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2013

MOBILE HEALTH TECHNOLOGY AND
HEALTH BEHAVIOR: A LOOK INTO THE
WORKPLACE SETTING

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MOBILE HEALTH TECHNOLOGY AND HEALTH BEHAVIOR:
A LOOK INTO THE WORKPLACE SETTING

THESIS

A thesis submitted in partial fulfillment of the requirements
for the degree Master of Science in the College of Agriculture
at the University of Kentucky

By Rachel C. Bolin

Lexington, Kentucky

Director: Dr. Kang Namkoong, Professor of Community and Leadership Development

Lexington, Kentucky

2013

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ABSTRACT OF THESIS

MOBILE HEALTH TECHNOLOGY AND HEALTH BEHAVIOR: A LOOK INTO THE WORKPLACE SETTING

Obesity is a widespread topic across the country as healthcare costs continue to rise. The field of health communication encompasses many efforts made by scholars and those working in health education and promotion to help individuals live healthier lives. As technology continues to evolve, e-health and mobile health programs are being explored as creative avenues for this endeavor. This study takes a mixed methods approach consisting of an experiment and a series of in-depth interviews. Based on the Theory of Planned Behavior, the experiment examines the effects of a popular mobile phone application, “my fitness pal,” on the users’ attitude, subjective norms and perceived behavioral control of health behaviors. The interviews investigate how and why the mobile application has health benefits. There were 35 University of Kentucky employees who participated, and then a few follow-up interviews were conducted. Although, several hypotheses were not supported by the data, the results show there was an increase in the overall health statuses of participants encouraged to interact with co-workers about the mobile application through social media as well as face-to-face communication. Several applications can be taken from this study in order to improve future mobile health applications and workplace health and wellness programs.

KEYWORDS: Health behavior, *My fitness pal*, Workplace health and wellness, Mobile technology, Theory of planned behavior

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MOBILE HEALTH TECHNOLOGY AND HEALTH
BEHAVIOR: A LOOK INTO THE WORKPLACE SETTING

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CHAPTER ONE: INTRODUCTION

Problem Statement/Background

Communication as we know it is constantly changing. It seems the communication channels that were popular ten years ago have been modified by the internet revolution, “Web 2.0”, computer-mediated technology, social media, etc. No matter what the exact “new age” term is today, the bottom line is communication has been revamped by the continuous growth of technology. According to the Pew Internet and American Life Project August 2011 survey, “78% of American adults use the internet,” compared to 61% just ten years prior (“Trend data: Internet,” 2012). Many businesses and communication campaign designers really have become more creative as far as what communication channel best fits their message. Particularly, when looking at health communication messages, Noar and Harrington (2012) state, new technologies; for instance, internet and mobile devices, are “opening up new doors for innovative health communication efforts” and providing a “wealth of opportunities for health promotion and disease prevention” (p. xvii). It is to no one’s surprise that we are living in a sedentary society, one facing major health risks and dangerous diseases. It is essential through research to gain further understanding and knowledge about health promotion in order to produce more successful health outcomes.

“Obesity and overweight account for nearly one of every 10 American deaths,” and it contributes to \$223 billion in health care costs each year (“Obesity in America,” 2012, p. 5). This alone places human lives and our economy at dangerous risk. “In less than 40 years, the prevalence of obesity in the U.S. has increased by over 50%, so that two of every three American adults are now overweight or obese” (“Obesity in America,”

2012, p. 5). These are just a few of the startling statistics that provoke direct need for health communication and education. Special health communication programs have the potential to be an excellent tool in facing the obesity epidemic.

Purpose of the Study

It is my goal in this study to extend e-health one step further and investigate the benefits of a specific mobile health application, “my fitness pal,” along with the impact it may have on an individual’s health behavior: “Nearly half of American adults are Smartphone owners,” according to the Pew Internet and American Life Project (Smith, 2012). Prior to this study, I had heard of people using their smartphones to track calories or record the mileage of their runs, which initiated my interest and idea about studying not just e-health communication in general, but mobile health communication. I saw a television commercial last summer that was aired by Verizon Wireless promoting their new 4G LTE. The basic premise of the commercial was a father wanting to lose weight for his daughter’s wedding, and by using his new mobile and tablet devices, he could track his calories, view exercise videos, and become motivated by the social support from his family and friends via Skype capabilities. In the end, the father reached his goal thanks to his Verizon device. Additionally, this type of approach has become a trend as seen in commercial weight loss programs like Jenny Craig and Weight Watchers (Tufano & Karras, 2005). Food diaries and social support through technology have increased in popularity and promotion even since I began researching and preparing for this study about two years ago.

