent advancements

have made it possible to share the data over social networks, the feature which users are quite excited. If one individual would like to share their fitness achievements in technical aspects, it is possible with this device.

The technical aspects of fitness activities shared with the user can be one of the motivating factors to continue or even increase their physical activities.

It is important to understand the impacts of activity tracker on its user for two major reasons.

First, fitness tracker assists users in tracking their physical activities. For a user who is relying upon the data collected on the tracker might plan his/her future activities to achieve fitness goals. All though the question here is not about the accuracy of the tracking device but the impact is directly on the user's health. The impact can be either positive or negative. As a positive impact a user might use this device as a source of motivation because of which physical fitness can be achieved. On the downside, it is highly likely that many people incorporate ambitious training plans due to high motivation in the initial days. The user might gradually tend to get demotivated by the data shown and might discontinue the use of device.

Second, the recent interest among people in the knowing technical aspects of fitness data have encouraged several researchers and corporates to incline their research on the user perception of this device. The understanding of user perception will help designers to improve activities trackers design to provide better user experience.

Related Work

Use of Tracker

A study was conducted to understand the long term use of activity tracker[1]. The authors of the paper were successful in finding that long term users continue to rely upon the devices, which implies that the persuasive technology is successful in motivating and in providing values to user over long term. In the future work they cited that the future wearable devices should incorporate techniques to evolve data metrics, engagement with social networks and 'real-life' rewards program. The findings and the suggestions of this paper motivated me to conduct a study to explore more such functionalities that can be explored by interviewing users of tracking devices.

Wearable technologies are mostly used by fitness and health freaks who want to achieve some kind of fitness

goals. A contextual study was conducted that primarily focused on the impacts of wearables or activity tracker while working out at gym[8]. The researchers of the paper were keen to understand how the use of activity tracker along with other technologies like TV, smartphones and music devices impacts the user behavior during exercise. This study revealed that there were some positive and some negative effects on users while using the devices during exercising in gym.

The tracking devices can be used for various reasons, for example to achieve fitness goals, change eating habits, sleep patterns, compete with friends and colleagues. These reasons will be studied in the proposed research paper to find an answer on how these devices bring a change in user's daily activities.

Motivation

Other study shows how personalized touch can be added to motivate user to increase physical activity[7]. The paper uses reflective strategy for users to personalize their Fitbit plan based on their needs and priorities. The researchers suggest that users are motivated to use reflective strategy and are motivated to achieve their fitness goals.

Another study that focuses on exploring motivations for users describes an extension of activity tracker called digital fitness coach[9]. The aim of this concept is to provide a system that identifies users goal, plan their training to realize goals and mainly plan according to user's performance to motivate them. The study envisioned digital coach that will analyze user's performance with help of activity tracker. The digital coach will adapt new training plans based on analysis also considering various factors like training units and weather conditions. The researchers conclude the importance and need of such digital fitness coach which stress importance on personal fitness plans and goals. The author believes this system helps users to overcome motivational problems.

Besides the studies on motivations and use of activity tracker, there are studies that asses what influences a user to accept and use tracker[10]. The authors propose an acceptance model for activity tracker. The model explains that perceived usefulness, ease of use, health consciousness and contextual information all play major influencing factor on behavioral intention to use the device.

It is boring to see graphs and numbers on screen and that might be one of the reasons why user abandon the use of fitness trackers. In a study, an alternate way to show the graph or activity is presented[5]. The researchers of this paper discuss the need to develop alternative stories to inspire users to adopt them on daily basis.

However, to the best of my knowledge, I believe the existing literature does not examine the motivations that persuades a user to continue using a tracking device for long term. In my study, I will attempt to find the various

reasons why a user chooses to adhere to a tracking devices to track the activities.

Security and Privacy

In a recent study, the author summarizes the security and privacy features of specific activity tracking devices and explore potential vulnerabilities and privacy breaches in the device[4]. The authors in this research assessed Jawbone UP move and Fitbit Charge activity trackers. They also compared the two devices from security perspective by analyzing different components in the device ecosystem like Bluetooth, Android mobile app and network communication. The key findings are that the two fitness trackers are vulnerable to attacks because of which can disrupt normal behavior of the device and third party can gain illegal access to sensitive information.

