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The Impact of Fitness Technology on Health Outcomes

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THE IMPACT OF FITNESS TECHNOLOGY ON HEALTH OUTCOMES

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Abstract

Using 2014 data compiled from a sample of Claremont McKenna undergraduate students, I examine the effect that fitness technology (i.e., mobile and wearable technology) has on users' health outcomes. Specifically, I find no effect of mobile or wearable use on self-reported health. However, I do find some evidence of mobile use on weight but not wearable. Applying a basic OLS regression analysis, I show that mobile users tend to be heavier than non-mobile users irrespective of gender. Furthermore, I find that contemporaneous health on prior mobile use show higher weight levels compared to non- mobile prior users. Such findings provide evidence suggesting that mobile is ineffective in providing users with healthier outcomes.

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I. Introduction

The World Health Organization (WHO) recommends that the average person should perform at least 30 minutes of moderate physical activity a day (IJsselsteijn et al, 2006). In 2010, the Department of Health and Human Services reported that 80 percent of adults do not meet guidelines for physical activity levels, and that 80 percent fail to even meet the physical activity guidelines for youth (HealthyPeople, 2010). Obesity has grown to be a major public concern, especially for developed countries (IJsselsteijn et al, 2006). Health People, managed by the U.S. Department of Health and Services, is planning to improve the general health of Americans over its 10 year plan. The organization strives to identify nationwide health priorities, increase public awareness of the determinants of health, and create environments that will promote good health for everyone. Every year, the United States costs for inactivity average roughly 76 billion dollars due to healthcare spending (Almeida, 2008). As of now, health information technology (IT) and wellness technology (e.g., heart rate monitors, step counters, and health portals) are positively impacting health care consumers by receiving higher quality of care, reduction in medical errors, decreases in paperwork and increased access to health information (Eysenbach, 2012). Fitness and health technology has the ability to not only improve consumers' physical activity levels, but also the potential to transform healthcare and the practice of medicine.

Technological advancement has led to a dramatic increase in mobile devices worldwide, and a complete shift from desktop traffic to mobile traffic. Mobile web traffic is doubling annually and predicted to surpass desktop traffic by 2014. Consumers are no longer tied to their desks to browse the Internet anymore (Undertone 2013). Adults spend an average of 2 hours and 21 minutes per day on their smart phones, which is longer than they will spend online on a desktop or laptop computer (Undertone 2013). In just one year, consumers are spending an hour more a day on their phones. This hourly increase in consumer's daily mobile consumption provides suggestive evidence of just how important these devices are to users and society at large. Within the next five years, wearable technology is predicted to increase to a 48 percent market penetration worldwide (TMC News 2013).

The digital market is where most users are spending their time, whether on a smart phone, tablet, laptop or desktop (Levitas, 2013). These four traditional digital screens have transformed the way users consume information and data, especially with regard to the mobile market. Statistics show that by 2017 the percent of smart phone users will reach 68 percent (Levitas, 2013). "Four out of five smartphone users check their phones within the first 15 minutes of waking up. 80 percent of those say it's the first thing they do in the morning" (Levitas, 2013, 8). Not only are consumers messaging, emailing and calling more often, but consumers are using their phones for other activities as well. Fitness and wellness technology, which is an umbrella term that covers areas of wearable technology (e.g., Fitbit, Nike Fuelband) and mobile apps (e.g., MyFitnessPal, Runkeeper), is just one of many new industries rapidly expanding within the mobile market.

As of today, empirical studies conducted within the mobile and wearable health and fitness industries mainly focus on the impact of mobile technology, and less on the impact that wearable technology has on consumers. This is largely due to the fact that wearable technology is still a relatively new market, with the first commercialized wearable product released in 2008 (Fitbit, 2014). Much of the existing literature surrounding mobile fitness technology focuses on participants that are categorized as overweight and/or are looking to lose weight (see for example, Ahtinen 2009, Gerber 2009, Gupta 2011, Liu 2011). These studies find that these users saw positive results (i.e., weight loss, healthier choices, etc.) after using the mobile wellness applications. However, to the best of my knowledge, the existing literature on fitness technology to date does not examine the impact of the technology on the entire population of users – (as opposed to overweight users); nor does it focus on wearable technology (it solely focuses on mobile technology).

The purpose of this paper is to fill these gaps in the literature. In particular, I examine mobile technology as well as wearable technology. Also, I look at a broad range of health outcomes; in addition to not restricting my analysis to individuals who are seeking to improve their health but irrespective of health I examine whether the use of fitness technology is important. However, it should be noted that I restrict my age range to individuals apart of the Millennial Generation (i.e., born 1981+) due to the high probability these individuals are adopters of mobile and wearable technology. Casual empiricism suggest that the effect of fitness technology will have positive implications on users' fitness, and ultimately health outcomes controlling for household environment, school, fitness, diet and personal factors. I seek to determine if this is indeed the case using data from Claremont McKenna undergraduate students.

However, my results suggest otherwise. Interestingly, I find some evidence of an effect of mobile use on weight but the effect goes in the opposite direction. This suggests that mobile users tend to be heavier than non-mobile users. I further find no evidence of an effect of wearable use on users BMI levels, and also find that neither mobile usage, nor wearable usage have an effect on respondents' self-reported health measures.

The remainder of the paper is as follows. The next section explores the mobile and wellness technology industry in detail, discussing the relevant existing empirical literature on the effects of such technology on health outcomes. Section III discusses the data. Sections IV and V present my empirical strategy and results, respectively. Section VI concludes.

II. History of the Fitness and Wellness Technology Industry and Literature Review

As previously noted, the fitness and wellness technology is an umbrella term that covers areas of wearable technology and mobile apps. Fitness and wellness technology has increased rapidly, largely due to recent advancements in technology. Fitness and wellness apps are predicted to grow from 154 million downloads in 2010 to 908 million by 2016 and the number of wearable technology devices is predicted to grow from 8 million in 2010 to 72 million by 2016 (Kim, 2010). The proliferation of small, portable devices provides the fitness and health industries with a great opportunity to excel in the wearable technology market.

Wearable technology is transforming the fitness and health industries. In 2008, Fitbit Inc. released one of the first activity trackers, wireless-enabled wearable technology (Fitbit, 2014). Created by James Park and Eric Friedman, the product known as Fitbit Classic contributes to the seamless integration of fitness into a consumer's daily routine, no longer limited to the confinement of the gym (Fitbit, 2014). Furthermore, Nike released one of the first fitness wristband technologies known as the Fuelband wristband in 2012 (Colon, 2014). An idea first pioneered by the founders of Fitbit, this customized technology, namely “fitness and wellness technology,” is changing the way consumers assess fitness levels, set goals, and track physical activity.

MyFitnessPal, launched in 2005, is a mobile platform that provides consumers with the necessary means to track their calories and share information with friends (MyFitnessPal, 2014). By integrating wearable technology with mobile, MyFitnessPal is participating in both mobile and wearable technology. Fitbit Tracker is just one of many wearable technologies partnered with MyFitnessPal allowing the consumer to keep all the data tracked by Fitbit and synchronize the data to MyFitnessPal. By incorporating social media into these wellness technologies, the fitness and health spaces are becoming increasingly more publicized and integrated within society.

In addition, companies like Misfit Wearables are beginning to offer wearable fitness technology fit to accessorize for any occasion, encouraging tracking to move past just exercise activities and into everyday activities. The Misfit Shine comes in four variations of wearable technology: the clasp, sport band, leather band or necklace (Miller, 2013). And currently, startups such as OMsignal are attempting to move past wearable fitness accessories and into wearable fitness clothing. OMsignal is creating T-shirts and bras that have 3-axis accelerometers that track not just steps and calories, but also respiratory rate and volume capturing a user’s ECG (OMsignal, 2013). The product is not for sale yet, but is predicted to be the first bio- sensing apparel for tracking health and wellness. All these fitness inventions have either been released within the last two years or are still being developed.

Social media is a central contributor to the rise in these technologies. Consumers want to share everything everywhere in real time. These consumer demands have driven social account participation to enormous levels. Social media is now primarily mobile and continues to grow. More than 90 percent of tweets on Twitter are from mobile, there are 819 million monthly active mobile users on Facebook and 7.3 million average daily mobile visitors on Instagram (Horizon Media, 2013). These numbers exemplify just how huge the mobile market is becoming, and how social media is responding to this migration of mobile usage. The fitness and wellness technology industry is beginning to respond to this trend, which ultimately has the potential to greatly transform the way people exercise and monitor health in their everyday lives.

Now, more than ever, our society is prepared for fitness and wellness technology adoption. Trends of smartphone adoption rapidly increasing to near-universal, social media accounts surpassing billions of users, and an ever-increasing number of people affected by lifestyle-related health risks all contribute to the advancement and necessity of fitness and wellness technology. An increased recognition in the fitness and health industries alongside United States' epidemic of obesity provides a necessary and viable platform for this emerging space. Mobile tech consultancy companies like Research2Guidance project that in 2014 two of the five major health technology trends include a rise in data in doctor's offices, and commercialization of smart clothes (Black, 2013). Studies have shown that fitness and wellness technology have positive implications on a consumer's health and wellness, and offer a potential solution towards increasing health care access with fewer resources. One of the main challenges the fitness and wellness technology industry faces today is the widespread application/-adoption of these technologies by consumers, patients and health-care systems (Rutherford, 2010). Nonetheless, these technologies have the potential to offer some solution for providing preventative and health care to a growing world population.

