

Comparison of Fitness Trackers in Predicting Daily Step Counts in a College Population

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Introduction

Increased physical activity can result in better sleep, less weight gain, improved bone health, fewer symptoms of depression and anxiety, and a decreased risk of many chronic diseases¹ College students can further benefit from physical activity with improved cognition, memory, attention, and processing speed.¹

Although the benefits to exercise are well known, according to the Spring 2019 American College Health Assessment, about fifty-four percent of college students do not meet the current recommendations.²

Do Steps Matter?

Walking continues to remain the most common form of physical activity and is considered a good motivator in getting people to move more.³ Tracking steps can help to quantify an amount of physical activity done and can serve as a measurable goal for increasing activity.³

Although it may not be the amount of steps per day that are of benefit, but rather an increase in steps in general that matters.⁴ Many studies have shown that tracking steps is effective in improving physical activity, therefore, positively impacting health.³

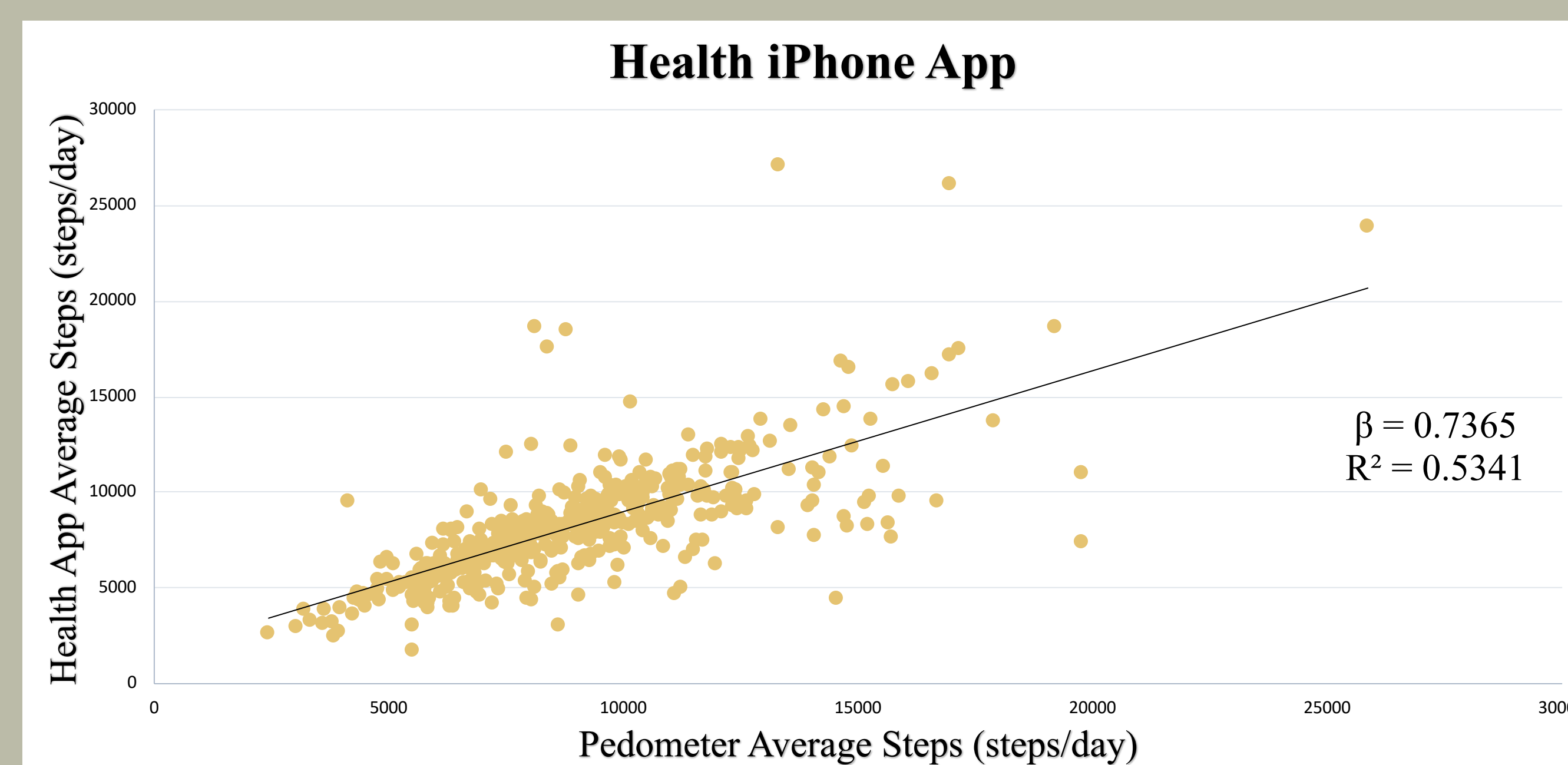
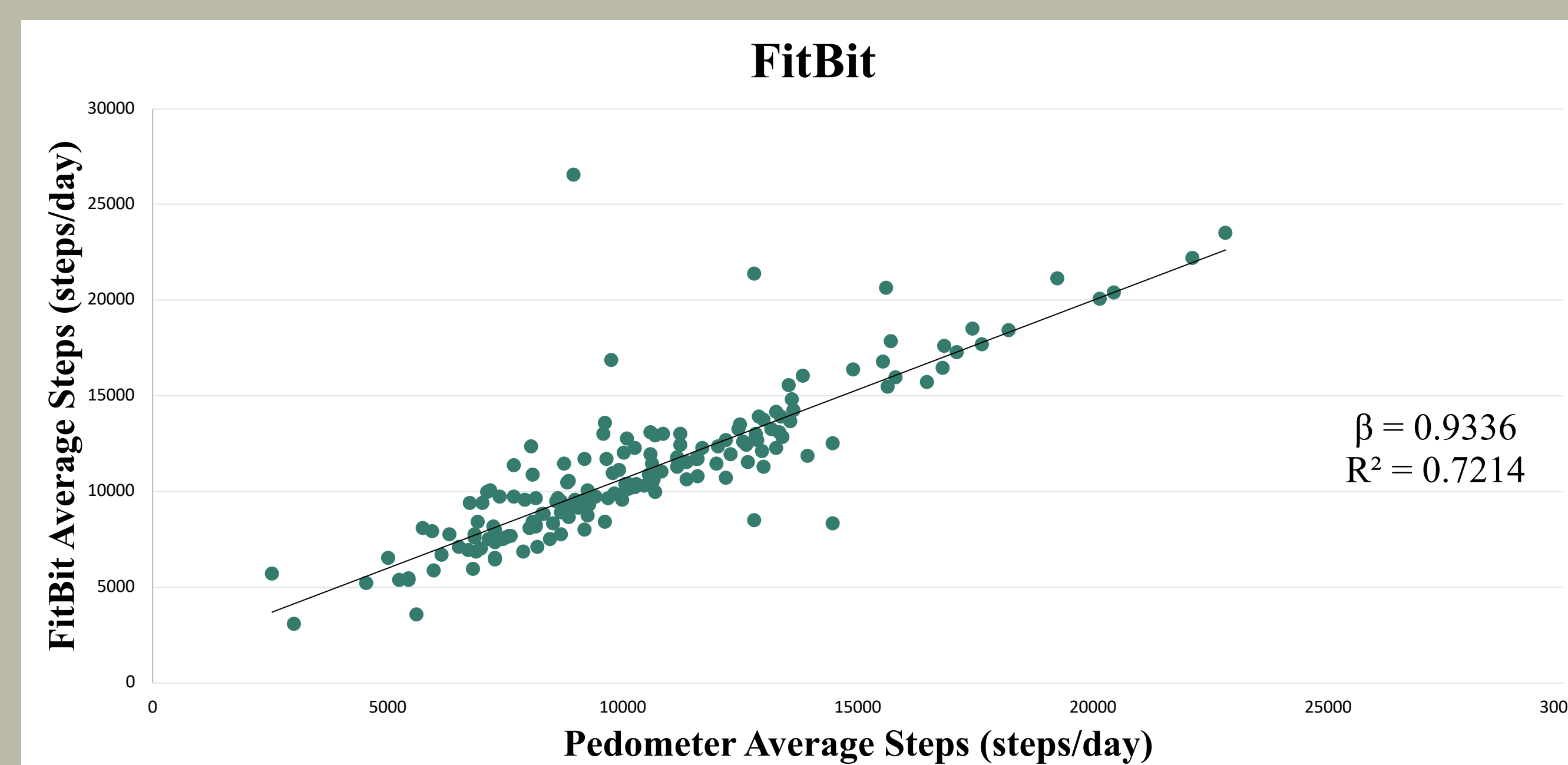
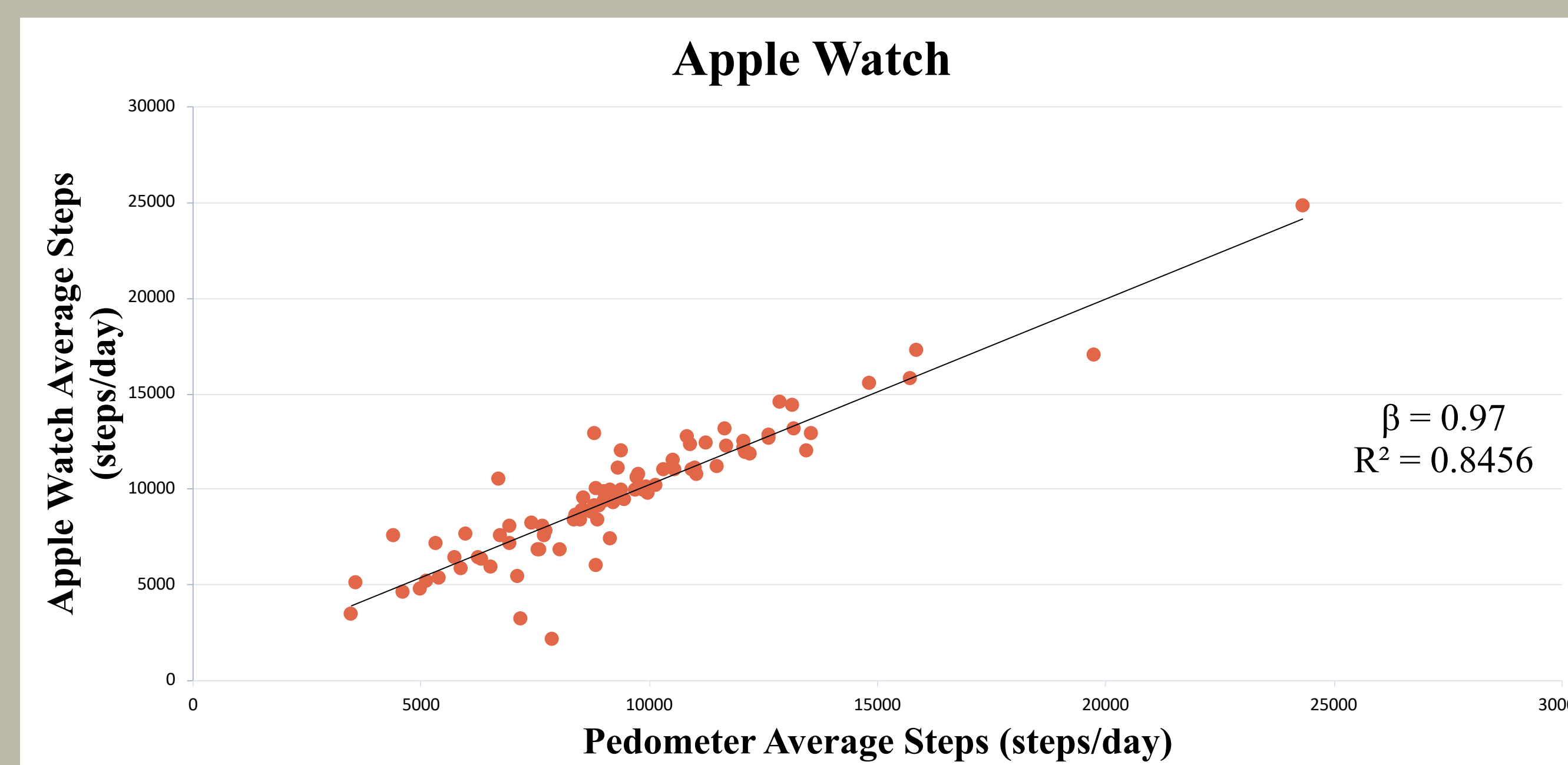
Today, there are many step counters available, ranging from watches to phone applications, but their reliability is not well studied. Due to the high variability, it is important to look at devices that are specifically being used by college students to determine their validity.