While I will be looking at mobile health technology usage and perception, I will target a specific population in this study as well. Since I was an employee at the

University of Kentucky (UK) for the past three years, I would receive promotion and reminder e-mails and mailings to participate in UK Health and Wellness programs on campus. As I thought more about this concept, I figured there was a lot more to this subject than I originally had thought. This was an entire department dedicated to making UK employees (about 12,000) live healthier lives. According to Astrup, McGovern, and Kochevar (1992), “Americans spend one-third of their average day at the workplace” (p. 42). I feel it is important for this reason alone to continue to expand e-health communication research involving workplace wellness. I want to build upon this idea of workplace wellness by utilizing feedback and results from my study as insight on how to create successful health programs in this type of community. Also, I intended to see if these types of programs using mobile technology are actually valuable.

You will find in the review of literature how scholars are turning to health communication efforts for innovative ways to encourage and help people make healthier decisions. Noar and Harrington (2012) explained similar goals in their chapter regarding computer-tailored interventions (CTIs): “The more we learn about what makes effective CTIs, the better able we will be to build more successful CTIs in the future that maximize our ability to positively affect health behavior change and ultimately improve health outcomes” (p. 142). Through research, I found a well-suit theory to help guide my study and the questions I will ask participants, the Theory of Planned Behavior. I was fascinated because of its emphasis on the causes and intentions of behavior change.

As discussed, obesity is a serious and ongoing problem, especially in this nation. All in all, the purpose of this study is to fill a gap in previous health communication research, adding to the knowledge and understanding of how mobile health technology

effects health behavior. The workplace wellness environment will also play a role in this study to see how useful and motivating the support of co-workers is in regard to health behavior in this setting. Assessment from this population will be beneficial so hopefully more successful programs will be created in the future.

Organization of Thesis

The next chapter presents the current research on e-health communication, workplace health and wellness, social support, and mobile technology and health behavior. In addition, more information will be provided on the theoretical framework of this study. Then, the methodology, results, and discussion will follow.

CHAPTER TWO: LITERATURE REVIEW AND THEORETICAL FRAMEWORK

A thorough literature review is conducted in order to gain a better understanding of the current discussion in research about mobile health communication and workplace health and wellness programs. Several themes have been determined and are discussed within this section, which provide insight into the ways my particular study can extend the literature by potentially determining the most valuable factors of a mobile health application and how it impacts an individual's health behavior.

E-health Communication

Since its inception in the late 1980s, eHealth communication has been thought to have great promise to improve upon traditional health communication through user-centered design and interactivity, broad social connectivity, deeper understanding of what motivates behavior change beyond "risk," and the use of multimodal media that expand people's access to health information and discourse across time, place, and cultures (Kreps & Neuhauser, 2010, p. 330).

Health communication has really come a long way, and through the development of technology and the internet, we are now able to refine and focus the approaches to establishing more healthy lifestyles in our society. E-health is a term that is commonly thrown around in this field, noted by Oh, Rizo, Enkin, and Jadad (2005) and Pagliari et al. (2005) "eHealth is now viewed as a field in and of itself, with much discussion regarding precisely how the term should be defined (as cited in Noar & Harrington, 2005, p. 8). As definitions vary across disciplines, the Office of Disease Prevention and Health Promotion (2006) define it as a "broad term for the heterogeneous and evolving digital resources and practices that support health and health care" (as cited in Noar &

Harrington, 2005, p. 9). I believe it is also important to note that now even mHealth has been coined a term, according to Akter, D'Ambra, and Ray (2011) "mHealth is defined as an application of wireless technologies to transmit and enable various data contents and information services, which are easily accessible by users through mobile devices such as mobile phones, smartphones, PDAs, laptops, and Tablet PCs" (p. 101).

E-health communication offers so many opportunities—people literally can have health information at their fingertips; it is easier to access and more convenient. There are many benefits to utilizing and building a program based on e-communication. One of the main differences between e-health and traditional health education is the cost. E-health provides a more affordable way to reach a larger number of people by utilizing technology. When specifically looking at health promotion, Kreps and Neuhauser (2010) said that traditional health messages are usually "one-way" and "downward focused," which could be unintentionally disempowering (p. 332). One of the largest draws to the e-health approach is the interactivity it can offer. E-health allows a person to engage in their health more than ever before.

