Do fitness level trackers increase the level of physical activity?

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Abstract

The study investigates the use of fitbits on 10 random participants in Blackpool Sixth Form college. Before the study was carried out, the participants must sign a consent form meaning they give consent to take part, and will let them drop out at any time if they wish to. In addition, they completed a health screening questionnaire to see if they have any health problems limiting them from taking part. The 10 participants would wear a Fitbit for 6 weeks and monitor their levels of physical activity. The participants would then monitor their next 6 weeks worth of physical activity without a Fitbit. After the 12 weeks is completed, the data was analysed using a paired t-test and is displayed using box plots. Overall, the study showed that wearing a Fitbit does initially increase levels of physical activity, but the novelty does begin to wear off after 6 weeks.

Chapter 1 – Introduction

Amongst the population of the UK (aged 6 and above), approximately 28% use fitness level trackers, which asks the question of whether they actually work. The research project looks at how fitness level trackers can affect physical activity levels on a day to day basis. 10 people will measure the amount of physical activity they do over a 12 week period without a fitbit. In the same 12 weeks, 10 different participants will measure their physical activity levels with a fitbit (6 weeks) and their fitness levels without a fitbit (6 weeks). When all the data is collected, the results will be analysed using a paired t-test to see if the novelty of wearing a fitness level tracker wears off over 6 weeks.

Chapter 2 – Literature Review

2.1 – Who uses fitness level trackers?

According to a study based upon the effectiveness of fitness level trackers, around 73% of people who use fitbits are aged between 18 and 25 [Sciencedirect.com. (2016)]. This shows that it is common upon the younger population. However, when fitbits are used in order lose weight, only 21% are aged 18-25. This is most likely due to a little knowledge about obesity in the younger generation. [John R. Sirad, 2001]

2.2 – How should fitness level trackers affect our levels of physical activity

Fitness level trackers are used to help track the level of physical activity you are completing. This suggests that FitBits (a brand of fitness level trackers) would aid you in completing more hours of physical activity. However, the novelty of wearing a Fitbit seems to wear off after a few months. According to a recent study, although most results are positive when trying to lose weight, the amount of physical activity often drops off after 3-4 months [NPR.org, 2016].

If fitness level trackers are supposed to increase physical activity levels, surely the amount of weight lost would increase as well. However, according to the same study, the group with no FitBit lost more weight. This is because people with the FitBit will "reward themselves more for completing more exercise" [NPR.org, 2016].

2.3 – Dependant variables

Dependant variables will always affect the levels of physical activity. According to a study based upon physical inactivity. Many dependant variables such as weather and injuries will always have the power to prevent physical activity Gates, M. (2015). This means that the end results could be affected by other variables.

Chapter 3 – Methodology

3.1 – Research design

For this project, the researchers chose to do an experimental research design. This is because they will be able to look at the effects that an independent variable has on a dependant variable.

The researchers collected both quantitative and qualitative research to help test the hypothesis. They gave each participant a questionnaire based upon the experiment to see if wearing the fitbit had a positive impact upon their health and can give an honest opinion on whether the fitness tracker affected their fitness levels. The researchers collected quantitative data to see if how much physical activity the participants completed. The data collected can be analysed to using a t-test and will be presented in box plots to help easily see where the most and least physical activity was done.

The researchers used both primary and secondary data. This allows them to use their own data in order to draw their own conclusions and mould the experiment around the hypothesis. In addition, secondary data was used to see if other researchers agreed or disagreed with their findings. If the secondary data agrees, this means the primary data can be deemed as more valid.

3.2 – Participants and Sampling Design

The researchers used 10 subjects throughout the experiment. All subjects are aged between 16-18 with the gender being completely random. In addition, all participants fitness levels are random so the data collected isnt bias. All subjects must sign a consent form and fill in a health screening questionnaire to see if any medical conditions restrict them from taking part. Finally, the participants taking part in the experiment are all from the local area.

3.3 – Methods used to collect data

The data will be collected using a field experiment. The researchers will collect the first 6 weeks worth of data using the fitness tracker. This shows exactly how much exercise was completed and how much calories were burnt. The next 6 weeks worth of data will be collected by a physical activity plan. The subjects will fill in a sheet daily, saying how much exercise they completed that day and what physical activity they were doing. This will help get a difference in calories burnt with and without a fitness tracker.