Objective

To determine the agreement of popular fitness trackers used by college students, age 18-24, compared to a validated pedometer in a free-living environment.

Methods

- Data were collected between 2016-2019 through the College Health and Nutrition Assessment survey, an ongoing, cross-sectional study at a midsize, northeastern university. Students (n=1034; 71% females; 51% first year) wore the Yamax Digi-Walker SW-200 Pedometer (PED) and another step tracking device of their choice for seven days.
- Study methods and objectives of CHANAS were approved by the UNH Institutional Review Board (#5524) and explained to students prior to obtaining written consent.
- Agreement in the average steps between devices were examined via Pearson correlations and paired sample t-tests. Steps differences between PED and three common trackers were evaluated via ANCOVA using gender, semester, and year as covariates.

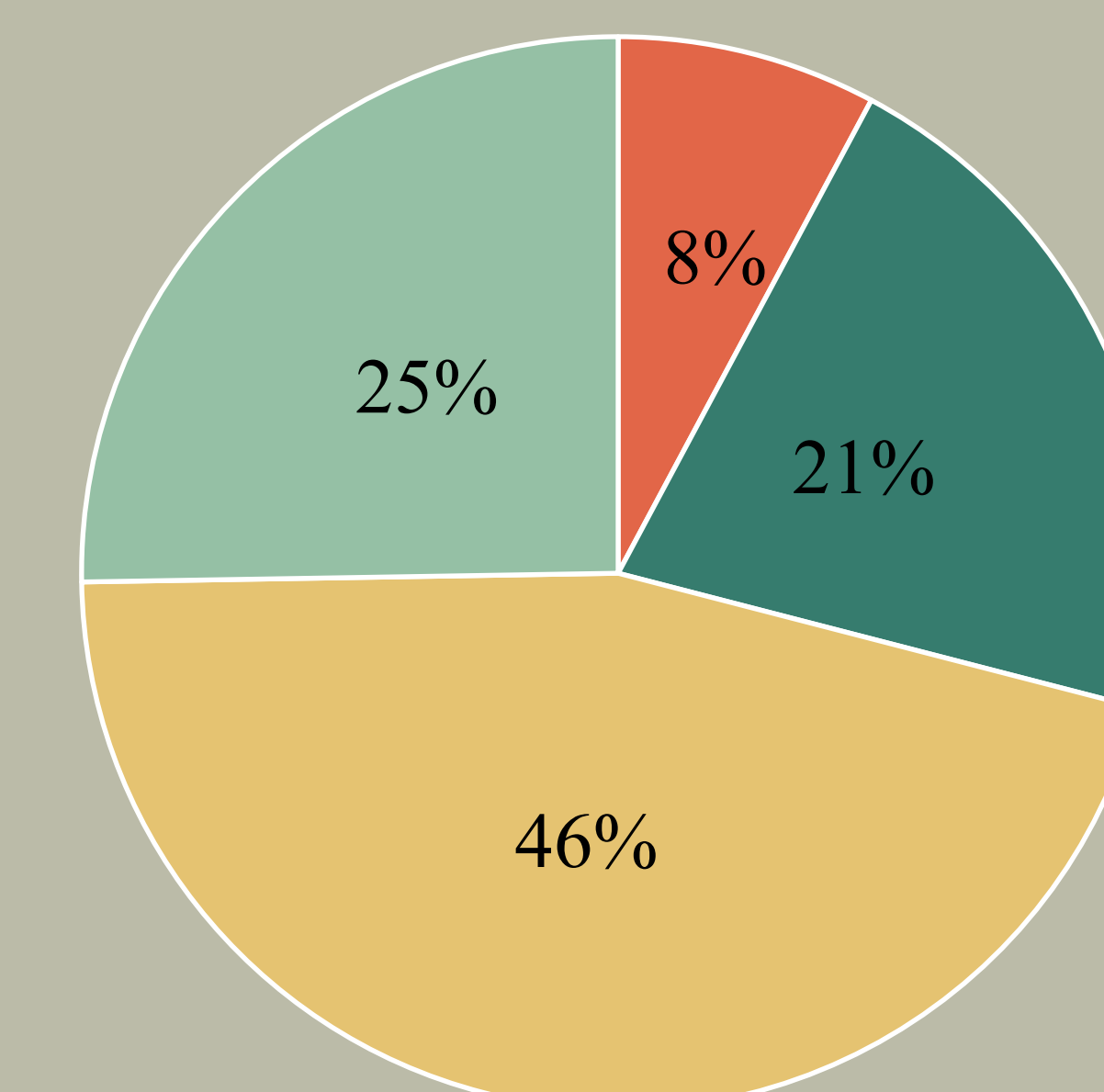


Sample Characteristics of All Participants Based on Activity Level

	Basal-Low Active (n=345)	Somewhat Active (n=365)	Active (n=193)	Very Active (n=131)	P-value
Sex					
Male (n[%])	106(30.7)	95(26.0)	70(36.3)	28(21.4)	.013
Female (n[%])	239(69.3)	270(74.0)	123(63.7)	103(78.5)	
Age (yr)	19.2±.07	18.8±.05	18.9±.09	18.7±.08	.000
