

Observing Lifestyle Changes with Fitbit Users

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ABSTRACT

Wearable technology is becoming increasingly more popular and advanced. Currently, there are several different wearable fitness tracking devices on the market. These devices encourage people to engage in a healthy lifestyle by making them aware of their vitals and movements. In this paper, we evaluated the Fitbit, a device which can measure calories burned, steps taken, floors climbed, heart rate, and hours slept to help users understand what they are achieving on a given day. To answer our research question: *Does the Fitbit wearable change user's lifestyle?* we investigated the change in three major categories: Sleep, Exercise, and Eating Habits. We created an online survey with questions, which pertains to user experience and lifestyle. Based on our results, we observed specific lifestyle changes after users purchased the Fitbit and gained insight about user success with the Fitbit though it's accuracy, reliability, incentives, and motivational community.

1. INTRODUCTION

Wearable technology differs from other types of technology because it is integrated into the user's wardrobe, through clothing and accessories. One of the most popular devices, the Fitbit, comes in several different models, each having different capabilities, such as measuring calories burned, steps walked, floors climbed, heart rate, and hours slept. The Fitbit device is a sleek band worn on the user's wrist, which lets you check the health progress with a quick glance. Depending on the model, the screen is small to non-existent and is mainly interfaced with the user's Smartphone. It also has a notification system to congratulate the user whenever a certain goal is achieved. As long as the user is wearing the band, the Fitbit will record their vitals and movements.

Wearable fitness devices are purchased by people for a variety of different reasons — social status, to lose weight, to measure vitals easily, to engage in a healthier lifestyle, or to help reach their fitness goals. Harrison and colleagues [1], found the Fitbit device to be not as effective as advertised. Researchers [2] also found that if they allowed users to customize Fitbit design preferences and capabilities, there was an increase in user motivation, which ultimately led to more effective results. In this study, we aim to answer our

research question: *Does the Fitbit wearable change user's lifestyle?* Given the short amount of time, we created an online survey, which encouraged Fitbit and non-Fitbit users to participate.

2. METHODS

We created an online survey through Google Forms. The survey consists of three parts: general questions, Fitbit users, and general users. The general section was comprised of demographic questions, such as gender, age, education level, and if they had a Fitbit. If the participant selected "Yes", they were redirected to the Fitbit user survey. If "No", they were redirected to the general user survey.

We created questions that aimed to answer the following research question: *Does the Fitbit wearable change user's lifestyle?* Through the parameters of the Fitbit capabilities, we defined "lifestyle" through categories of Sleep, Exercise, and Eating Habits. Furthermore, we asked questions about other factors that could affect the user's lifestyle, such as which Fitbit model they own, battery life, the accuracy of data, and how often the user wears the device. In the general user survey, we still wanted to collect data that could help us answer our research question. We asked if the user knew about the Fitbit, if they would like to own one in the future, and why they didn't own the Fitbit. A list of all survey questions asked can be found in *Appendix A*. We pre-tested the survey by sending it out to 19 people and conducted three in-person interviews. After, we made minor changes to the survey regarding question design, grammatical errors, and wording. During the second iteration, we posted our survey on a popular website. Including our pre-test participants, 112 people responded. At the beginning of our survey, it states that all responses will be anonymous and the data will only be used for the survey. Furthermore, participants were able to skip any questions. According to participants, it took the Fitbit users about three minutes to complete the survey and non-Fitbit users one minute.

3. RESULTS

Our survey was split up into three parts: General Questions (Demographics), Fitbit Users, and General Users. We received 93 responses to our survey.

3.1 General Questions

From our results, 16.1% of our participants were Male and 83.8% were Female. Furthermore, 32.2% said they do own a Fitbit and 67.7% do not. Figure 1 is a pie chart of responses to the question “What’s your age?”

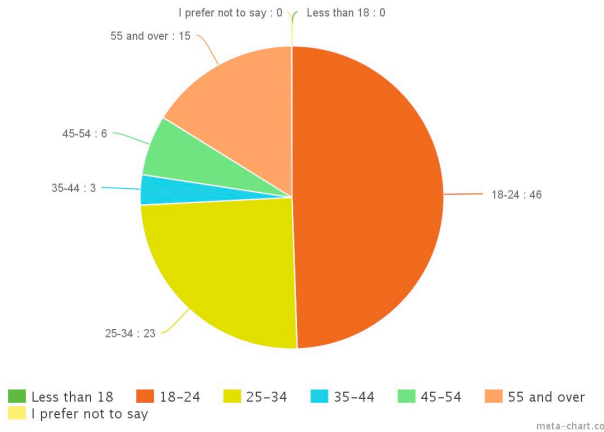


Figure 1. Responses to “What’s your age?”