3.4 – Method of Analysis

The researchers will analyse the data using the paired t-test. This means a t-value must be found from the raw data. To do this, the researchers will find the standard deviation of the raw data and put this into a the formula on **appendix 5**. This will give them their t-value, which will be used to compare against the degree of freedom table in **appendix 4**. For the project to be deemed valid, it must be 95% accurate. The researchers chose to use the paired t-test to analyse the data as the project uses two independent measures. This means the t-test allows a reliable t-value to be found.

3.5 – Reliability and Validity

Validity is measuring what you're supposed to be measure. The researchers made the experiment externally valid by making the participants complete their physical activity wherever they want. This means the data is more valid as variables like maturation and instrumentation were taken into account. The experiment was internally valid all variables we could control, were controlled. In addition, all participants were advised to have at least 8 hours sleep each not and to not over exercise to ensure they do not get exhausted. To ensure the test was reliable, the

researchers had to gather precise and accurate results by giving both groups of participants an equal amount of time to complete their physical activity.

3.6 – Ethical Considerations

All participants were made to sign a consent form allowing them to take part in the test. This also gave them the option to drop out of the experiment at any time if they wished to. The researchers also made each subject fill in a health screening questionnaire to see if they have any health problems limiting them from completing the test. Each subject knows that only the researchers will be able to access the data they provide, meaning all of the data collected is confidential.

Chapter 4 – Results

4.1 – Raw data

This is all of the raw data collected. It shows how much calories were burnt by each participant and was put into a table so it was easy to compare and contrast between each participant. **Appendix 1** is the raw data that the researchers collected. The data was collected over a period of 12 weeks.

4.2 – Data analysis

The researchers looked at the raw data and worked out the difference, standard deviation and t-value in order to help compare the data to the hypothesis. In **appendix 2** and **appendix 3**, the t value is worked out for each participant. At first the difference between week 1 and 6 is found. After that, the difference minus the mean difference is found to work out the standard deviation. The values found will but put into the t formula in order to get a t-value. The value found will be compared to the degree of freedom. Since the hypothesis is two sided, it is compared it to the row with two sided hypothesis. In sport and exercise science, for the research project to be seen as reliable and valid, it must be 95% accurate. **Appendix 4** is the degree of freedom table the researchers compared their t value to. We presented the data in box plots (seen in **appendix 6**) to help see where the most calories and least calories were burnt. This helped the researchers further prove the hypothesis.

Chapter 5 – Discussions and conclusions

In conclusion, fitness level trackers do increase the amount of physical activity completed and amount of calories burnt. According to the researchers data, the average calories burnt per week was greater when the participants used fitbits. However, the researchers also found that the novelty of wearing a Fitbit wore off after 6 weeks. The raw data showed that the amount of calories in week 1 was significantly greater than the amount of calories burnt in week 6.

References

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Appendices

Appendix 1 - A table showing the raw data collected from the 8 participants that were involved in the study. It shows the average calories burnt over 6 weeks with and without a FitBit.

Client	Week 1 (FitBit)	Week 6 (FitBit)	Average Over 6 Weeks (FitBit)			Average Over 6 Weeks (No FitBit)
AH	4,920	4,920	4,920			3,840
JF	3,638	3,174	3,174			3,997
KP	9,060	6,240	7,528			4,530
LD	6,175	5,072	5,792			3,252
LP	12,493	10,500	10,956			10,956
MG	8,060	6,895	7,528			6,160
RM	7,434	7,434	7,434			2315
RW	2386	1648	1731			1025

Appendix 2 - A table showing the working of a paired t-test to see the difference in calories burnt from week 6 to week 1, in order to get a t-value.

Participant	Week 1 (FitBit)	Week 6 (FitBit)	Difference	(Difference - Mean Difference) Squared*
AH	4920	4920	0	**845,296.36**
JF	3638	3174	464	**207,389.16**
KP	9060	6240	2820	**3,612,280.36**
LD	6175	5072	1103	**33,708.96**
LP	12493	10500	1993	**1,152,616.96**
MG	8060	6895	1165	**60,319.36**
RM	7434	7434	0	**845,296.36**
RW	2386	1648	738	**32,905.96**
Mean:			919.4	SD:6,789,813.48/7 = 969,973.35 *square root* = 984.87
				T= 919.4 x *square root (8)*/ 984.87 = 2.64

Appendix 3 - A table showing the working of a paired t-test for the calories burnt on average with and without a FitBit.