Another benefit of e-health is its ability to tailor communication on a case-by-case basis. Kreps and Neuhauser (2010) stresses that this type of customization would have been unheard of in previous years. Health assessments are a common way health promotion programs can tailor messages based on a person's specific health risks and offer recommendations such as joining a fitness program, practicing stress management, good diet techniques, etc.

Overall, this topic has gained much popularity over recent years and according to Noar and Harrington (2012), "in many ways, the challenge for researchers and

practitioners is to advance an understanding of how we can best leverage eHealth application strengths for effective health promotion and disease prevention” (p. 13). It is important to develop clear ideas of which areas of applications may be beneficial to have the most impact on health behavior (Noar & Harrington, 2012).

Workplace Health and Wellness Programs

Not only are e-health programs becoming more popular among health educators, but health and wellness programs specifically within the workplace are growing topics of interest among organizations and corporations as well. Workplace health and wellness programs are by no means a brand new topic based on the articles that I read; for example, more than two decades ago, Gebhardt and Crump (1990), note the “exponential growth of worksite health promotion programs” (p. 262). These scholars explain three levels or types of fitness and wellness programs from O’ Donnell (1986): “Level I consists of awareness programs; Level II programs involve life-style modification by providing specific programs to help alter negative health habits; and Level III programs will hopefully create the environments to help sustain healthy lifestyles...” (as cited in Gebhardt & Crump, 1990, p. 263).

Health education can occur in many different settings, but the workplace seems to be a common environment to target because it includes a vast majority of our population—the working Americans. According to a study by Hewitt Associates in 2001, “93% of US companies are now offering health promotion and management programmes” (Kickbusch & Payne, 2003, p. 276). A nonprofit organization developed in the 1980s, the “Wellness Council of America (WELCOA),” has helped improve the health of working Americans and is considered a great example of workplace wellness

("WELCOA," 2012). Over 3,200 organizations have partnered with WELCOA committing to educating their employees about specific concerns and ideas like health care costs, health risks due to unhealthy living, and how workplace health programs can help transform the culture and the norms of an unhealthy corporate culture ("WELCOA," 2012).

Another reason why the workplace is a good community to focus health education efforts is money. Clark (2008) said, "Employers spend an additional \$226 billion a year on absenteeism, low productivity and other indirect costs of individual and family health problems..." (p. 23). Workplaces cannot afford to not act or at least consider the option of implementing and using resources to fund some type of health and wellness program.

As mentioned previously, a relative example and an integral part of my initial interest with this topic was the University of Kentucky (UK) Health and Wellness department; they offer a great number of activities and services to improve the health of UK employees. Employees are encouraged to utilize the technology that is already a natural part of their typical work day to better manage one's health decisions. I sat down and spoke with the UK Health and Wellness department's Senior Wellness Specialist for an informational interview to get an even better look behind the scenes of the department's history and what they offer. I found out that the department had been around since the 1990s, but it was not until the early 2000s, when the University President formed a task force to help control health care costs, that the programs really began to take off.

I found in my research that in order to increase participation in such programs offered by employers, various ideas such as competitions are used. For example, the

“Biggest Blue Loser” is a competition implemented through UK Health and Wellness comparable to the popular weight-loss reality show, *The Biggest Loser*. Monetary incentives are also used to help encourage employees to get involved in workplace health and wellness programs with hope that the investment will be returned by lowered health care costs and increased worker productivity.

In general, it has been found that these types of programs can make employees feel more valued; for example, there is a quote from Clark (2008) that says, “programs like this make me feel like my company truly cares about me and invests in my well-being; it makes me proud of where I work...” (p. 25). There is conflicting evidence about the outcomes of workplace wellness programs, so how can they be improved and better utilized?

Social Support and Social Media

A workplace health program can offer the opportunity to build a more health-conscious environment, one that motivates and encourages employees to live healthier lives. This type of support is emerging within the field of e-health communication. Braithwaite et al. (1999) state “that social support groups offer a holistic and cooperative approach to meeting cultural and social needs, resulting in a sense of empowerment” (as cited in White & Dorman, 2001, p. 693). The power of technology can offer a more beneficial arena known as online support. In 2001, White and Dorman explained that “very little is known about the emerging phenomenon of online social support” (p. 693). A well-known online support resource discussed in much health communication research is called CHESS (Comprehensive Health Enhancement Support System), for cancer and HIV/AIDS patients as well as their caregivers. According to Strecher (2007), the services

offered through CHES range from an “instant library and resource directory”, discussion groups with other patients or caregivers, “ask the expert” groups, and assessments (pp. 63-64). White and Dorman (2001) explained how researchers have found that specific CHES groups have experienced “fewer and shorter hospitalizations, spent less time at physician appointments because they felt better prepared and had more realistic expectations” (p. 697).