In addition, over the past couple of decades, there has been a noticeable shift in the demographic characteristics of people who use technology based products and services. The largest demographic user in the 1970s and 1980s were people between the ages of 18-34 years old; however, now the demographic user has broadened to include children, teenagers, and adults over the age of 50 years (Marshall and Norman, 2001). This shift in demographic characteristics of people who use and purchase fitness products and services has huge implications for the growth of fitness and wellness technology. This broadened user base has brought about user-specific wearable technologies. Game design principals and health maintenance/-monitoring tools are two main examples of different user-focused products. Game design principals target children with immediate feedback, rewards and levels of mastery; whereas, health maintenance and monitoring tools target older adults with tools to monitor blood pressure and sugar levels (Marshall and Norman, 2001).

An extensive study looking into the implications of mobile wellness applications (i.e., Wellness Diary, Mobile Coach, SelfRelax) on working-age citizens finds general positive responses among the participants (Ahtinen, 2009). This study included working class participants employed in Southern Finland, with ages ranging from 31- 45 years. Participants were studied over the course of one- year from 2008 to 2009. 79 percent of the participants wanted to increase their exercise activity/- fitness levels, and each of the participants had two health risks. Ahtinen finds that easy-of-use, usefulness, and motivating factors (e.g., variety of wellness parameters, adaptable exercise programs, graphs) are the main advantages of each of the mobile applications. The main barriers of use include monotonous data entry, not supporting cyclic use (i.e., holidays), too complicated initially, and applicants being too much in a hurry to use the applications. Overall, the study finds that in the beginning users seemed to try out different functionalities to learn all the applications, and in the end usage habits and personalized goals toward a more integrated usage of the applications within users' everyday life. Gerber (2009) looks at user experiences of mobile applications and finds that smartphone SMS reminders as a tool for promoting healthy behaviors is effective. Specifically, the study examines the effect that weight loss maintenance SMS notification has on an obese person's life in the United States. The author finds that this notification system led to weight loss from many of the study's participants.

A main trend being seen within the fitness and wellness technology industry is the increase in geo-location, physiologic, and metabolic indicators of energy exertion. Marshall and Norman (2001) show that during economic recessions people tend to work out more outside to cut back on gym membership fees and equipment costs. This trend has led to a consumer demand for "self-tracking" tools and applications. Gupta (2011) examines the top two hundred mobile health apps and also finds that users preferred apps that turn inconvenient tasks into easy tasks. Self-tracking is an important component of fitness and wellness technology that allows the user to track jogging/-biking routes, workout data and comprehensive workout history, control music, geo-tag routes and photos, and share performance levels through social media applications.

Another key finding for mobile health apps suggests that users favor features that create a seamless mobile user experience. Lui (2011) looks at the top two hundred mobile health apps from a developers' perspective and classifies them according to purpose, function, and user satisfaction. The main findings suggest that users favor mobile health apps with context awareness, visuals, and tracking tools. Context awareness includes unique mobile features such as location awareness, preference awareness, and network awareness. The data visualization that is found to be most favorable in mobile health apps includes 2D charts and 3D views. And tracking tools such as the Calorie Tracker, a mobile app that tracks a user's diet, weight change and workout frequency, are favored by users due to convenience and ease-of-use.

While there has been much research and discussion surrounding mobile health and fitness applications and user implications, there has been limited scientific research exploring wearable fitness technologies. This is arguably due to the relative youth of wearable fitness. Specifically, to the best of my knowledge, there is only one study that examines the effectiveness of wearable fitness tracking devices (Burns et al., 2012). Burns et al. hypothesize that devices such as the Fitbit and Jawbone UP require high-complexity (i.e., large amount of data presented to the user), and high-engagement interfaces (i.e., users must commit to regularly monitoring), which may be problematic for less active users in the long run. Over time, less active users are more likely to abandon these devices and go back to old habits compared to more active users. Burns et al. develop a wearable technology, ActivMON, which is designed to be a low-complexity, low- engagement interface. ActivMON is a wristband that has an accelerometer and LED light. The accelerometer allows the user to watch their level of physical activity, while the LED light alerts the user when they should increase their level of physical activity. Currently, Burns et al. are still evaluating whether low-complexity, low-engagement interfaces are more effective at motivating less active participants.

The purpose of this paper is to continue to expand research within this developing market, especially with regard to wearable technology. I examine the impacts of fitness wearable technology on fitness and health outcomes, as well as examine the fitness and wellness technology industry as a whole. I look at all consumers that use fitness technology, not just limited to overweight users. My given age bracket focuses on users from the Millennial Generation (i.e., undergraduate students) to help exemplify this new industry because these users are people who have grown up with the rise of the Information Age. Whether or not these users are active participants in our high-tech society today, they have been surrounded by digital devices and content for over a decade, which I argue should lead them to be probable candidates of wearable technology in the near future. By better understanding the everyday user's fitness and health habits through today's techno savvy youth, this study can offer important input to the discussion surrounding technologies that can better enhance quality of life for humans.

III. Data

The data is from a survey instrument I created on Fitness Technology and Health Outcomes using Qualtrics Survey Software that was distributed via email to Claremont McKenna College (CMC) undergraduate students in March of 2014 (see Appendix A7 for the complete survey instrument). The original survey request was sent on the March 11th and a follow-up request was sent on March 26th. The overall response rate is 13%.

This is relatively low considering the historical variation in institutional student surveys response rates range from 14% to 70% according to the National Survey of Student Engagement that conducted surveys across 316 different colleges and universities within the U.S. (Porter et al., 2006). Respondents are omitted from the analysis if they had missing information on any of the variables of interest or indicated they did not consent to taking the survey.[1] As a result, the final sample size is 166 of which 60 are males and 106 are females. This predominantly female skewed sample does not reflect the current gender distribution at CMC, 52% of the total undergraduate enrollment is male students, and 48% female students (U.S. News College Compass, 2014). This suggests that my survey sample of undergraduates is not a representative sample of CMC students.

I create 6 health measures and discuss each in turn. The first measure is based on the self-rated health question which asks respondent to rate his/her general health on a five point scale (poor, fair, good, very good, excellent) during three different points in time (12 months ago, 6 months ago, 1 week ago). While current self-reported health was answered by all respondents, some respondents did not rank their health in one/or both of the other two time frames.[2] In order to maintain sample size, I replaced missing values for self-rated health 12 months ago with the respondent's answer to either the 6 months ago or current point in time depending on which one(s) the respondent answered. For self-rated health 6 months ago, I replaced missing values with the respondent's answer to current point in time. For example, a participant that responded "good" to his/her current health but did not respond to the 6 months or 12 months ago general health question

[1] 1 respondent refused to take the survey, and 3 variables were dropped due to missing information on one of the variables of interest (i.e., BMI).

[2] 2 real changes made for missing values in 12 month time frame, and 1 real change made for missing values in 6 month time frame.

would receive a “good” ranking for both his/her 6 months and 12 months ago self-rated general health. The average response from the general self-health indicator is consistently in the high 3’s (representing “good” and “very good” responses) irrespective of gender or time period (see Columns 3, 6, and 9 of Tables 1-3). It is important to note that the health information gathered from CMC students does not represent the average person, which would help explain why the students in this sample are in such good health standing. Deemed one of the healthiest colleges in the U.S., Claremont McKenna College has frequently made the top of student health and life lists (Princeton Review, 2012 and McDermott, 2013).

The second two measures break the self-reported health status into two indicator variables for extreme health outcomes. In particular, I create an indicator variable for poor health equal to 1 if the respondent reported poor or fair health and 0 otherwise. Similarly, I create an indicator variable for excellent health equal to 1 if the respondent reported excellent or very good health and 0 otherwise. Overall, a small fraction of the total sample indicate poor health, and a very high fraction of the sample indicate excellent health irrespective of time frame (poor rated health means of 0.139, 0.0723, 0.0542, and excellent health means of 0.223, 0.301, 0.319 respective to current, 6 months, and 12 months ago time frame). Males are more likely to be in poor health than females currently, but this likelihood flips to females being more likely to be in poor health compared to their male counterparts for both 6 months and 12 months ago time frames. Perhaps this highlights the general finding that women think about health more, and do more about it (Harvard Men’s Health, 2010). Women are 50% more likely to meet the goal of eating at least five servings of fruits and vegetables a day compared to men, more likely to have health insurance than men, and men are 80% more likely to abuse drugs than women (Harvard Men's Health, 2010). Although these findings fail to explain why females self-reported poor health 6 and 12 months ago, maybe women are just overall more concerned about their health compared to their male counterparts.

The third health measure I construct is the body mass index (BMI), which is a measure of body fat based on height and weight levels. BMI is calculated by dividing the respondents' weight in kilograms over the respondent's height in meters squared:

$$BMI = {mass(kg)}/{height(m)^2}$$

The BMI is typically used to help identify potential weight problems for adults. In the U.S., the average adult male has a BMI of 26.6, while the average adult female has a BMI of 26.5 (National Health and Nutrition Examination Survey, 2000). It is a screening tool that categorizes weight levels into overweight and obesity classifications. The minimum BMI level from the sample is 15.6, and the maximum BMI level is 30.9 (see Columns 3 and 4 of Appendix Table A1). The average BMI level for females from my sample is 22.2, and for males is 23.5. The average BMI level irrespective of gender is 22.7, four points below the national average level, indicating that the majority of the respondents in this sample have healthy weight levels according to BMI. The fourth health measure I construct is the natural log of BMI to reduce the variation caused by extreme values (outliers).

I create an indicator variable for overweight as my fifth health measure. Specifically, a respondent is assigned a value of 1 if their BMI is 25 or higher, and zero otherwise. Ideally I would also create an indicator variable for obesity (BMI of 30 or higher) but my sample of undergraduates includes very few respondents in this category, again reflecting the non-representativeness of the sample. 19% of respondents in the sample are considered overweight (approximately represented evenly amongst both genders in my sample), again echoing the unusually good standing health of the participants compared to the average adult in the U.S.