3.2 Fitbit Users

We conducted three individual Chi-squared tests with the 30 Fitbit user responses we received. For our each of our tests, we used a .05 significance level. Each Chi-squared test correlates with our three lifestyle categories we defined: Sleep, Exercise, and Eating Habits. For each category, Fitbit users responded to before and after they purchased the Fitbit. The frequency of their responses is shown in Table 1-3.

In our first test, our p-value was very high, $X^2 (3, N = 30) = 0.17, p > .05$, so we found the Fitbit does not significantly change user’s sleep habits. In this test, we accounted for the two participants who owned the “Zip”, one of the models of the Fitbit, which does not measure user’s sleep. Data used to conduct the first Chi-squared test can be found in Table 1.

Table 1. Average Hours of Sleep Per Night

	Less than 6	6 hr	7-8 hr	9+
Before purchasing the Fitbit	7	5	15	0
After purchasing the Fitbit	6	6	15	0

For the second test, our p-value was lower than our significance level of 0.05, $X^2 (3, N = 30) = 14.87, p < .05$, suggesting there is a significant difference in reported average hours of exercise per week after the users purchased the Fitbit. Data used to conduct the first chi-squared test can be found in Table 2.

Table 2. Average Hours of Exercise Per Week

	0-2 hr	3-5hr	6-8hr	9+
Before purchasing the Fitbit	18	8	3	1
After purchasing the Fitbit	4	13	10	3

For our third test, our p-value was lower than our significance level of 0.05, $X^2 (3, N = 30) = 13.84, p < .05$, suggesting there is a significant difference in reported average eating habits after the users purchased the Fitbit. Data used to conduct the first Chi-squared test can be found in Table 3.

Table 3. Average Eating Habits

	Very Healthy	Healthy	Average	Poor
Before purchasing the Fitbit	1	5	13	11
After purchasing the Fitbit	2	17	9	2

Table 4. Percentage of Fitbit users categorized by age group

	Less than 18	18-24	25-34	35-44	45-54	55 and over
Fitbit Users	0%	10.6%	43.5%	100%	8.3%	46.6%

In table 4, we calculated the percentage of the Fitbit participant responses we received by age category. In addition, 83.3% of Fitbit users reported that they “Always” wear their Fitbit and 70% believe the data reported by the Fitbit is accurate. Furthermore, 80% of users said the Fitbit’s battery life does not interfere with their lifestyle. In our open-ended question, “Please enter any general stories or experiences you have with the Fitbit”, at the end of the online survey, users provided a plethora of information.

“Before Fitbit [I] was less active and less healthy. Now it has made me go to the gym and [I] lost about 35 pounds in about an year. It is a good motivational tool to help in the weight loss journey” (Quote 1, P3)

According to this participant, the Fitbit was a helpful tool to effectively motivate the user to lose weight.

“Being aware of what I am eating and the impact that being active has is a huge benefit for me. I put my Fitbit on my wrist August 17th and didn't make many changes for he first week except logging what I was eating. At that time I weighed 225 and I am 5'8”

tall. Now on October 7th I am at 201. My goal is to get to 185 and see how I look and feel. I know that is still overweight even though I have a large frame according to the wrist size index. I decided to start with small goals instead of a seemingly impossible one. at that point I should be able to avoid meds for cholesterol and high blood pressure which I was on the verge of requiring.” (Quote 2, P6)

According to this participant, the Fitbit has made the user more mindful and goal-oriented. Here is an excellent example how the Fitbit has helped improve their quality of life.

“The community surrounding the Fitbit has been just as motivating to me as the actual data received from it. I’ve found myself really wanting to go for another quick walk, or go eat on the other side of my college campus, or maybe get up and run around with my kid a bit longer... because I have friends cheering me on every time I get a new badge or do well in a challenge. Even without knowing any of the people I do Fitbit with in real life, it’s been a huge help to have them there supporting me.” (Quote 3, P7)

According to this participant, the community engaged in the Fitbit wearable device is just as motivating as the device.

3.3 General User Results

We received 63 General User responses. For our first question in the General User survey, “Do you know about the Fitbit?”, 85.7% said “Yes”, 14.3% said “No”. For the second question, “Would you like to own one in the future?”, 17.5% said “Yes”, 41.3% said “No”, and 66.7% said “I’m not sure”. Figure 2 is a pie chart of responses to the question: “Why do you not have a Fitbit device?”

