



Impact of Brain Cognition and Technology-Enhanced Physical Activity Intervention

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Research Purpose

- To determine whether increased levels of physical activity, as reflected on the Fitbit, increased cognitive performance among 5th grade students at local elementary schools,
- To examine how different levels of physical activity improved student's health.

Methods

Participants

One hundred sixteen fifth grade students from local Ann Arbor schools with similar demographics.

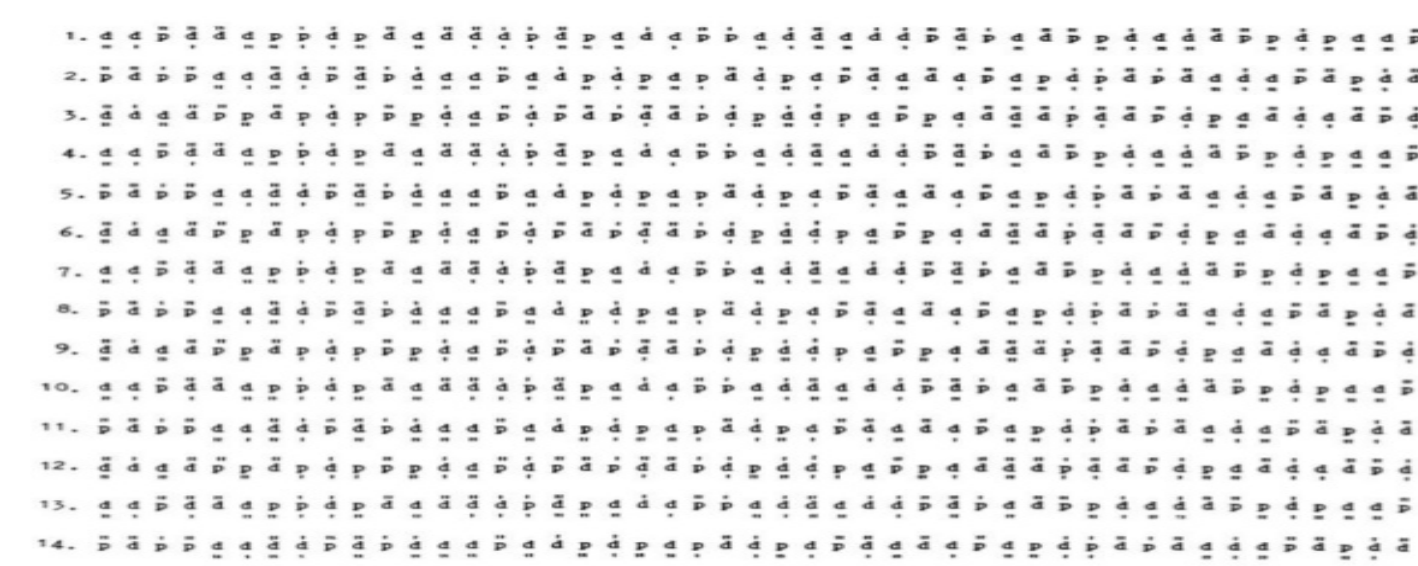
Experimental Design

- Quasi-experimental design with two different schools 5th grade classes.
- Two Different groups:
 - Fitbit group
 - Fitbit+ Physical Activities Engaging the Brain
- Students received Fitbit and measured physical activity over 7 weeks during school days (Monday morning to Friday afternoon)
- Given pre and post d2 tests.
- Tested for health using Progressive Aerobic Cardiovascular Endurance Run (PACER) test.

Instruments of Measure

D2 Test

- Specific test of attention and concentration and has been shown to measure scanning accuracy and cognitive performance. Specifically, it measures both visual processing speed and ability to concentrate.
- Assesses the child's capacity to focus on one stimuli while ignoring others such as the letter "p" having two dashes which is similar to the letter "d".



Fitbit

- Calculates low to moderate and moderate to vigorous physical activity based on Metabolic Equivalents(MET).
- 1 MET means the participant is sitting, 1-3 METs is low intensity, 3-6 METs is moderate intensity, and greater than 6 METs is vigorous activity.