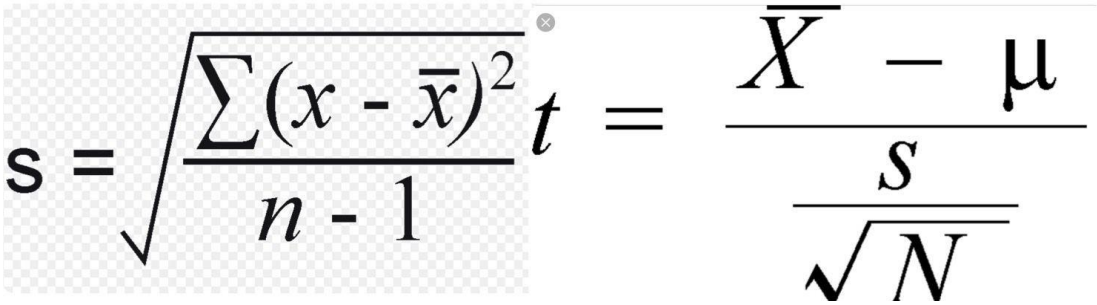
H	I	J	K	L
Participant	Average calories burnt per week (FitBit)	Average calories burnt per week (No FitBit)	Difference	(Difference - Mean difference) Squared*
AH	4920	3840	1080	295392.25
JF	3174	3997	-823	5985362.25
KP	7528	4530	2998	1689250.25
LD	5792	3252	2540	683102.25
LP	10956	10866	0	2635752.25
MG	7528	6160	1368	65280.25
RM	7434	2315	5119	12218520.25
RW	1731	1625	706	841806.25
Mean:			1623.5	SD: 24614196/7 = 3516313.714 *Square Root* = 1875.184
				T = 1623.5 x *Square Root (8)*/1875.184 = 2.45

Appendix 4 - A degrees of freedom table for a two sided hypothesis (our hypothesis).