Fitness technology represents my variables of interest that looks at respondent's adoption and usage in mobile and wellness technology. I create two indicator variables; one for mobile technology and one for wearable technology, for each time period based on the two survey questions that asked whether or not respondents have downloaded mobile fitness apps or used wearable fitness technology within the past 12 months, 6 months, and past week. For each respective indicator variable, if the respondent indicated they did download the technology or used the technology they are assigned a value of 1, and 0 otherwise. Overall 31% of all respondents use mobile technology, and 7% of all respondents use wearable technology. This however masks some important differences by gender. Female respondents have higher mobile adoption rates relative to their male counterparts. 60% of female participants indicate they used or downloaded a mobile fitness app within the past 12 months, 56% within the past 6 months, and 42% within the past week. Whereas for male participants, only 30% indicate they used or downloaded a mobile fitness app within the past 12 months, 27% within the past 6 months, and 17% within the past week. Both female and male participants indicate very low use of wearable technology, with the highest response rate (17% of females indicated wearable usage within the past 6 months) among female respondents across all periods in time.

Summary statistics and variable definitions for my remaining variables are presented in Appendix Table A1-2 and A7. It can be seen that the majority of the sample is white (66%), and the second largest racial/ethnic origin group identify themselves as Asian or Pacific Islander. 87% of the respondents are U.S. citizens. 40% of the respondents are seniors, while freshman, juniors and sophomores evenly represent the remaining 60% of the sample. 80% of the respondents indicate having an average GPA of 3.5 or higher, while nearly 87% participate in some kind of extracurricular activities on campus. Social sciences represent the most popular type of major declared by these students, with 15% of respondents majoring in natural sciences, and only 4% of respondents majoring in engineering. I also account for respondents double majoring, 38% of which indicated having a second major. Students in this sample have high academic standings, and are most likely active students within the CMC community. These findings reiterate much of the reviews done on the school at large, that CMC students are motivated, career- driven and involved with internships and clubs within the school (Princeton Review, 2012).

With respect to students' family background, the majority (85%) of respondents in the sample have parents that are currently married. 45% of respondent's mothers received levels of education higher than a Bachelor's degree (e.g., Master's, Professional, or Doctoral Degree), and 63% of respondent's fathers received levels of education higher than a Bachelor's degree. For respondents' parents work status, results indicate that before thirteen years old and after, the majority of respondent's parents work for pay of profits. Figures drop slightly for mothers and fathers once the respondent is no longer considered a child (less than thirteen years of age).

Looking more closely at respondents' athletic backgrounds and exercise routines, the sample of respondents indicates high levels of past Varsity sport participation. 81% of participants responded High School experience in Varsity level sports, and 33% of the sample are currently participating in CMS Varsity athletic programs. Respondents indicate low levels of personal trainer usage across all points in time, however indicated high levels workout class participation. Workout frequency in a typical week varied across all points in time. With respect to respondents' diets, the majority indicate "good" and "very good" dietary choices across all points in time. Much of these statistics continue to hold consistent with the existing articles and reviews done on CMC, that students are very into sports/ and athletics, and physically fit. High self-rated dietary choices (i.e., low 3's "good" across all time frames) seem to be a reflection of the high caliber of health standing that CMC students live by.

III. 1. Health Measure by Gender and Mobile Status

In order to take a first look at the relationship between health and fitness technology I present summary statistics of the six health measures by gender and mobile status across all three time frames (see Table 1-3). Due to the low usage rate of wearable technology, I do not look at wearable technology here, but continue to control for it in my formal analysis below. The patterns are somewhat surprising. Students (both males and females) with lower self-rated health (i.e., higher poor-rated health and lower excellent-rated health), and higher BMI levels (i.e., BMI and overweight) are currently using mobile more than their non-mobile counterparts (see Table 1). A similar pattern is found between health measures and mobile use 6 months ago (see Table 2). However, users' mobile status with health measures 12 months ago suggests conflicting results, as mobile users indicate having higher self-rated health compared to their non-mobile users. This surprising pattern suggests that early mobile adopters, presumably individuals already in healthy conditions, downloaded mobile fitness and/ or health apps but saw no reason for such assistance and abandoned the technology.

Looking at mobile status separately by gender, non-mobile male users consider themselves at higher levels of self-rated health across all time frames, and have lower current BMI levels, despite the exception that holds for health measures 12 months ago. Non-mobile males indicate lower rates of excellent-rated health compared to mobile users (see Columns 1 and 2 in Table 3). Female non- mobile users are also considered healthier than mobile users. However, this trend is not represented with health measures 6 and 12 months ago for females. As it may be males are less likely to turn to mobile use for health assistance if they already consider themselves healthy and/or fit compared to female users. As mentioned, existing research suggests that females tend to think more about their health and do more about it than males. Perhaps the higher probability that females are more concerned about their health translates to a higher likelihood that females turn to mobile technology for help.

The remainder of this paper formally analyzes the relationship between fitness technology and health outcomes controlling for observable characteristics to determine if these patterns persist.

IV. Empirical Strategy

In order to understand the impact of fitness and health technology on health, I estimate a model of the following form:

(1)
$$HEALTH_i = \alpha + \beta_1 MOBILE_i + \beta_2 MALE_i + \beta_3 MMOBILE_i + \beta_4 WEAR_i + \beta_5 FITNESS_i + \beta_6 DIET_i + \beta\gamma X_i + \epsilon_i$$

where HEALTH is one of 6 measures of health depending on the specification being estimated (i.e., overall self-reported health, poor health, excellent health, BMI, log of BMI, and overweight), MOBILE is an indicator variable for mobile technology, MALE is an indicator variable for male students, MMOBILE is an interaction term between male and mobile users, WEAR is an indicator variable for wearable technology, FITNESS is a vector of physical activity measures (i.e., self- rated workout frequency, workout class participation, personal trainer usage), DIET is a vector of food intake measures (i.e., self-rated dietary choices), X is a vector of observable characteristics (i.e., age, gender, major, average GPA, leadership studies sequence, extracurricular activities, parental education, parental work status, parental marital status, citizenship status, place of birth, Varsity High School sport participation, current student athlete, former student athlete) in hopes to explore the potential role of household environment, respondents' athletic experience, school involvement, and current academic standing, and i represents an individual, and $\in$ is an error term with the usual properties.

While I estimate equation (1) at three different points in time (i.e., 12 months ago, 6 months ago, 1 week ago), when the dependent variables is overall self-reported health, I estimate equation (1) at one point in time (i.e., one week ago) when using BMI, log of

BMI, and overweight because these questions were not asked retrospectively. For each of the three separate specifications, I match the timeline of the fitness technology variables (i.e., mobile1, wear1) with the concurrent health variables (i.e., BMI, log of BMI, overweight, self-rated health, poor rated health, and excellent rated health). I estimate equation (1) using a linear regression model for continuous health measure and a linear probability model for qualitative (0-1) health measures.[3]

V. Results

The results for equation (1) are presented in Tables 4, 5, and 6 for current health measures, health measures reported 6 months ago, and health measures reported 12 months ago, respectively. These tables focus on the main variables of interest and all other coefficient estimates are reported in Appendix Tables A3- A5.

Perhaps surprisingly, I find no effect of mobile use or wearable use on self-reported health irrespective of time frame. The same holds true for both poor health and excellent health measures. There is also no gender difference in terms of reports of self-reported health. However, these results could be an indicator that the sample I am working with is not representative of the average person using fitness and health technology today. As seen with the summary statistics of many of my variables of interest, CMC students represent a highly active, healthy, and fit group of individuals in sharp contrast to the average American.

[3] Results are similar if a basic probit model was used as opposed to linear probability model for my qualitative health measure (0-1) measures. Results available upon request.

I do however find some evidence of an effect of mobile use on weight but not on wearable use. Specifically, mobile users tend to be heavier than non-mobile users irrespective of gender. Not surprisingly, males are heavier than females in terms of BMI but are equally likely to be overweight. At first this trend seemed surprising, as casual empiricism suggests that mobile adopters would be more likely to represent healthier individuals relative to non-mobile users. However, this positive relationship between mobile user and BMI could reflect the fact that users who want health and/ or fitness help are the ones adopting these mobile and wellness technologies. Perhaps, those who are already active and at the standard of health desired do not use mobile technology for health and/ or fitness because such technology is not needed. Healthy individuals have already established such healthy lifestyles, which in turn reflect their non- mobile usage in the health and fitness spaces.

None of the controls hold significance except for citizenship and average GPA. Respondents' who are considered U.S. citizens are more likely to have higher BMI levels compared to non U.S. citizens. The U.S. continues to lead with some of the highest overweight levels worldwide. Current obesity rates within the U.S. have plateaued and in some cases declined, however obesity is still a massive problem within the U.S. (Ogden, 2014). This finding represents some of the current problems Americans are facing regarding weight and health levels. With respect to academic standing, students' with lower GPA's (an average GPA of 7.50 or below), are more likely to have lower BMI levels compared to students with higher academic standings. This finding could reflect the fact that these students spend more time on their health levels as opposed to their academics. However, it's important to note that lower BMI levels do not always represent better fitness levels. BMI does not distinguish between body fat and muscle mass, which weighs more than fat (Works, 2014). An individual who has a high BMI level could have a lower percentage of body fat compared to someone with a lower BMI level. This finding could then argue quite the opposite, that students with higher academic standing have better time management skills, which could suggest better time spent on health and/ or fitness related activities.

To address whether or not overweight mobile adoption users have seen positive results from downloading these applications, I look at current health on prior mobile usage. In attempt to circumvent limitations with outliers, I estimate equation (1) using robust regression analysis of contemporaneous health on prior mobile use. The results for equation (1) are presented in Tables 7, 8, and 9 for current health measures (i.e., BMI, log of BMI and overall self- reported health). Again, these tables focus on the main variables of interest. I introduce a new variable of interest (i.e., mobile prior) to indicate respondents' mobile use 6 and/ or 12 months ago. Interestingly so, users who adopted mobile technology 6 and/ or 12 months ago show higher current BMI levels than non-mobile prior users. Perhaps these mobile users (who tend to be heavier than non-mobile users) are downloading such technologies, but not actually using them. Or it may be that mobile is ineffective in helping users reach healthier outcomes. Such results indicate that mobile may not be affecting contemporaneous health in a positive way.