Now, more than ten years later, there has been advanced research conducted considering social support. In a study by Fukuoka et al. (2011) looking at mobile technology and improving health behavior, real-time peer social and professional support were common themes reported by participants. Participants valued a “virtual companion,” another person engaged in a health program in addition to traditional face-to-face social support. Mobile phones make this a more convenient task and an easier way to “connect to each other and share experiences, feelings, and obstacles” anytime throughout the day (Fukuoka et al., 2011, p. 4).

Online social support, according to Noar and Harrington (2012), is “reemerging in the examination of the effects of using social media such as Facebook and Twitter for health promotion” (p. 26). These scholars emphasize the importance of “engagement for participant retention,” and recognize that it is essential to maintain technology content by keeping sessions interactive and updated (Noar & Harrington, 2012, p. 26). Social media provides a way to reach a larger population including the social circles of an individual, which offers promise for health promotion (Noar & Harrington, 2012). Lenhart et al. (2010) state that recent reports from PEW Internet and American Life “indicate that almost three-quarters of teens and young adults aged 18-29 use social networking sites

and just under half of adults over 29 use them” (as cited in Noar & Harrington, 2012, p. 27). Still, there is little research that has been conducted about social media and health promotion because of rapid technology changes; however, the research on this relationship does produce conflicting perspectives (Chou et al., 2009). Several advantages include the cost effective and convenient access, asynchronous communication, anonymity to discuss sensitive topics, and offers an unlimited number of perspectives (White & Dorman, 2001; Chou et al., 2009). Then again, it is valuable to also consider the disadvantages of utilizing online social support: one of the largest being the digital divide—reminding us that there are many people who do not have internet access. In addition, White and Dorman (2001) discuss other disadvantages like how online messages can be easily misunderstood because of the lack of nonverbal cues and how online relationships could become replacements for face-to-face interactions.

In summary, I found a notable quote from Neiger et al. (2012) when thinking about my study regarding health behavior: “social media should not be viewed as a solution to the complexities of behavior change and improved health outcomes though there are certainly applications that can support the change process (p. 162).

Mobile Technology and Health Behavior

At this time, there are not many studies out there looking at mobile technology and health behavior. The studies I have found that would link specifically to my topic were recent, within the past two to three years. I was encouraged by the perspective of Rabin and Bock (2011) regarding smartphone applications, in this case relating to increasing physical fitness among Americans:

Given that one-third of American adults are physically inactive, and it is estimated that half will own smartphones before 2012, an efficacious SPAA (smartphone physical activity application) has the potential to exert a significant public health impact by reducing the incidence of diseases associated with inactivity (e.g., cardiovascular disease) (p. 803).

Like Fukuoka et al. (2011) states, “few studies have explored the individual needs and expectations of a mobile phone-based program to motivate and promote healthy lifestyle modifications in sedentary and overweight or obese adults” (p. 2). Norman et al. (2007) refers to this topic as the “third generation of e-health technologies” (p. 343). Fukuoka et al (2011) had six focus groups in their study in order to learn participants’ ideas and views on “examples of a mobile phone-driven lifestyle change program” (p. 3). Four major themes emerged in the analysis: “1) real-time peer social and professional support, 2) tailoring of timing, frequency, and content of messages in mobile phone programs, 3) combination of motivations, self-monitoring, and goal setting, and 4) potential barriers and sustainability of mobile phone programs (p. 4). Fukuoka et al. (2011) also tested the views of “just-in-time messages,” which can be an effective idea to change their unhealthy habits. It is interesting that “the desire for social support from other participants was the most frequent theme reported” (Fukuoka et al., 2011, p. 4). Oddly, no participant accessed support through social networking groups. Finally, emphasis is placed here again on “tailoring” the mobile program to one’s routine and lifestyle, and that it must “not dictate their daily activities” (Fukuoka et al., 2011, p. 5).

Other significant research was generated from Fukuoka, Lindgren, and Jong (2012), who enrolled female participants in a three-week mobile and pedometer pilot

intervention, and then interviewed each participant to acquire their feedback. The participants were motivated and perceived the application as a “virtual coach.” As a result, the self-monitoring aspect seemed to work well because the participants could follow how they were doing on their set goals. Looking back, the authors did suggest that they would have liked to hold an initial face-to-face meeting with the participants as a sort of training workshop, going over the layout and use of the program.