Health Outcomes

Previous study determined that fitness trackers failed to establish relationship between mobile/fitness technologies on health outcome, but a key observation of the study was that users in need of fitness help are most likely to use fitness devices compared to healthy individuals leading healthy lifestyle[6].

Conversely to the above mentioned study, a study found that impact of activity tracker on health and well-being was significant from those who did not use any activity tracking device[2].

Failures in Design

In 2015, researchers found the reasons that caused failure of an activity tracker called Habito[3]. They found that the causes were mainly due to failure in the design and also proposed directions for design. They highlighted that "designing for different levels of 'readiness', designing for multilayered and playful goal setting, and designing for sustained engagement" is necessary for a successful engagement of user with the tracking device.

All of the above mentioned study inspired me to study the various effects of the tracker on its user and whether it brings any significant changes in the life of the user.

METHODS

For the proposed research, qualitative and survey-based study will be conducted to collect data. The survey data will be collected by creating an online survey which will have general questions to collect information like user's age, type of activity they use, for how long the user has been wearing or wore the device, the purpose, and motivation behind its use. The interviews will be conducted on participants to get more insights about the advantages, change in lifestyle, motivation for usage of the device, what they like about the tracker etc. I will focus on question that can fetch data from participants which can help answering the research question.

To collect the survey data, a google form link will be posted on social media and will be emailed to Rochester Institute of Technology (RIT) students. Only the people

who currently use or have had used any type of activity tracker in past will be asked to take the survey. I aim to collect survey data from at least 50 activity tracker users. After a survey, the data will be analyzed. Out of 50, 15 randomly chosen participants will be filtered for conducting an interview. The recruitment will be done by emailing the potential participants identified through survey forms. A semi-structured interview will be conducted on selected few participants. The participants will be asked to bring their activity devices that they use so that they can recollect or answer questions relevant to the activity trackers that they use. The questions will be open-ended, to allow participants bring up interesting information. I will not be restricting in recruiting participants of any gender. Participants can be active users or had previous experience using the activity tracker. This will help me to get details about positive and negative impacts of activity tracker. Participation in this study will be voluntary. An outline will be created for the interview to focus on the research question and get maximum possible information from the participants. The interviews will be audio recorded and should not last more than 20 minutes. The key points will be noted down to ensure that all the details are captured. There will be no potential risk involved in the study and there will be no harm caused economically or financially.

Before the start of the interview, participants will be explained in brief about the purpose of the study and then will be asked to sign an informed consent form. This form will include the purpose of the study, what is involved in the interview, interview duration, risks and benefits, steps taken to keep confidentiality of the data collected, disclosing permit for recording interview and inform them of the outcome of the study.

The next step will be to develop a rapport with participants to ease the interview session by telling what I know about them, through the survey form they filled and then moving on to more detailed questions.

The questions will be focused on following:

1. What features of the tracker they like and use the most?
2. What was their motivation behind buying a tracker?
3. Did they achieve the goal or purpose behind buying the tracker?
4. How did the tracker change their lifestyle?

Participants will be asked few questions which will require them to access their tracking devices. All the data collected during the interviews and survey will be kept anonymous and confidential. Personas will be created to masking the original names of the subject. Data collected will be stored locally and will not be shared on any online platform. The data collected by this study will be analysed and the demographic details will be masked by the investigators to preserve confidentiality. The audio recordings conducted during the interview, will be destroyed after data is extracted and used for the study purpose.

DISCUSSION

The findings will help in understanding user perception about the impacts of activity trackers on their lifestyle. The developers of fitness trackers will understand what the users expect from the device.

The results and observations can help the researchers in the field of Human Computer Interaction (HCI) to extend this work by overcoming the limitations to get deeper insights on the impacts of the activity trackers. The data collected from the surveys and interviews can be used by the makers of fitness trackers to improve the design and include the features and functionalities that are widely used by the users. Also by understanding the impacts on users will help in creating a feature to lift their motivation to use the tracker.