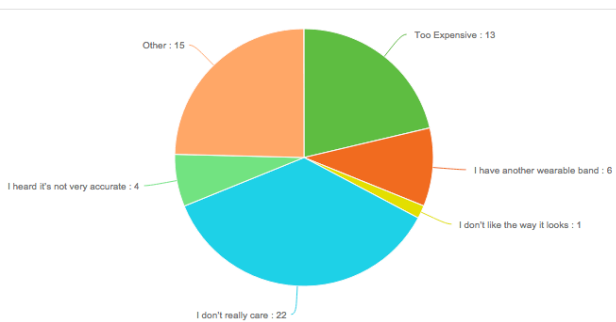


Figure 2. Responses to “Why do you not have a Fitbit device?”

4. DISCUSSION

We conducted this survey in order to answer our research question: Does the Fitbit wearable change user’s lifestyle? According to our data analysis, the Fitbit does significantly change users’ lifestyle in terms exercise and eating habits with p-values of .001932 and .003136, respectively, which

both lower than our .05 significance level. It is interesting to note that users did not report a change in their amount of sleep after purchasing the Fitbit, even though most of the devices monitor sleep.

Furthermore, there were other factors we wanted to account for that could contribute to a change in lifestyle, such as battery life. A majority of users (80%) stated that Fitbit battery life did not interfere with their lifestyle. According our data, the Fitbit becomes heavily incorporated into user’s wardrobe, with 83.3% of Fitbit users reporting that they “Always” wear their device.

According to (Quote 3, P7), the community surrounding the Fitbit has just been as motivating as the data itself. This extrinsic motivation may be a huge contribution why so many have seen an improvement in their fitness. This newfound inclusion may significantly change the users’ lifestyle.

From our General User survey, a most participants (35.9%) responded to the survey question “Why do you not own a Fitbit”, with “I don’t care”. It is possible that users who purchase a Fitbit are ready to make a major change their lives and do so, which is why we see such a significant difference in data for exercise and eating habits, while non-Fitbit users are already content with their lives. According to Table 4, the Percentage of Fitbit users categorized by age group was highest with 35-44 and 55+ year-olds. This could be for a variety of reasons, including maybe people later in life are more motivated to make life changes or they simply have the means to buy such gadget.

4.1 Limitations

Our research had several limitations. Our responses were self-reported. The Fitbit may have made users more aware of their lifestyle and made it seem like they are exercising more or eating better. Furthermore, users may have said there was an improvement in these two categories for their own self-gratification. However, several participants did write in the open-ended question they have seen significant weight loss since purchasing the Fitbit.

Other limitations include self-selection bias. We posted this survey on a popular website, which allowed participants choose to take the survey if they wish. We chose this method to ensure we received enough Fitbit users to conduct a Chi-squared test (participants>20) given the short amount of time. We were able to get enough participants, however, the number of Fitbit users and non-Fitbit users is not evenly distributed. We also would have liked the age categories to be evenly distributed as well. Lastly, the use of an online survey is limiting because it only collects data from those who have a computer or Internet access.

5. CONCLUSIONS AND FUTURE WORK

After purchasing the Fitbit, users integrated the Fitbit into their life by always wearing it on their wrist. Our Fitbit user participants experienced improvements in their lifestyle, through aspects such as an increase in exercise and better eating habits. Based on user feedback, both the goal-oriented design of the Fitbit and community surrounding the device is helpful in motivating users. Non-Fitbit users were aware of the device, but the majority was indifferent about owning one. There is still room for improvement. Given the amount of time, the online survey was posted popular website, which resulted in responses that were not evenly distributed. For the future, we hope to investigate why users were initially motivated to purchase this device and how the device sustained their motivation to make a change in their lifestyle.

APPENDIX A: SURVEY QUESTIONS

General Questions (Demographic Questions)

1. What is your gender?
2. What education level have you achieved?
3. What's your age?
4. Do you have a Fitbit?
 - a. Yes: Fitbit Users Question Set
 - b. No: General Users Question Set

Fitbit Users

1. Which Fitbit model do you have?
2. On average, how often do you wear the Fitbit?
3. Do you think the data collected by your Fitbit is accurate?
4. Before purchasing the Fitbit [On average, how hours a night do you sleep?]
5. After purchasing the Fitbit [On average, how hours a night do you sleep?]
6. Before purchasing the Fitbit [On average, how many hours a week do you exercise?]
7. After purchasing the Fitbit [On average, how many hours a week do you exercise?]
8. Before purchasing the Fitbit [On average, how would you describe your eating habits?]
9. After purchasing the Fitbit [On average, how would you describe your eating habits?]
10. Does the Fitbit battery life interfere with your lifestyle?
11. *“Please enter any general stories or experiences you have with the Fitbit”*

General Users

1. Do you know about the Fitbit?
2. Would you like to own one in the future?
3. Why do you not have a Fitbit?

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