Positive feedback has been found from those who have used mobile health applications; however, on the other hand, there are some potential barriers of this topic. Norman et al. (2007) states that it is important to get participants to use the technologies on a regular basis over a specified duration in order to receive “an optimal dose of intervention” (p. 342). Participants’ fear of failing, loss of interest overtime, and age and mobile technology could also possibly play a role (Fukuoka et al., 2011). Artimage (2005) claims, “very little research has examined the factors important in maintaining behavior” (p. 236). However, it is Tufano and Karras (2005) who say:

The health behaviors to target are self-monitoring of diet and physical activity.

The devices are web-enabled “smart” cellular telephones and wireless PDAs.

Given the lack of effectiveness of other interventions to prevent or treat obesity in a sustainable matter, trials of these persuasive, ubiquitous technologies are required without delay (p. 8).

“My Fitness Pal”

Mobile health and fitness applications are growing more and more popular. In my research study, I tested the use of one specific application called, “my fitness pal.” It is one of the most trendy *free* health apps currently on the Apple and Android markets. The

app allows you to build an account via your smartphone, iPad/Tablet, or online by entering your personal health goals. Then, you are able to track calories by entering your meals into your food diary or scanning your food barcodes, logging physical activity, and nutrition in order to help you reach those health goals. According to their website, “My Fitness Pal is a diet and fitness community built with one purpose in mind: providing you with the tools and support you need to achieve your weight loss goals” (“myfitnesspal,” 2013). Community is another keyword here because it is a major feature of the application where participants do not feel alone in their efforts of dieting or exercise. The application offers social support functions through social networking and media like Facebook, blogs, discussion boards, support groups, and you can also search the local health-related events in your area. As technology continues to progress and become even more a part of our lives, it seems people who have stayed up with technology are more open to trying these types of mobile applications. In the next section, you will read more in depth about the foundation of my study—the Theory of Planned Behavior and the hypotheses that were generated to test in my experiment.

Theoretical Framework

As you read in the introduction, my goal was to investigate if and how a mobile health application program affects one’s health behavior. The Theory of Planned Behavior (TPB) has been used to “explain a wide array of health-related behaviors” (Fishbein & Ajzen, 1975; Bresnahan et al., 2007, p. 202). Three key variables are considered within the TPB that tend to influence the intention and ultimately the behavior. “Attitudes, perceived norms, and self-efficacy are all functions of underlying beliefs about the a) outcomes of performing the behavior in question b) normative

expectations of specific referents, and c) specific barriers to behavior performance” (Cappella et al., 2001, pp. 218-219). This theory has been proven effective over time and serves as a great resource and foundation for my study.

In Brug’s (2008) article, “Determinants of Healthy Eating: Motivation, Abilities and Environmental Opportunities,” environmental factors and self-efficacy are assessed and then motivation, abilities and the environment are discussed in comparison to the variables of the Theory of Planned Behavior. Brug (2008) states clearly “awareness of unhealthy eating habits is a strong positive correlate of intentions to make dietary changes” (p. i52). I really like how “awareness” is used in this context because it supports the need of health and wellness programs—increased awareness leads to healthier behavior choices. Brug’s (2008) view argues that the “obesogenic environment” can keep people from acting on their positive intentions; however, by opening people up to an environment where living an active and healthy lifestyle is valued could affect one’s intentions in a positive manner (p. i54).

Buller and Floyd (2012) discuss the outcomes of internet-based interventions (IBIs) and they found among various research studies that “IBIs improved health-related knowledge, self-management skills, quality of life, social support, social norms and self-efficacy, and progress along stages of motivational readiness to change” (as cited in Noar & Harrington, 2012, p. 68). Noar and Harrington (2012) also found that studies that tailored using theoretical foundations had larger effect sizes than those who did not tailor. These scholars continue to suggest that the more customized the message is to the individual, there will be more influence on health behavior change (Noar & Harrington, 2012).

Another article by Spink, Wilson, and Bostick (2012) explores one's intention to exercise in a structured versus unstructured setting based on predictions from the Theory of Planned Behavior (TPB). Intentions can be influenced on different variables as established by this theory, but like stated by Neuhauser and Kreps (2003), "however, even when people intend to make a change, it is often difficult for them to figure out how to do so in the context of their lives" (p. 10). I found the methodology useful in this article looking at setting and exercise intentions because of its useful measures and questions for the different variables. Even though the TPB works well as my theoretical framework, I still want to extend the boundaries of this theory: how does mobile health communication play a role and affect the causes and intentions of health behavior? Next, you will find my research hypotheses that I will test in this study.