Height (cm)	167.7±.01	167.3±.01	169.7±.01	169.5±.01	.282
Weight (kg)	64.5±1.3	65.3±1.2	69.2±1.8	65.6±1.6	.137
BMI (kg/m²)	23.0±.46	23.2±.32	23.9±.46	22.8±.48	.414
Semester (%)					
Fall	69.9	66.8	58.5	57.3	.011
Spring	30.1	36.3	41.5	11.1	
Academic Class (%)					
Freshman	39.7	57.0	58.0	56.5	.001
Sophomore	42.0	29.3	28.0	33.6	
Other	18.3	13.7	13.9	9.9	

Continuous variables are presented as means ± SE. Significance is set at p<.05.

Reported Fitness Tracker Worn



Apple Watch FitBit Health iPhone App Other

Results

- Average daily steps recorded via PED = 9490±108.
- All three devices were strongly correlated to the PED (AW, r=0.92, FB, r=.84, HiPA, r=.73; all p<.001).
- Both AW and FB overestimated steps (4.4 and 8.2 percent, respectively), while the HiPA underestimated steps (6.6 percent) as compared to PED.
- Average steps did not significantly differ between students who tracked activity via AW compared to the PED (9728±374 vs. 9461±355, p=.07).

Conclusions

Our findings show wrist-worn fitness trackers correlate well to a validated pedometer in free-living college students.

Given the popularity of fitness trackers and mobile apps, these results may be important for researchers designing health interventions in the college population.

Acknowledgement

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