Digital Fitness coach

The fitness trackers can be extended to provide contextual aspects of fitness data as opposed to current technical aspects. These features are envisioned by researchers but the need for such technology will depend on the outcome of this study. If the results indicate negative impacts on user's lifestyle, the need for Digital fitness coach can be one of the option to transform the impacts.

Limitations

As the interviews are planned to be conducted in a controlled environment, the study will not reflect the minute details and impacts that are unknown to the user. There are various types of activity tracker available and each one of them have different functionality and value provided but the study is not going to focus on the physical features of the device but on its effects on the user. This way we can say the research is not specific to any brand of activity tracker. Because of this limitation, we might see the difference in impacts on user's lifestyle to be dependent on make, model and brand. A user might have a positive impact by using a specific activity tracker, while the same user might dislike other brands or models, which is eventually treated as a negative impact in this study. Another limitation of the research will be that all the input fields in the survey are not mandatory. The participants can prefer not to answer or skip questions. This might lead to responses with missing values. The responses with missing values will be discarded. The limitation here is that no plan of action for such responses. Participants will be students at RIT who use or have ever used fitness tracker. Students represents a part of general population because of which I might obtain biased results and observations.

REFERENCES

1. T Fritz, E M Huang, G C Murphy, and T Zimmermann. 2014. Persuasive technology in the real world: A study of long-term use of activity sensing devices for fitness. *Conference on Human Factors in Computing Systems - Proceedings*: 487–496. <https://doi.org/10.1145/2556288.2557383>

2. David G. Glance, Esther Ooi, Ye'elah Berman, Charlotte F. Glance, and Hugh R. Barrett. 2016. Impact of a Digital Activity Tracker-Based Workplace Activity Program on Health and Wellbeing. *Proceedings of the 6th International Conference on Digital Health Conference - DH '16*: 37–41. <https://doi.org/10.1145/2896338.2896345>
3. Rúben Gouveia and Marc Hassenzahl. 2015. How Do We Engage With Activity Trackers? A Longitudinal Study of Habito. *UbiComp '15 Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing*: 1305–1316. <https://doi.org/10.1145/2750858.2804290>
4. Rohit Goyal, Nicola Dragoni, and Angelo Spognardi. 2016. Mind The Tracker You Wear - A Security Analysis of Wearable Health Trackers. *SAC '16 Proceedings of the 31st Annual ACM Symposium on Applied Computing*: 131–136. <https://doi.org/10.1145/2851613.2851685>
5. M. Hassenzahl, M. Laschke, and J. Praest. 2016. On the stories activity trackers tell. *UbiComp 2016 Adjunct - Proceedings of the 2016 ACM International Joint Conference on Pervasive and Ubiquitous Computing*: 582–587. <https://doi.org/10.1145/2968219.2968325>
6. Megan C Kelley. 2014. The Impact of Fitness Technology on Health Outcomes.
7. Min Kyung Lee, Min Kyung Lee, Junsung Kim, Jodi Forlizzi, and Sara Kiesler. 2015. Personalization Revisited: A Reflective Approach Helps People Better Personalize Health Services and Motivates Them To Increase Physical Activity Personalization Revisited: A Reflective Approach Helps People Better Personalize Health Services and Motiva. *UbiComp'15*, October: 743–754. <https://doi.org/10.1145/2750858.2807552>
8. Misha Patel and Aisling Ann O'Kane. 2015. Contextual Influences on the Use and Non-Use of Digital Technology While Exercising at the Gym. *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems - CHI '15*: 2923–2932. <https://doi.org/10.1145/2702123.2702384>
9. Benedikt Schmidt, Sebastian Benchea, Rudiger Eichin, and Christian Meurisch. 2015. Fitness tracker or digital personal coach: how to personalize training. *UbiComp '15 Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing and Proceedings of the 2015 ACM International Symposium on Wearable Computers*: 1063–1067. <https://doi.org/10.1145/2800835.2800961>
10. R. Sol and K. Baras. 2016. Assessment of activity trackers: Toward an acceptance model. *UbiComp 2016 Adjunct - Proceedings of the 2016 ACM International Joint Conference on Pervasive and Ubiquitous Computing*: 570–575. <https://doi.org/10.1145/2968219.2968323>