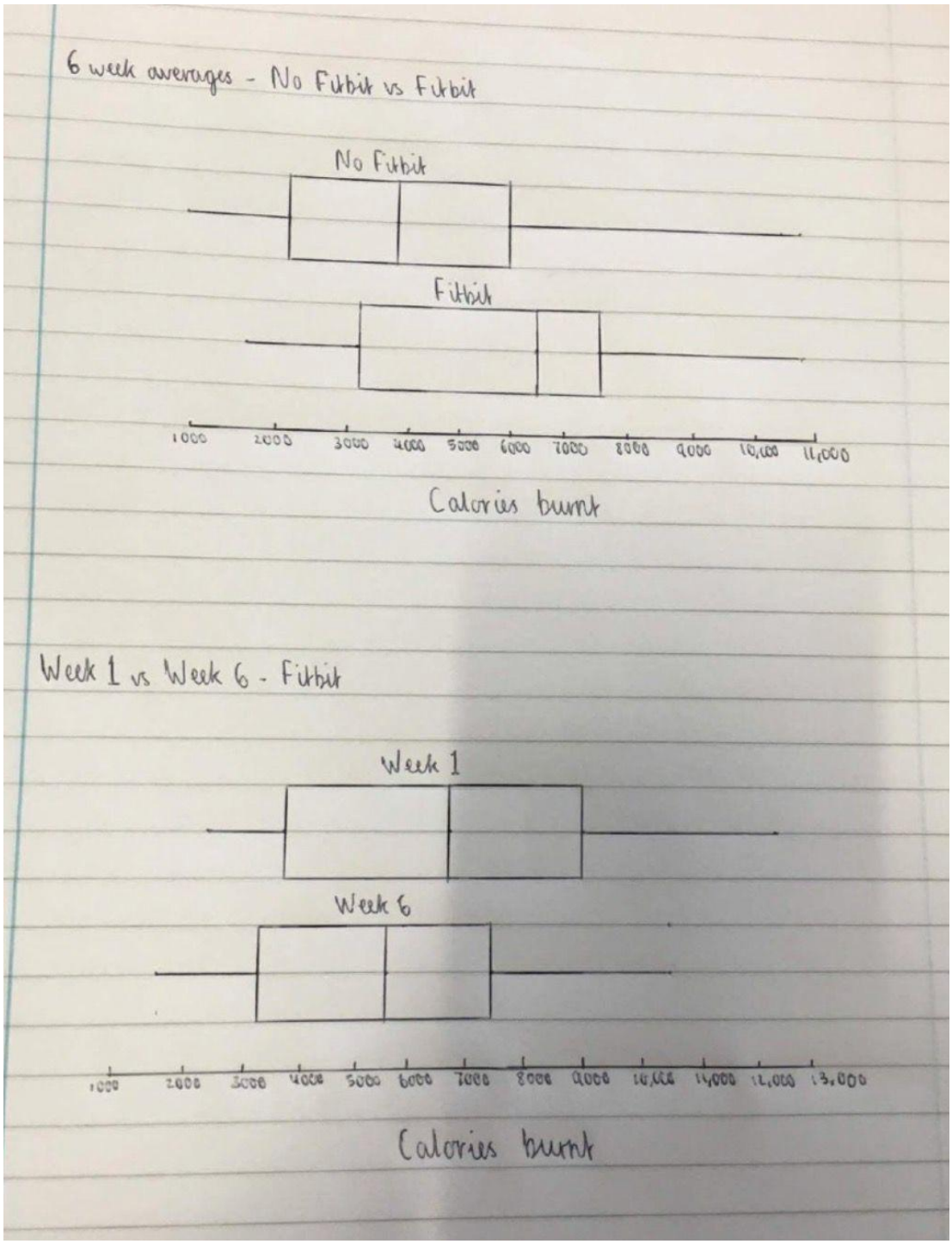
Will be used to help compare our t-value from **appendix 2** and **appendix 3.**

	Percent											
75		*90*	*95*	*97.5*	*99*	*99.5*	*99.75*	*99.9*	*99.95*	*99.975*	*99.99*	*99.995*
	One-sided α											
.25		*.10*	*.05*	*.025*	*.01*	*.005*	*.0025*	*.001*	*.0005*	*.00025*	*.0001*	*.00005*
	Two-sided α											
.50		*.20*	*.10*	*.05*	*.02*	*.01*	*.005*	*.002*	*.001*	*.0005*	*.0002*	*.0001*
df												
1	1.00	3.08	6.31	12.71	31.82	63.66	127.32	318.31	636.62	1273.24	3183.10	6366.20
2	.82	1.89	2.92	4.30	6.96	9.22	14.09	22.33	31.60	44.70	70.70	99.99
3	.76	1.64	2.35	3.18	4.54	5.84	7.45	10.21	12.92	16.33	22.20	28.00
4	.74	1.53	2.13	2.78	3.75	4.60	5.60	7.17	8.61	10.31	13.03	15.54
5	.73	1.48	2.02	2.57	3.37	4.03	4.77	5.89	6.87	7.98	9.68	11.18
6	.72	1.44	1.94	2.45	3.14	3.71	4.32	5.21	5.96	6.79	8.02	9.08
7	.71	1.42	1.90	2.37	3.00	3.50	4.03	4.79	5.41	6.08	7.06	7.88
8	.71	1.40	1.86	2.31	2.90	3.36	3.83	4.50	5.04	5.62	6.44	7.12

Appendix 5 - The formulas used to work out a t-value in a paired t-test. The formula on the left shows standard deviation whereas the table on the left shows the formula for the t-value.



Appendix 6 - Box plots showing the amount of calories burnt on average with and without a FitBit.


6 week averages - No Fitbit vs Fitbit
No Fitbit
Fitbit
1000
2000
3000
4000
5000
6000
7000
8000
9000
10,000
11,000
Calories burnt
Week 1 vs Week 6 - Fitbit
Week 1
Week 6
1000
2000
3000
4000
5000
6000
7000
8000
9000
10,000
11,000
12,000
13,000
Calories burnt

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