Progressive Aerobic Cardiovascular Endurance Run (PACER)

- Administered indoor for Fitbit students using cones marked on the floor and instructions telling the students to run from one side of the room to the other.
- The test was then completed when a student failed to reach the opposite side and the total number of laps was counted.

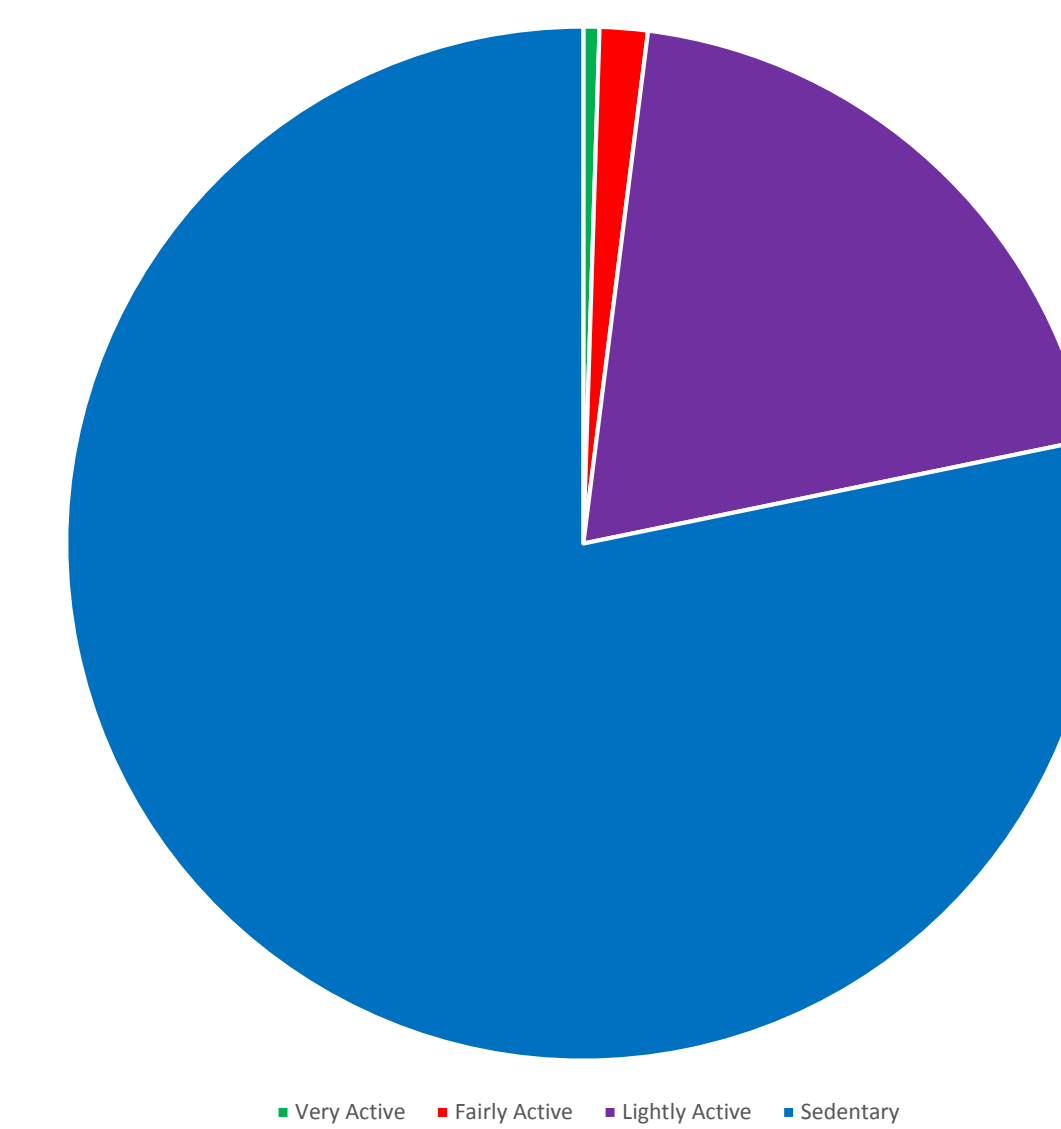
Data Analysis

- A two tailed Pearson product moment correlation was run to determine the relationship between fitness zones and the amount of minutes of different levels of physical activity.
- Also ran a two tailed Pearson product moment correlation was run to determine the relationship between d2 test results and the amount of minutes of different levels of physical activity.