Hypotheses

After the participants use the intervention applied in this study, I predict that between the treatment group and the control group;

H1. There will be a difference in the attitudes toward physical activity (H1a) and healthy eating behaviors (H1b).

H2. There will be a difference in the subjective norms of the co-workers regarding physical activity (H2a) and healthy eating behaviors (H2b).

H3. There will be a difference in the perceived behavioral control of one's overall health (H3a), physical activity (H3b), and healthy eating (H3c).

H4. There will be a difference in the overall health statuses of participants (H4a), physical fitness outcomes (H4b), and healthy eating behaviors (H4c).

In summary, the Theory of Planned Behavior is the foundation for my research and I investigate the main variables of the theory to find significant data between the two groups including attitude, subjective norms, and perceived behavioral control. In addition, I look to discover the health outcomes between both groups and what results occur due to the intervention of using the application, “my fitness pal.”

CHAPTER THREE: METHODOLOGY

This study takes a mixed methods approach to examine the effects of a popular mobile phone application, “my fitness pal,” on the users’ attitude, subjective norms and perceived behavioral control of health. I utilized two sequential phases, quantitative then qualitative. For the quantitative phase, I employed a quasi-experimental design to test the Theory of Planned Behavior hypotheses comparing two groups of University of Kentucky (UK) employees. The treatment group included UK employees within the Enrollment Management (EM) department, and the control group included UK employees within the Human Resources (HR) department. The participants in the treatment group were asked to use not only the basic functions of the mobile application, but to also integrate the social networking feature and instigate some interpersonal communication among their co-workers during the study. The control group was asked to simply use the general functions of the mobile application, and the social support aspect with co-workers was not mentioned to this group. A pre-test was administered to all participants in both the treatment and control group (all questions were optional). A post-test was administered after four weeks of the intervention. Each participant was also required to review and sign an informed consent form.

In effort to recruit participants from these two UK departments, I first gained official permission from each department head to contact employees through an internal e-mail listserv. I coordinated and reserved a conference room in both departments where I hosted participants for the pre-questionnaire. Once the dates, times, and locations were set for each group, I then was able to send out the UK Public Relations approved recruitment e-mail promoting and briefly explaining my study (Appendix A). HR sent out

the e-mail on my behalf to 117 total staff members, and I sent a personal e-mail to EM, which included 107 staff members. Within one week, the recruitment flyer was sent to the EM group three times and two times to HR in order to try and recruit the highest number of participants possible. The only requirements to be a part of this study consisted of being an employee in one of these two specific UK departments and owning a smartphone. In order to collect post-questionnaires from the participants, after four weeks, I again setup specific dates and times for them to stop by the conference room and fill out the post-questionnaire. I was able to send personal e-mails and reminders to the two groups twice in order to receive the highest response.

The qualitative phase occurred after the experiment collecting data from face-to-face interviews to serve as a supplement to the quantitative data. I contacted four total participants, two from each experimental group, and all agreed to participate in a one-on-one interview about their experience with the mobile application and the overall study. I selected these participants based on first, if they submitted both the pre-and post questionnaires and I wanted to speak with individuals both who had and who had not used “my fitness pal” previously.

To increase the response rate, incentives were offered as a part of this study and were outlined in the recruitment flyer. If the participant submitted both the pre- and post-questionnaires, they would be given ten dollars, and if the participant was selected and participated in an interview, they would be given an additional ten dollars for their time. Participants were required to submit a participation form in order to receive payment.

In summary, this study included a non-random and convenient sample. Demographic characteristics like gender or ethnic background were not considered when

recruiting participants. The initial study participants in the quantitative portion of the experiment who completed the pre-questionnaire and downloaded the mobile application included the following: 29 total EM participants (treatment group) and 13 total HR participants (control group); however, after the four weeks of the study concluded, I unfortunately did not hold one hundred percent retention as only 26 total EM participants completed the post-questionnaire (treatment group) and 9 participants from HR (control group). Within these final numbers, there were 25 female participants (71.4%) and 10 males (28.6%). 31 participants (88.6%) were White/Caucasian and about 3 (8.6%) were African-American. One participant selected both White/Caucasian and Hawaiian/Pacific Islander as their Race/Ethnicity. The age of the participants ranged from 23 to 62 ($M=33.64$, $SD=9.98$). Education level ranged from holding a Doctorate degree (one participant) to holding a high school diploma (one participant); 60 percent held a Bachelor's degree and about 31 percent had a Master's degree. More than 60 percent of participants had used "my fitness pal" (22 out of 35; 62.9%) or any other health mobile application previously (24 out of 35; 68.6%).