The regression results, the positive relationship between BMI and mobile use, support the hypothesis that mobile is perhaps not an effective tool for users trying to lose weight and/ or adopt healthier lifestyles. Recent statistics show that one third of Americans stop using their wearable devices within six months of buying the technology, and half of Americans owning some form of activity tracker no longer use it (Arthur, 2014). Early abandonment of these mobile and wearable technologies highlights the current limitations of these technologies in today's society. As of now, the majority of fitness trackers are restricted to tracking, and many of which lack sustainable battery lives. Although the capability for these technologies is high, they may have a ways to go before consumer adoption truly takes off.

VI. Conclusion

My analysis of data gathered from CMC undergraduate students has shown that mobile, not wearable, has some effect on weight irrespective of gender. While I hypothesize that mobile would show positive results (i.e., lower BMI levels/ or healthier self-rated health), my findings suggest otherwise. Mobile users tend to be heavier than non- mobile users. Thus, I explore one potential explanation, that users who needed health/ or fitness help turned to mobile technology. However, when I look at contemporaneous health on prior mobile use I find mobile use to be an ineffective tool for these mobile users. An area for further research is to look at contemporaneous health on prior mobile use restricted to overweight individuals only. I was unable to look at this test due to the small amount of overweight individuals in my sample.

Despite the lack of mobile adoption and effective usage of such mobile applications in my analysis, the industry of mobile and wellness technology is growing suggesting that in a couple of years from now, the environment for such technologies in the fitness and health spaces will be conducive for those looking to lose weight and/ or sustain a healthier lifestyle. The platform for these technologies is here (the smartphone), and developing them requires low- cost entry. With time, these technologies are becoming better suited for the everyday user, not just users looking to lose weight. Companies are designing products that are meant to be integrated for all activities (e.g., leisure), not limited to just fitness and physical activities. This would ultimately broaden the target users of these products, showing potential for an increase in mobile adopters that are both healthy and overweight.

TABLE 1

Summary Statistics of Current Health Measures by Gender and Mobile Status

	Male			Female			Both Genders		
Health Dependents (Current)	**Non-Mobile (1)**	**Mobile (2)**	**Total (3)**	**Non-Mobile (4)**	**Mobile (5)**	**Total (6)**	**Non- Mobile (7)**	**Mobile (8)**	**Total (9)**
Self- Rated Health	3.860	2.900	3.700	3.758	3.568	3.679	3.804	3.444	3.687
	(0.969)	(1.101)	(1.046)	(1.066)	(1.021)	(1.047)	(1.021)	(1.058)	(1.044)
Poor Rated Health	0.100	0.400	0.150	0.129	0.136	0.132	0.116	0.185	0.139
	(0.303)	(0.516)	(0.360)	(0.338)	(0.347)	(0.340)	(0.322)	(0.392)	(0.347)
Excellent Rated Health	0.260	0	0.217	0.274	0.159	0.226	0.268	0.130	0.223
	(0.443)	(0)	(0.415)	(0.450)	(0.370)	(0.420)	(0.445)	(0.339)	(0.417)
BMI	23.46	23.85	23.53	21.51	23.12	22.18	22.38	23.26	22.67
	(2.160)	(2.296)	(2.168)	(2.259)	(2.884)	(2.647)	(2.410)	(2.779)	(2.561)
Log BMI	3.151	3.168	3.154	3.063	3.133	3.092	3.102	3.140	3.115
	(0.0932)	(0.095)	(0.0929)	(0.103)	(0.125)	(0.118)	(0.108)	(0.120)	(0.113)
Overweight	0.200	0.300	0.217	0.113	0.273	0.179	0.152	0.278	0.193
	(0.404)	(0.483)	(0.415)	(0.319)	(0.451)	(0.385)	(0.360)	(0.452)	(0.396)

Notes: Means with standard errors are in parentheses.

TABLE 2

Summary Statistics for 6 months ago Health Measures by Gender and Mobile Status

	Male			Female			Both Genders		
Health Dependents (6 months)	**Non-Mobile (1)**	**Mobile (2)**	**Total (3)**	**Non-Mobile (4)**	**Mobile (5)**	**Total (6)**	**Non- Mobile (7)**	**Mobile (8)**	**Total (9)**
Self- Rated Health	4.023	3.813	3.967	3.787	3.831	3.811	3.901	3.827	3.867
	(0.876)	(1.276)	(0.991)	(1.020)	(0.985)	(0.996)	(0.955)	(1.045)	(0.994)
Poor Rated Health	0.0227	0.125	0.0500	0.0638	0.102	0.0849	0.0440	0.107	0.0723
	(0.151)	(0.342)	(0.220)	(0.247)	(0.305)	(0.280)	(0.206)	(0.311)	(0.260)
Excellent Rated Health	0.364	0.313	0.350	0.277	0.271	0.274	0.319	0.280	0.301
	(0.487)	(0.479)	(0.481)	(0.452)	(0.448)	(0.448)	(0.469)	(0.452)	(0.460)

Notes: Means with standard errors are in parentheses.

TABLE 3

Summary Statistics for 12 months ago Health Measures by Gender and Mobile Status

	Male			Female			Both Genders		
Health Dependents (12 months)	**Non-Mobile (1)**	**Mobile (2)**	**Total (3)**	**Non-Mobile (4)**	**Mobile (5)**	**Total (6)**	**Non- Mobile (7)**	**Mobile (8)**	**Total (9)**
Self- Rated Health	4.048	3.889	4	3.786	3.953	3.887	3.917	3.939	3.928
	(0.854)	(1.183)	(0.957)	(0.951)	(0.898)	(0.919)	(0.908)	(0.960)	(0.931)
Poor Rated Health	0.0476	0.111	0.0667	0.0476	0.0469	0.0472	0.0476	0.0610	0.0542
	(0.216)	(0.323)	(0.252)	(0.216)	(0.213)	(0.213)	(0.214)	(0.241)	(0.227)
Excellent Rated Health	0.333	0.389	0.350	0.262	0.328	0.302	0.298	0.341	0.319
	(0.477)	(0.502)	(0.481)	(0.445)	(0.473)	(0.461)	(0.460)	(0.477)	(0.468)

Notes: Means with standard errors are in parentheses.

TABLE 4
Determinants of Current BMI and Overall Self-Reported Health

Independent Variables	**BMI (1)**	**Log BMI (2)**	**Overweight (3)**	**Self-Reported health (4)**	**Poor Reported Health (5)**	**Excellent Reported Health (6)**
mobile1	1.515***	0.0640**	0.203**	-0.0867	0.0410	-0.0555
	(0.575)	(0.0253)	(0.0947)	(0.216)	(0.0729)	(0.0906)
wear1	-0.291	-0.0103	-0.0598	-0.0865	0.0654	-0.0297
	(0.678)	(0.0298)	(0.112)	(0.254)	(0.0859)	(0.107)
male	2.160***	0.0982***	0.139	0.0761	0.0204	0.00311
	(0.549)	(0.0241)	(0.0904)	(0.206)	(0.0696)	(0.0865)
mmobile1	-1.815	-0.0777	-0.217	-0.347	0.0213	-0.203
	(1.115)	(0.0490)	(0.184)	(0.418)	(0.141)	(0.176)
Observations	166	166	166	166	166	166
R-squared	0.377	0.383	0.293	0.473	0.454	0.418

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: In addition to the variables listed, each regression also controls for five individual characteristics, eleven school characteristics, twelve family characteristics, six fitness characteristics and three diet characteristics (See Appendix)

TABLE 5

Determinants of Overall Self-Reported Health 6 months ago

Independent Variables	**Self-Reported health (1)**	**Poor Reported Health (2)**	**Excellent Reported Health (3)**
mobile6	0.130	0.0384	0.00609
	(0.189)	(0.0565)	(0.0908)
wear6	0.0695	-0.0616	0.0329
	(0.203)	(0.0608)	(0.0977)
male	0.376*	-0.0374	0.143
	(0.216)	(0.0647)	(0.104)
mmobile6	-0.246	0.0405	-0.00708
	(0.328)	(0.0982)	(0.158)
Observations	166	166	166
R-squared	0.558	0.419	0.521

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Notes: See notes to Table 4.

TABLE 6

Determinants of Overall Self-Reported Health 12 months ago

Independent Variables	**Self-Reported health (1)**	**Poor Reported Health (2)**	**Excellent Reported Health (3)**
mobile12	-0.0737	0.0357	-0.0268
	(0.182)	(0.0473)	(0.0982)
wear12	0.155	-0.0225	-0.00898
	(0.231)	(0.0602)	(0.125)
male	0.101	0.0336	-0.00726
	(0.213)	(0.0555)	(0.115)
mmobile12	0.0168	0.0161	0.133
	(0.307)	(0.0800)	(0.166)
Observations	166	166	166
R-squared	0.480	0.408	0.399

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Notes: See notes to Table 4.