Results

Amount of Minutes of Physical Activity

Figure 1 illustrates the average amount of minutes of different Physical Activity Levels.



Correlations

Table 1 presents the correlations between health and d2 test results to the amount of minutes of different levels of physical activity.

		veryact_mv	fairlyact_mv	lightact_mv	sedentary_mv	sedisleep_mv	valfa_mv	valfit_mv
HRFZpre	Pearson Correlation	.079	.169	.043	-.023	-.023	.121	.051
	Sig. (2-tailed)	.557	.205	.746	.865	.865	.365	.705
	N	58	58	58	58	58	58	58
HRFZpost	Pearson Correlation	.230	.167	-.010	-.007	-.007	.184	.033
	Sig. (2-tailed)	.083	.210	.939	.959	.959	.168	.808
	N	58	58	58	58	58	58	58
TN	Pearson Correlation	.050	-.040	.030	.050	.050	-.025	.003
	Sig. (2-tailed)	.707	.762	.824	.854	.854	.849	.979
	N	59	59	59	59	59	59	59
PostTN	Pearson Correlation	.025	-.089	-.052	.042	.042	-.052	-.034
	Sig. (2-tailed)	.852	.499	.693	.748	.748	.694	.798
	N	60	60	60	60	60	60	60
E1	Pearson Correlation	-.062	-.021	.229	-.105	-.105	-.027	.182
	Sig. (2-tailed)	.643	.876	.081	.427	.427	.839	.167
	N	59	59	59	59	59	59	59
PostE1	Pearson Correlation	-.065	-.086	.181	-.118	-.118	-.080	.126
	Sig. (2-tailed)	.623	.513	.166	.371	.371	.543	.338
	N	60	60	60	60	60	60	60
E2	Pearson Correlation	-.109	-.014	.109	-.121	-.121	-.041	.002
	Sig. (2-tailed)	.413	.917	.412	.361	.361	.760	.986
	N	59	59	59	59	59	59	59
PostE2	Pearson Correlation	-.130	.056	.024	.050	.050	.029	-.015
	Sig. (2-tailed)	.321	.669	.855	.702	.702	.824	.912
	N	60	60	60	60	60	60	60
CP	Pearson Correlation	-.026	-.063	-.238	.087	.087	-.041	-.174
	Sig. (2-tailed)	.845	.637	.070	.511	.511	.760	.188
	N	59	59	59	59	59	59	59
PostCP	Pearson Correlation	.092	.049	-.197	.131	.131	.062	-.131
	Sig. (2-tailed)	.486	.711	.132	.317	.317	.641	.318
	N	60	60	60	60	60	60	60
FR	Pearson Correlation	-.195	-.184	.153	-.180	-.180	.214	.197
	Sig. (2-tailed)	.139	.163	.247	.173	.173	.104	.135
	N	59	59	59	59	59	59	59
PostFR	Pearson Correlation	-.086	-.033	.202	-.072	-.072	-.045	.128
	Sig. (2-tailed)	.514	.804	.122	.583	.583	.731	.331
	N	60	60	60	60	60	60	60

Correlation revealed that there was a significant difference between very active minutes and Health related fitness zone ($p=0.083$, $r=.230$), the more lightly active minutes the students had of physical activity resulted in more E1 errors, errors of omission ($p=0.081$, $r=.229$), and finally as pre-test concentration performance increased, light active minutes decreased ($p=0.070$, $r=-.238$).

Conclusions

- Physical activity did not have a dramatic influence on cognitive performance due to PAEBs leading students to improving d2 tests independent of physical activity.
- Increased amount of very active minutes as measured by the Fitbit resulted in an increase likelihood of students being part of the Health Related Fitness Zone.

Future Studies

- If the study was repeated students would not be informed that they were receiving the Fitbit until after completion of the pre-test as that excited students and could have influenced test results.
- There would be no PAEBs because that caused a correlation that was unexpected and helped increase students performance on d2 tests regardless of the amount of physical activity they had.