Measures

Experiment

The Theory of Planned Behavior was the main framework for my instrument to test the hypotheses. In order to find out how the "my fitness pal" application influenced the TPB variables, I asked questions in the pre- and post-questionnaires related to each (Appendix B). First, *attitude* (physical activity: $\alpha=.86$ pre-test, .92 post-test) (healthy eating: $\alpha=.83$ pre-test, .91 post-test) was measured on a 7-point Likert scale asking participants to rate their views of physical activity and healthy eating based on several

adjectives, “Bad/Good;” “Useless/Useful;” “Worthless/Valuable;” “Unpleasant/Pleasant;” and “Unenjoyable/Enjoyable” (Blanchard et al., 2008). *Subjective norms* (physical activity: $\alpha=.80$ pre-test, $.87$ post-test) (healthy eating: $\alpha=.83$ pre-test, $.86$ post-test) were measured by the participants indicating on a 7-point Likert scale how much they agreed or disagreed if their co-workers *support, approve, and think* they should eat healthy and exercise regularly (Blanchard, 2008). *Perceived behavioral control* (overall health: $\alpha=.44$, pre-test, $.89$ post-test) (physical activity: $\alpha=.88$ pre-test, $.87$ post-test) (healthy eating: $\alpha=.65$ pre-test, $.81$ post-test) was measured with about nine questions, where participants were asked to indicate how much they agreed or disagreed with each statement regarding their overall health, physical activity and healthy eating on a 7-point Likert scale; for example, “I am capable of improving or maintaining my health;” “I am confident I can make healthy decisions;” and “I feel in control of my personal health” (Armitage, 2005).

Overall health outcomes are tested for hypotheses four, and I asked participants to rate their current health on a 7-point Likert scale, ranging from *not very healthy* to *very healthy* (pre-test: $M=5.50$, $SD=.97$; post-test: $M=5.60$, $SD=.91$). Particularly in the post-questionnaire, I asked the participants to rate how much they agreed or disagreed on a 7-point scale with the following two statements based on the previous four weeks of the study: “I exercised more regularly” ($M=4.77$, $SD=1.61$) and “I ate healthier in the past four weeks” ($M=4.66$, $SD=1.85$).

In-depth Interviews

Interviews were a part of this study in order to grasp an even better understanding of a select number of participants’ experience with my research study. I felt that this was

an opportunity to learn more about if and how the application influenced the person's daily health decisions. Ten main questions were used in the one-on-one interviews as a guide (Appendix C), seeking responses regarding health behaviors, health attitudes, perceived behavioral control, social support, and mobile application feedback.

Data Analysis

Experiment

Each participant was given an identification number not to be associated with his or her questionnaire. The hypotheses were tested by t-test, using SPSS. Before the t-tests, I conducted Levene's tests for equality of variances. A p-value of 0.05 or less was considered statistically significant. Additionally, descriptive statistics were used to test other meaningful questions.

In-Depth Interviews

The data collected from the four one-on-one interviews were transcribed manually and then coded for thematic categories. The themes were selected based on what I found significant according to the hypotheses, themes that the participant(s) had a strong opinion about, or in general if I felt it was a critical point to share. To become more organized, I created a matrix with these themes including interview responses and specific quotes so I could report the results more clearly.

CHAPTER FOUR: RESULTS

This section provides the details of the results found in both the quantitative and qualitative parts of the study related to the hypotheses and the usage of the intervention, “my fitness pal,” looking at the differences in the pre- and post-test data.

Influential Factors affecting Health Decisions

It was first important to learn more about the leading factors that keep participants from making positive health behavior changes. On the pre-test, participants were given a list of ten factors that might influence health decisions and behaviors on a regular basis (Table 1). On a 7-point Likert scale, participants were asked to rank each from *least likely* to *most likely* to influence them. Convenience, time, and motivation were the top three most influential factors, according to the results.