TABLE 7
Determinants of Current BMI by Mobile Use

	Mobile Users					
Independent Variables	**6 months (1)**	**12 months (2)**	**6 &12 months ago (3)**	**1 week, 6 & 12 months ago (4)**	**Mobile Prior (5)**	**Mobile Prior & 1 week ago (6)**
Mobile1				0.133		0.145
				(0.692)		(0.725)
Mobile6	0.947**		0.212	0.150		
	(0.477)		(0.747)	(0.843)		
Mobile12		1.162**	1.002	0.979		
		(0.482)	(0.765)	(0.779)		
Wear1	0.0104	-0.0669	-0.0636	-0.0887	-0.0391	-0.0643
	(0.660)	(0.650)	(0.655)	(0.668)	(0.663)	(0.674)
Male	2.301***	2.304***	2.321***	2.332***	2.304***	2.316***
	(0.497)	(0.483)	(0.493)	(0.496)	(0.495)	(0.499)
Mobile Prior					1.052**	0.955
					(0.490)	(0.725)
Observations	166	166	166	166	166	166
R-squared	0.450	0.461	0.460	0.459	0.449	0.448

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE 8
Determinants of Log of BMI by Mobile Use

	Mobile Users					
Independent Variables	**6 months (1)**	**12 months (2)**	**6 &12 months ago (3)**	**1 week, 6 & 12 months ago (4)**	**Mobile Prior (5)**	**Mobile Prior & 1 week ago (6)**
Mobile1				0.00255		0.00332
				(0.0307)		(0.0324)
Mobile6	0.0442**		0.00948	0.00828		
	(0.0212)		(0.0332)	(0.0374)		
Mobile12		0.0546**	0.0471	0.0466		
		(0.0215)	(0.0340)	(0.0346)		
Wear1	0.00124	-0.00212	-0.00189	-0.00235	-0.00151	-0.00206
	(0.0293)	(0.0289)	(0.0291)	(0.0297)	(0.0296)	(0.0301)
Male	0.104***	0.104***	0.105***	0.105***	0.104***	0.104***
	(0.0221)	(0.0215)	(0.0219)	(0.0220)	(0.0221)	(0.0223)
Mobile Prior					0.0498**	0.0476
					(0.0219)	(0.0324)
Observations	166	166	166	166	166	166
R-squared	0.449	0.461	0.459	0.458	0.441	0.440

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE 9
Determinants of Overall Self- Rated Health by Mobile Use

	Mobile Users					
Independent Variables	**6 months (1)**	**12 months (2)**	**6 &12 months ago (3)**	**1 week, 6 & 12 months ago (4)**	**Mobile Prior (5)**	**Mobile Prior & 1 week ago (6)**
Mobile1				-0.392		-0.386
				(0.260)		(0.262)
Mobile6	-0.216		0.189	0.406		
	(0.167)		(0.271)	(0.316)		
Mobile12		-0.338*	-0.489*	-0.431		
		(0.174)	(0.278)	(0.292)		
Wear1	0.00926	0.0422	0.0207	0.169	0.0235	0.106
	(0.231)	(0.235)	(0.238)	(0.251)	(0.239)	(0.243)
Male	-0.00753	-0.104	-0.0979	-0.0684	-0.0577	-0.0719
	(0.174)	(0.174)	(0.179)	(0.186)	(0.179)	(0.180)
Mobile Prior					-0.230	0.0480
					(0.177)	(0.262)
Observations	166	166	166	166	166	166
R-squared	0.548	0.530	0.529	0.498	0.524	0.525

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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APPENDIX

TABLE A1

Summary Statistics for Dependent Variables

Dependent Variables	**Mean (1)**	**Std. Dev. (2)**	**Min (3)**	**Max (4)**
BMI	22.66659	2.561138	15.56823	30.89661
Log of BMI	3.114555	.1130621	2.745232	3.430647
Overweight	.1927711	.3956684		
N	166			

TABLE A2

Summary Statistics for Independent Variables

Independent Variables	**Mean (1)**	**Std. Dev. (2)**
Male	.3614458	.4818729
Black	.0180723	.133616
Hispanic	.0722892	.2597496
Asian	.1445783	.3527392
Othrace	.1024096	.3041036
Citizen	.873494	.3334246
Sophomore	.1927711	.3956684
Junior	.186747	.3908874
Senior	.3975904	.4908807
GPA2	.3795181	.4867353
GPA3	.2168675	.4133585
GPA4	.126506	.3334246
GPA5	.060241	.2386527
GPA6	.0060241	.0776151
Artshuman	.0662651	.2494975
Natsci	.1506024	.3587431
Engineer	.0361446	.1872146
Mismaj	.0180723	.133616
Major2	.3795181	.4867353
LSS	.186747	.3908874
Extra	.8674699	.3400921
Midwest	.0421687	.2015819
South	.0722892	.2597496
West	.4518072	.4991779
Intl	.0361446	.1872146
Misreg	.3313253	.4721139
Mba	.4277108	.4962436

Mgtba	.4518072	.4991779
Dba	.2831325	.4518834
Dgtba	.626506	.4851952
Married13	.873494	.3334246
Mwork13	.7228916	.4489247
Dwork13	.9638554	.1872146
HSathlete	.813253	.3908874
CMSathlete	.3253012	.4699048
Trainer12	.2228916	.4174454
Trainer6	.126506	.3334246
Trainer1	.060241	.2386527
Class12	.5722892	.4962436
Class6	.5963855	.4921064
Class1	.3373494	.4742358
Goals12	.6024096	.4908807
Goals6	.6807229	.4676071
Goals1	.6325301	.4835747
Wo12_12	.1686747	.3755974
Wo12_34	.246988	.4325645
Wo12_56	.3855422	.4881958
Wo12_7p	.1024096	.3041036
Wo6_12	.1746988	.3808582
Wo6_34	.2650602	.4427007
Wo6_56	.3493976	.4782223
Wo6_7p	.1084337	.3118682
Wo1_12	.2108434	.4091416
Wo1_34	.2289157	.4214061
Wo1_56	.3313253	.4721139
Wo1_7p	.0903614	.2875664
D12good	.4277108	.4962436
D12vgood	.313253	.4652197
D12excel	.0843373	.2787339
D6good	.3855422	.4881958
D6vgood	.3253012	.4699048
D6excel	.0783133	.2694768
D1good	.3433735	.4762716
D1vgood	.2831325	.4518834
D1excel	.0843373	.2787339
N	166	

TABLE A3
Determinants of Current BMI and Overall Self-Reported Health

Independent Variables	**BMI (1)**	**Log BMI (2)**	**Overweight (3)**	**Self-Reported health (4)**	**Poor Reported Health (5)**	**Excellent Reported Health (6)**
black	0.556	0.0242	0.118	-0.434	0.101	0.103
	(1.641)	(0.0721)	(0.270)	(0.615)	(0.208)	(0.259)
hispanic	0.740	0.0333	0.133	-0.742**	0.0722	-0.223
	(0.891)	(0.0392)	(0.147)	(0.334)	(0.113)	(0.140)
asian	-0.262	-0.0160	0.0341	-0.396	0.0942	-0.131
	(0.746)	(0.0328)	(0.123)	(0.280)	(0.0945)	(0.117)
othrace	-0.105	-0.00511	0.182	-0.0758	0.0854	-0.174
	(0.724)	(0.0318)	(0.119)	(0.271)	(0.0917)	(0.114)
citizen	1.792**	0.0733*	0.300**	-0.0829	-0.0111	-0.1000
	(0.899)	(0.0395)	(0.148)	(0.337)	(0.114)	(0.142)
sophomore	0.909	0.0455	0.0391	0.198	0.0204	0.0563
	(0.693)	(0.0305)	(0.114)	(0.260)	(0.0879)	(0.109)
junior	0.334	0.0173	0.0524	0.0759	-0.00566	0.0949
	(0.709)	(0.0312)	(0.117)	(0.266)	(0.0898)	(0.112)
senior	1.025*	0.0474*	0.165*	0.000711	0.0900	0.179*
	(0.601)	(0.0264)	(0.0989)	(0.225)	(0.0761)	(0.0946)
gpa2	0.0361	0.00257	-0.0155	0.190	-0.0176	0.0963
	(0.579)	(0.0254)	(0.0953)	(0.217)	(0.0734)	(0.0912)
gpa3	1.001	0.0421	0.177	-0.222	0.0411	-0.0691
	(0.665)	(0.0292)	(0.110)	(0.249)	(0.0843)	(0.105)
gpa4	0.0680	0.00279	0.0296	-0.00783	-0.0672	-0.0861
	(0.812)	(0.0357)	(0.134)	(0.304)	(0.103)	(0.128)
gpa5	-0.548	-0.0211	-0.139	-0.00179	0.0960	-0.156
	(0.968)	(0.0426)	(0.159)	(0.363)	(0.123)	(0.153)
gpa6	9.532***	0.420***	-0.648	0.185	-0.298	-0.493
	(3.461)	(0.152)	(0.570)	(1.297)	(0.439)	(0.545)
arts_humanities	0.352	0.0126	0.0304	0.368	-0.0571	0.154
	(0.866)	(0.0381)	(0.143)	(0.325)	(0.110)	(0.136)
natsci	-0.440	-0.0239	0.100	0.156	-0.00265	0.0261
	(0.628)	(0.0276)	(0.103)	(0.235)	(0.0796)	(0.0990)
engineer	2.004	0.0912	0.314	0.157	-0.156	-0.0177
	(1.312)	(0.0577)	(0.216)	(0.492)	(0.166)	(0.207)
mismaj	-1.132	-0.0509	-0.157	0.251	-0.240	-0.179
	(1.627)	(0.0715)	(0.268)	(0.610)	(0.206)	(0.256)
major2	-0.112	-0.00573	0.00756	-0.0150	-0.0223	-0.00725
	(0.453)	(0.0199)	(0.0747)	(0.170)	(0.0574)	(0.0714)

lss	0.0734	0.00425	0.118	0.268	-0.0497	0.0913
	(0.596)	(0.0262)	(0.0982)	(0.224)	(0.0756)	(0.0939)
extra	0.490	0.0247	0.0437	-0.264	0.0979	-0.00436
	(0.662)	(0.0291)	(0.109)	(0.248)	(0.0839)	(0.104)
midwest	-0.607	-0.0300	-0.0817	0.337	0.110	0.347*
	(1.300)	(0.0571)	(0.214)	(0.487)	(0.165)	(0.205)
south	0.366	0.0154	0.123	0.473	0.159	0.385**
	(1.152)	(0.0506)	(0.190)	(0.432)	(0.146)	(0.181)
west	-0.671	-0.0291	-0.154	0.196	0.0957	0.173
	(0.875)	(0.0385)	(0.144)	(0.328)	(0.111)	(0.138)
intl	1.174	0.0476	0.282	0.702	-0.167	0.447*
	(1.475)	(0.0648)	(0.243)	(0.553)	(0.187)	(0.232)
misreg	-0.0303	-0.00447	0.0220	0.246	0.0680	0.248*
	(0.933)	(0.0410)	(0.154)	(0.350)	(0.118)	(0.147)
mba	0.486	0.0218	0.0813	-0.0562	0.0802	-0.0758
	(0.741)	(0.0326)	(0.122)	(0.278)	(0.0939)	(0.117)
mgtba	0.0787	0.00261	0.0104	-0.112	0.118	-0.154
	(0.776)	(0.0341)	(0.128)	(0.291)	(0.0984)	(0.122)
dba	0.478	0.0208	0.0457	-0.0745	0.0199	-0.00316
	(0.909)	(0.0400)	(0.150)	(0.341)	(0.115)	(0.143)
dgtba	0.208	0.00776	-0.0254	-0.137	-0.0157	0.0457
	(0.914)	(0.0402)	(0.151)	(0.343)	(0.116)	(0.144)
married13	-0.995	-0.0454	-0.00117	-0.312	0.0374	-0.104
	(0.696)	(0.0306)	(0.115)	(0.261)	(0.0882)	(0.110)
mwork13	-0.408	-0.0177	0.0176	0.298	-0.0604	0.00239
	(0.521)	(0.0229)	(0.0858)	(0.195)	(0.0660)	(0.0821)
dwork13	-1.358	-0.0480	-0.114	-0.290	-0.268	-0.501**
	(1.319)	(0.0580)	(0.217)	(0.495)	(0.167)	(0.208)
hsathlete	0.479	0.0193	0.000205	0.118	0.0336	0.0964
	(0.637)	(0.0280)	(0.105)	(0.239)	(0.0807)	(0.100)
cmsathlete	-0.464	-0.0223	-0.00765	0.257	-0.0120	0.137
	(0.542)	(0.0238)	(0.0893)	(0.203)	(0.0687)	(0.0855)
trainer1	1.390	0.0571	0.137	-0.609*	0.148	-0.297*
	(0.957)	(0.0421)	(0.158)	(0.359)	(0.121)	(0.151)
class1	0.589	0.0295	-0.0312	-0.0592	-0.0569	-0.00399
	(0.498)	(0.0219)	(0.0821)	(0.187)	(0.0632)	(0.0785)
goals1	-0.820*	-0.0387*	-0.0798	0.106	-0.0104	-0.0229
	(0.481)	(0.0211)	(0.0792)	(0.180)	(0.0610)	(0.0758)
wo1_12	-0.125	-0.00312	-0.00737	0.0610	-0.188*	-0.165
	(0.781)	(0.0343)	(0.129)	(0.293)	(0.0990)	(0.123)
wo1_34	0.0643	0.00345	0.0852	0.125	-0.141	-0.175
	(0.776)	(0.0341)	(0.128)	(0.291)	(0.0983)	(0.122)
wo1_56	0.00412	0.00246	0.0288	0.392	-0.142	0.0589
	(0.785)	(0.0345)	(0.129)	(0.294)	(0.0994)	(0.124)
wo1_7p	0.197	0.0142	0.00595	0.558	-0.294**	0.152

	(1.002)	(0.0441)	(0.165)	(0.376)	(0.127)	(0.158)
d1good	-0.443	-0.0164	-0.169*	0.780***	-0.351***	-0.0151
	(0.592)	(0.0260)	(0.0975)	(0.222)	(0.0750)	(0.0933)
d1vgood	-0.901	-0.0373	-0.232**	0.992***	-0.324***	0.110
	(0.607)	(0.0267)	(0.0999)	(0.227)	(0.0769)	(0.0956)
d1excel	-0.380	-0.0157	0.0420	1.256***	-0.266**	0.344**
	(0.854)	(0.0375)	(0.141)	(0.320)	(0.108)	(0.135)
Constant	21.42***	3.051***	-0.141	3.176***	0.484	0.600
	(2.375)	(0.104)	(0.391)	(0.890)	(0.301)	(0.374)
Observations	166	166	166	166	166	166
R-squared	0.377	0.383	0.293	0.473	0.454	0.418

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE A4

Determinants of Overall Self-Reported Health 6 months ago

Independent Variables	**Self-Reported health (1)**	**Poor Reported Health (2)**	**Excellent Reported Health (3)**
black	-0.385	0.275*	-0.0496
	(0.549)	(0.164)	(0.264)
hispanic	-0.565*	0.0674	-0.172
	(0.295)	(0.0885)	(0.142)
asian	-0.508**	0.143*	-0.0872
	(0.244)	(0.0731)	(0.118)
othrace	0.0355	0.0351	-0.0564
	(0.245)	(0.0733)	(0.118)
citizen	-0.193	-0.0583	-0.141
	(0.293)	(0.0878)	(0.141)
sophomore	0.182	-0.135**	-0.0268
	(0.221)	(0.0663)	(0.107)
junior	0.137	-0.0552	0.0645
	(0.236)	(0.0707)	(0.114)
senior	0.218	-0.0308	0.201**
	(0.203)	(0.0607)	(0.0977)
gpa2	0.246	0.0127	0.127
	(0.187)	(0.0560)	(0.0900)
gpa3	-0.393*	0.117*	-0.102
	(0.221)	(0.0662)	(0.107)
gpa4	0.0236	-0.0140	-0.0174
	(0.267)	(0.0800)	(0.129)

gpa5	-0.760**	0.171*	-0.260*
	(0.312)	(0.0934)	(0.150)
gpa6	1.882*	-0.503	-0.0644
	(1.110)	(0.332)	(0.535)
arts_humanities	-0.0393	0.223***	0.245*
	(0.283)	(0.0847)	(0.136)
natsci	0.0115	0.0394	-0.000579
	(0.200)	(0.0598)	(0.0961)
engineer	-0.156	-0.0240	-0.0939
	(0.407)	(0.122)	(0.196)
mismaj	-0.428	-0.104	-0.265
	(0.542)	(0.162)	(0.261)
major2	-0.118	-0.0393	-0.137*
	(0.151)	(0.0452)	(0.0727)
lss	-0.00951	0.0128	0.0242
	(0.186)	(0.0559)	(0.0898)
extra	0.0155	-0.01000	0.113
	(0.226)	(0.0677)	(0.109)
midwest	0.652	-0.0157	0.561***
	(0.426)	(0.127)	(0.205)
south	0.710*	0.00878	0.370**
	(0.376)	(0.113)	(0.181)
west	0.512*	0.0338	0.351**
	(0.286)	(0.0856)	(0.138)
intl	1.199**	-0.237	0.724***
	(0.487)	(0.146)	(0.235)
misreg	0.412	0.0376	0.403***
	(0.303)	(0.0907)	(0.146)
mba	0.101	-0.0171	-0.00699
	(0.252)	(0.0755)	(0.121)
mgtba	-0.0444	0.0125	-0.0349
	(0.270)	(0.0807)	(0.130)
dba	-0.318	0.00481	-0.0388
	(0.291)	(0.0871)	(0.140)
dgtba	-0.381	0.0570	-0.0227
	(0.294)	(0.0880)	(0.142)
married13	0.00133	-0.0546	-0.216**
	(0.226)	(0.0676)	(0.109)
mwork13	0.358**	-0.118**	0.0922
	(0.168)	(0.0502)	(0.0808)
dwork13	0.698*	-0.364***	-0.198
	(0.412)	(0.123)	(0.198)
hsathlete	0.163	-0.0365	0.0555
	(0.203)	(0.0608)	(0.0978)
cmsathlete	0.451**	0.00531	0.281***

	(0.188)	(0.0564)	(0.0907)
trainer6	-0.245	-0.0745	-0.189*
	(0.230)	(0.0690)	(0.111)
class6	0.00444	0.0605	0.0882
	(0.156)	(0.0468)	(0.0752)
goals6	0.206	0.0175	0.0953
	(0.157)	(0.0469)	(0.0754)
wo6_12	-0.0170	-0.182**	-0.242*
	(0.277)	(0.0829)	(0.133)
wo6_34	0.0436	-0.189**	-0.203
	(0.265)	(0.0793)	(0.127)
wo6_56	0.634**	-0.166**	0.137
	(0.261)	(0.0782)	(0.126)
wo6_7p	0.327	-0.147	0.0685
	(0.327)	(0.0978)	(0.157)
d6good	0.251	-0.0982	-0.0451
	(0.205)	(0.0615)	(0.0990)
d6vgood	0.771***	-0.147**	0.153
	(0.203)	(0.0607)	(0.0977)
d6excel	1.068***	-0.102	0.433***
	(0.296)	(0.0886)	(0.143)
Constant	1.691**	0.774***	-0.0234
	(0.804)	(0.241)	(0.387)
Observations	166	166	166
R-squared	0.558	0.419	0.521

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

TABLE A5

Determinants of Overall Self-Reported Health 12 months ago

Independent Variables	**Self-Reported health (1)**	**Poor Reported Health (2)**	**Excellent Reported Health (3)**
black	-0.0552	0.0534	0.00267
	(0.563)	(0.147)	(0.304)
hispanic	0.161	-0.153*	0.133
	(0.301)	(0.0783)	(0.162)
asian	-0.246	0.0760	-0.0109
	(0.251)	(0.0652)	(0.135)
othrace	0.0872	-0.00817	-0.0458
	(0.243)	(0.0633)	(0.131)

citizen	0.375	-0.0951	0.0290
	(0.300)	(0.0780)	(0.162)
sophomore	0.0453	-0.109*	-0.0563
	(0.228)	(0.0594)	(0.123)
junior	0.0677	-0.0824	-0.0189
	(0.238)	(0.0620)	(0.129)
senior	0.122	-0.0938*	0.0343
	(0.202)	(0.0525)	(0.109)
gpa2	0.0387	0.0277	0.00995
	(0.190)	(0.0494)	(0.102)
gpa3	-0.273	0.102*	-0.0413
	(0.220)	(0.0572)	(0.119)
gpa4	-0.208	0.0856	0.00434
	(0.264)	(0.0687)	(0.142)
gpa5	-0.568*	0.0849	-0.212
	(0.319)	(0.0829)	(0.172)
gpa6	-0.387	0.179	-0.570
	(1.118)	(0.291)	(0.604)
arts_humanities	0.0458	0.103	0.234
	(0.282)	(0.0734)	(0.152)
natsci	-0.178	0.0412	-0.0397
	(0.201)	(0.0522)	(0.108)
engineer	0.0805	0.0186	-0.0726
	(0.417)	(0.109)	(0.225)
mismaj	-0.303	-0.0381	-0.0603
	(0.546)	(0.142)	(0.295)
major2	0.0180	0.00650	0.0717
	(0.151)	(0.0394)	(0.0817)
lss	-0.0890	0.00437	-0.0138
	(0.186)	(0.0484)	(0.100)
extra	-0.0331	0.00859	0.0467
	(0.222)	(0.0579)	(0.120)
midwest	0.686	0.105	0.564**
	(0.437)	(0.114)	(0.236)
south	0.282	0.236**	0.184
	(0.382)	(0.0995)	(0.206)
west	0.665**	0.0482	0.305*
	(0.294)	(0.0764)	(0.159)
intl	1.198**	-0.0436	0.572**
	(0.516)	(0.134)	(0.278)
misreg	0.653**	0.0407	0.333*
	(0.316)	(0.0822)	(0.170)
mba	0.141	0.0235	0.0779
	(0.251)	(0.0652)	(0.135)
mgtba	-0.154	0.0589	-0.0509

	(0.263)	(0.0685)	(0.142)
dba	-0.396	0.00747	-0.224
	(0.307)	(0.0799)	(0.166)
dgtba	-0.169	0.0239	-0.113
	(0.311)	(0.0810)	(0.168)
married13	-0.240	-0.0553	-0.210*
	(0.230)	(0.0599)	(0.124)
mwork13	0.0911	-0.0405	-0.00444
	(0.169)	(0.0439)	(0.0910)
dwork13	0.181	0.00949	-0.0935
	(0.423)	(0.110)	(0.228)
hsathlete	0.459**	-0.0944*	0.167
	(0.208)	(0.0542)	(0.113)
cmsathlete	0.233	0.0708	0.197**
	(0.181)	(0.0472)	(0.0979)
trainer12	0.0386	-0.0707	-0.0885
	(0.177)	(0.0462)	(0.0958)
class12	0.0359	-0.0189	-0.0189
	(0.156)	(0.0406)	(0.0842)
goals12	0.0780	0.00459	0.0695
	(0.144)	(0.0374)	(0.0777)
wo12_12	-0.283	0.0417	-0.189
	(0.302)	(0.0786)	(0.163)
wo12_34	-0.108	-0.0108	-0.0986
	(0.282)	(0.0734)	(0.152)
wo12_56	0.239	-0.000267	0.0658
	(0.286)	(0.0744)	(0.154)
wo12_7p	0.462	-0.0564	0.257
	(0.351)	(0.0914)	(0.190)
d12good	0.357*	-0.193***	0.0708
	(0.198)	(0.0516)	(0.107)
d12vgood	0.511**	-0.218***	0.129
	(0.213)	(0.0555)	(0.115)
d12excel	0.884***	-0.180**	0.449***
	(0.297)	(0.0774)	(0.161)
Constant	2.310***	0.313	0.0240
	(0.813)	(0.212)	(0.439)
Observations	166	166	166
R-squared	0.480	0.408	0.399

Standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

TABLE A6
Variable Definitions

DEPENDENTS (Y)	BMI	Measured by respondents weight in kilograms divided by respondents height in meters squared
	LOG BMI	The log of respondents calculated BMI level
	OVERWEIGHT	=1 if respondents' BMI is $\geq$ 25 and 0 otherwise
	HEIGHT	Respondents height converted into meters
	WEIGHT	Respondents weight converted into kilograms
	HSELF_RATED	Respondents' health measured on a five point scale (i.e., poor, fair, good, very good, excellent) in the past 12 months/ 6 months/ past week
	POOR_HEALTH	=1 if respondent indicated poor/ fair health in the past 12 months/ 6 months/ past week
	EXCELLENT_HEALTH	=1 if respondent indicated excellent health in the past 12 months/ 6 months/ past week
DESCRIPTIVE	MALE	=1 if male and 0 if female
	BLK	=1 if African American and 0 otherwise
	HISP	=1 if Hispanic/Latino/Chicano and 0 otherwise
	NAT	=1 if Native American and 0 otherwise
	ASN	=1 if Asian or Pacific Islander and 0 otherwise
	HSATHLETE	=1 if HS Varsity athlete and 0 if non HS Varsity athlete
	CMSATHLETE	=1 if CMS Varsity athlete and 0 if non CMS Varsity athlete
	PAST_CMSATHLETE	=1 if former CMS Varsity athlete and 0 if non former CMS Varsity athlete
	MARRIED13	=1 if respondents parents were married (when <13 years old) and 0 otherwise

EDUCATION	FRESH	=1 if freshman and 0 otherwise
	SOPH	=1 if sophomore and 0 otherwise
	JUNIOR	=1 if junior and 0 otherwise
	GPA	Respondents average GPA on 12 point scale
	LSS	=1 if Leadership Studies Sequence student and 0 if non Leadership Studies Sequence student
	ARTS_HUMANITIES	=1 if students first major is in Philosophy, History, French, Media Studies, Spanish, Philosophy and Public Affairs, Literature and 0 otherwise
	NATSCI	=1 if students first major is in Chemistry, Neuroscience, Science and Management, Biophysics, Biochemistry, Biology, Physics, Molecular Biology, Organismal Biology and 0 otherwise
	ENGINEER	=1 if students first major is in Mathematical Sciences, Environmental Analysis Program, Management- Engineering, Economics and Engineering and 0 otherwise
	MISMAJ	=1 if student does not record his/her major
	MAJOR2	=1 if student has a second major and 0 otherwise
	EXTRA	=1 if student participants in extracurricular activities and 0 if student does not participate in extracurricular activities
	MLTBA	=1 if respondents mother's highest level of education: less than high school level, high school degree and/or some college/vocational and 0 otherwise [4]
	MGTBA	=1 if respondents mother's highest level of education: Master's degree, Professional degree and/or Doctoral degree and 0 otherwise
	DLTBA	=1 if respondents father's highest level of education: less than high school level, high school degree and/or some college/vocational and 0 otherwise
	DGTBA	=1 if respondents father's highest level of education: Master's degree, Professional degree and/or Doctoral degree and 0

[4] For parental education, I assume blank responses to take on the average of what respondents indicated to be the highest education level received by either the mother or father, which in this case is a Bachelor's Degree.

		otherwise
WORK STATUS	DWORKCHILD	=1 if self-employed or employee work status of respondents father when < 13 years of age and 0 otherwise
	MWORKCHILD	=1 if self-employed or employee work status of respondents mother when < 13 years of age and 0 otherwise
	MWORK13	=1 if self-employed or employee work status of respondents mother and 0 otherwise
	DWORK13	=1 if self-employed or employee work status of respondents father and 0 otherwise
GEOGRAPHIC	NOCITIZEN	=1 if non US citizen and 0 if US citizen
	CITIZENNAT	=1 if naturalized citizen and 0 if non naturalized citizen
	MIDWEST	=1 if respondent is from the Midwest region
	SOUTH	=1 if respondent is from the South region
	WEST	=1 if respondent is from the West region
	INTL	=1 if respondent is from anywhere outside of the United States

FITTECH (X)	MOBILE12	=1 if respondent downloaded a mobile fitness/health app within the past 12 months
	MOBILE6	=1 if respondent downloaded a mobile fitness/health app within the past 6 months
	MOBILE1	=1 if respondent downloaded a mobile fitness/health app within the past week
	MMOBILE12	Interaction variable of male respondents who downloaded mobile fitness/ health apps within the past 12 months
	MMOBILE6	Interaction variable of male respondents who downloaded mobile fitness/ health apps within the past 6 months
	MMOBILE1	Interaction variable of male respondents who downloaded mobile fitness/ health apps within the past week
	MPHYACT	=1 if respondents main reason for using mobile is monitoring level of physical activity and 0 otherwise
	MFITACT	=1 if respondents main reason for using mobile is monitoring goal progress
	MWGT	=1 if respondents main reason for using mobile is monitoring weight gain/loss

	WEAR12	=1 if respondent used a wearable tech within the past 12 months
	WEAR6	=1 if respondent used a wearable tech within the past 6 months
	WEAR1	=1 if respondent used a wearable tech within the past week
	WPHYACT	=1 if respondents main reason for using wearable tech is monitoring level of physical activity and 0 otherwise
	WFITACT	=1 if respondents main reason for using wearable tech is monitoring goal progress
	WWGT	=1 if respondents main reason for using wearable tech is monitoring weight gain/loss

FITNESS (X)	WORKOUT	Respondents' workout frequency in a typical week on a five point scale (i.e., 0, 1-2, 3-4, 5-6, 7+) in the past 12 months/ 6 months/ past week
	WO_12	=1 if respondent worked out 1-2 times in a typical week
	WO_34	=1 if respondent worked out 3-4 times in a typical week
	WO_56	=1 if respondent worked out 5-6 times in a typical week
	WO_7p	=1 if respondent worked out 7+ times in a typical week
	GOALS	=1 if respondent set fitness/health directed goals and 0 otherwise in the past 12 months/ 6 months/ past week
	CLASS	=1 if respondent participates in organized workout classes and 0 otherwise in the past 12 months/ 6 months/ past week
	TRAINER	=1 if respondent uses a personal trainer and 0 otherwise in the past 12 months/ 6 months/ past week

DIET (X)	DIET	Respondents' dietary choices measured on a five point scale (i.e., poor, fair, good, very good, excellent) in the past 12 months/ 6 months/ past week
	DGOOD	= 1 if respondent rated their dietary choices in a typical week as good

	DVGOOD	= 1 if respondent rated their dietary choices in a typical week as very good
	DEXCEL	= 1 if respondent rated their dietary choices in a typical week as excellent

TABLE A7
Complete Survey Instrument

Letter of Consent,
Dear Claremont McKenna Students,

As a senior at Claremont McKenna College researching fitness technology and health outcomes, I am interested in learning how current Claremont McKenna College undergraduate students are using such technology in their everyday lives. I am dedicated to conducting quantitative academic research in the area.

The following questions will take approximately 5-10 minutes to complete. As you complete the survey, you will be asked questions regarding your health, diet, and fitness activity. If you do not want to respond for any reason, you can easily stop at any time or leave any question unanswered. All responses will be kept confidential and any identifying information will be removed from the data immediately upon receipt. In addition, any potentially identifying information will be excluded from all future publications, reports, and presentations.

I appreciate you completing the survey in its entirety, as your participation will bring insight into this important issue.

Thank you in advance for your participation!
Sincerely,
Megan Kelley

Do you wish to continue with this survey?
- ❍ Yes
- ❍ No

What is your gender?
- ❍ Male
- ❍ Female

What is your class year?
- ❍ Freshman
- ❍ Sophomore
- ❍ Junior
- ❍ Senior

Select your major(s)

Major 1	▼
Major 2	▼

Are you planning on completing the leadership sequence?
- ❍ Yes
- ❍ No

What is your average GPA?
- ❍ 11.28- 12.00
- ❍ 10.53- 11.25
- ❍ 9.78- 10.5
- ❍ 9.03- 9.75
- ❍ 7.53- 9.00
- ❍ 7.50 or below

Are you involved in any extracurricular activities on campus?
- ❍ Yes
- ❍ No

What extracurricular activities on campus are you involved in?

What is your race/ ethnicity (please check all that apply)?
- ❑ White
- ❑ Black/African American
- ❑ Native American
- ❑ Asian or Pacific Islander
- ❑ Hispanic/Latino/Chicano

What is your citizenship status?
- ❍ U.S. Citizen, native born
- ❍ U.S. Citizen, naturalized
- ❍ Not a U.S. Citizen

What is your place of birth?
- ❑ City/Town ____________________
- ❑ State/Province ____________________
- ❑ Country ____________________

Please provide your current home address information below
- ❑ City/Town ____________________
- ❑ State/Province ____________________
- ❑ Zip/Postal Code ____________________
- ❑ Country ____________________

What is the highest level of education that your parents completed?

	Less than High School	High School Degree	Some College/ Vocational	Bachelor's Degree	Master's Degree	Professional Degree	Doctoral Degree
Mother	❍	❍	❍	❍	❍	❍	❍
Father	❍	❍	❍	❍	❍	❍	❍

What was your parent's marital status when you were less than 13 years of age?
- ❍ Married
- ❍ Widowed
- ❍ Divorced
- ❍ Separated
- ❍ Never married

Did your parents work for pay or profits when you were less than 13 years of age?

	Yes	No
Mother	❍	❍
Father	❍	❍

Do your parents currently work for pay or profits?

	Yes	No
Mother	❍	❍
Father	❍	❍

Did you ever participate in a varsity sport in high school?
- ❍ Yes
- ❍ No

What varsity sport(s) did you participate in?

Are you currently a student athlete at CMC?
- ❍ Yes
- ❍ No

What sport(s) do you participate in at CMC?

Are you a former student athlete at CMC?
- ❍ Yes
- ❍ No

What sport(s) did you participate in at CMC?

In general, how would you rate your health?

	Poor	Fair	Good	Very Good	Excellent
12 months ago	❍	❍	❍	❍	❍
6 months ago	❍	❍	❍	❍	❍
1 week ago	❍	❍	❍	❍	❍

Would you like to improve your current health?
- ❍ Yes
- ❍ No

How would you like to improve your current health?
- ❍ Eating healthier
- ❍ Exercising more
- ❍ Visiting the doctor more if sick
- ❍ Other ____________________

How many times did you visit the doctor?

	0	1- 2	3- 4	5- 6	7+
In the past 12 months	❍	❍	❍	❍	❍
In the past 6 months	❍	❍	❍	❍	❍
In the past week	❍	❍	❍	❍	❍

On average, how many times did you miss class because you were sick?

	0	1- 2	3- 4	5- 6	7+
In the past 12 months	❍	❍	❍	❍	❍
In the past 6 months	❍	❍	❍	❍	❍
In the past week	❍	❍	❍	❍	❍

How would you have rated your dietary choices in a typical week?

	Poor	Fair	Good	Very Good	Excellent
12 months ago	❍	❍	❍	❍	❍
6 months ago	❍	❍	❍	❍	❍
1 week ago	❍	❍	❍	❍	❍

Are you currently trying to
- ❍ Lose weight
- ❍ Gain weight
- ❍ Stay the same weight

How tall are you?
_______ Feet
_______ Inches

How much do you weigh?
_______ Lbs

How many times did you work out in a typical week?

	0	1- 2	3- 4	5- 6	7+
12 months ago	❍	❍	❍	❍	❍
6 months ago	❍	❍	❍	❍	❍
1 week ago	❍	❍	❍	❍	❍

Did you set any goals that were directed at improving your fitness/ health?

	Yes	No
12 months ago	❍	❍
6 months ago	❍	❍
1 week ago	❍	❍

Have you participated in an organized workout class?

	Yes	No
In the past 12 months	❍	❍
In the past 6 months	❍	❍
In the past week	❍	❍

In a typical week, how many times did you participate in the workout class?

	0	1- 2	3- 4	5- 6	7+
12 months ago	❍	❍	❍	❍	❍
6 months ago	❍	❍	❍	❍	❍
1 week ago	❍	❍	❍	❍	❍

Have you used a personal trainer?

	Yes	No
In the past 12 months	❍	❍
In the past 6 months	❍	❍
In the past week	❍	❍

In a typical week, how many times did you visit your personal trainer?

	0	1- 2	3- 4	5- 6	7+
12 months ago	❍	❍	❍	❍	❍
6 months ago	❍	❍	❍	❍	❍
1 week ago	❍	❍	❍	❍	❍

Did you download a mobile fitness/health app(s) (for example, Ultra Fitness, MyFitnessPal, Calorie Counter, Sleep Cycle, and RunKeeper)?

	Yes	No
In the past 12 months	❍	❍
In the past 6 months	❍	❍
In the past week	❍	❍

Which mobile fitness/health app(s) did you download?

	In the past 12 months	In the past 6 months	In the past week
Fitness and Strength (Ultra Fitness, Gym Pact, Gym Hero)	❑	❑	❑
Tracking and Analytics (MyFitnessPal, Strava, Nike Training Club)	❑	❑	❑
Food and Nutrition (Calorie Counter, Fooducate, LoseIt)	❑	❑	❑
Relaxation and Meditation (Sleep Cycle, Sleep Cycle Alarm Clock, Calm)	❑	❑	❑
Running and Cardio (RunKeeper, MapMyRun, Nike + Running)	❑	❑	❑
Other	❑	❑	❑

How many times did you use the app(s)?

	0	1- 2	3- 4	5- 6	7+
In the past 12 months	❍	❍	❍	❍	❍
In the past 6 months	❍	❍	❍	❍	❍
In the past week	❍	❍	❍	❍	❍

What was your main reason for using your mobile fitness/health app(s)?

	Motivation	Monitoring level of physical activity	Monitoring fitness goal activity	Monitoring weight gain/loss
12 months ago	❍	❍	❍	❍
6 months ago	❍	❍	❍	❍
1 week ago	❍	❍	❍	❍

Did you own a piece(s) of wellness technology (for example, Fitbit, Jawbone UP, and Nike + Fuelband)?

	Yes	No
In the past 12 months	❍	❍
In the past 6 months	❍	❍
In the past week	❍	❍

Which piece(s) of wellness technology did you use?

	In the past 12 months	In the past 6 months	In the past week
Fitbit Flex	❑	❑	❑
Jawbone UP	❑	❑	❑
Nike + Fuelband	❑	❑	❑
Misfit Shine	❑	❑	❑
BodyMedia	❑	❑	❑
Other	❑	❑	❑

How many times did you use the wellness technology device(s)?

	0	1- 2	3- 4	5- 6	7+
In the past 12 months	❍	❍	❍	❍	❍
In the past 6 months	❍	❍	❍	❍	❍
In the past week	❍	❍	❍	❍	❍

What was your main reason for using your wellness technology device(s)?

	Motivation	Monitoring level of physical activity	Monitoring fitness goal progress	Monitoring weight gain/loss
12 months ago	❍	❍	❍	❍
6 months ago	❍	❍	❍	❍
1 week ago	❍	❍	❍	❍

You have reached the end of the survey. Thank you! Please submit this survey by clicking the "Finish" button now. If you have any questions or concerns please email me at mkelley14@cmc.edu.

❍ Finished