Table 1. Leading factors that affect positive health behavior changes

Factor	Mean	SD
Convenience	5.10	1.68
Time	4.98	1.73
Motivation	4.60	1.89
Commitment	4.24	1.89
No consistent schedule	4.05	1.77
Cost	3.76	2.25
Unsure how to go about it	2.83	1.75
Benefits and Rewards-is it worth it?	2.79	1.75
Lack of Support	2.50	1.63
Other	1.55	1.21

Mobile Application Use

After the participants used “my fitness pal” for four weeks, I wanted to know what features of the application were used most frequently (*never to very frequently*). In Table 2, you will find that the basic functions of the application were used the most. Also, I asked participants how many times per day they would login to the application, on average ($M=2.44$, $SD=1.93$). In order to find what features of the application were *most important* to the participant; for instance, the nutrition summary, barcode scanner, food database, etc., participants ranked each feature listed on a scale ranging from *not very important* to *very important*. The results are shown in Table 3. It demonstrates that the top three most important features of “my fitness pal” were that it is a free app, easy to use, and convenient.

Social support and the ability to social network through the app were important to measure in this study. I specifically asked “how much did you utilize the social networking aspect of “my fitness pal” (e.g. add friends through Facebook; connect with friends through the application, discussion boards, etc.)?” The results were very interesting as the average was closer to *not very often* on a 7-point scale ($M=1.66$, $SD=1.35$).

Finally, I wanted to see how strongly the participant agreed or disagreed with the statement: “It is very likely that I will recommend “my fitness pal” to someone in the future” ($M=6.03$, $SD= 1.38$). On a 7-point scale, this is a positive result as participants are highly likely to recommend this application.

Table 2. How often “my fitness pal” features were used

Feature	Mean	SD
Calorie tracker-Added your food intake to your food diary	5.46	1.96
Viewed daily nutritional summary	4.43	1.93
Tracked your physical activity in your diary	4.34	2.35
Barcode scanner to find your foods	3.53	2.11
Weight check-in-checked goal progress	3.49	2.16
Added a friend	2.15	1.42
Added a recipe to the database	1.91	1.44
Read a message board	1.74	1.38
Wrote on a friend’s wall	1.35	.92
Other:	1.00	.000

Table 3. Most important features of “my fitness pal”

Feature	Mean	SD
The application is free.	6.46	1.25
Easy to use	6.37	1.19
Convenient	6.34	1.24
Large food database	6.26	1.22
Nutrition summary	5.60	1.58
Secure account	5.34	1.89
Personal customization	5.20	1.68
Exercise Tracker	4.91	2.05
Barcode scanner	4.86	2.25
Social Support	2.94	2.13

Theory of Planned Behavior

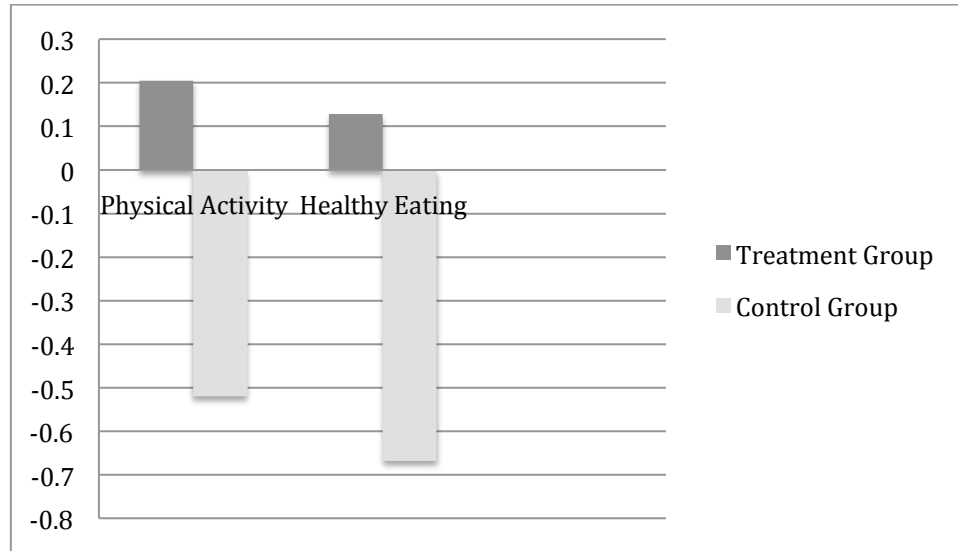
Hypothesis 1 predicted a difference in attitudes between the treatment and control groups on physical activity (H1a) and healthy eating (H1b). The results show that there was no significant difference in the attitude changes towards physical activity (treatment: $M=-.51$, $SD=1.48$; control: $M=-.90$, $SD=1.43$; $t(32)=-.67$, $p=.51$) and healthy eating behavior (treatment: $M=-.26$, $SD=.74$; control: $M=-.98$, $SD=1.94$; $t(33)=-1.61$, $p=.12$) (Figure 1).

Figure 1. Differences in Attitude Between the treatment and the control condition



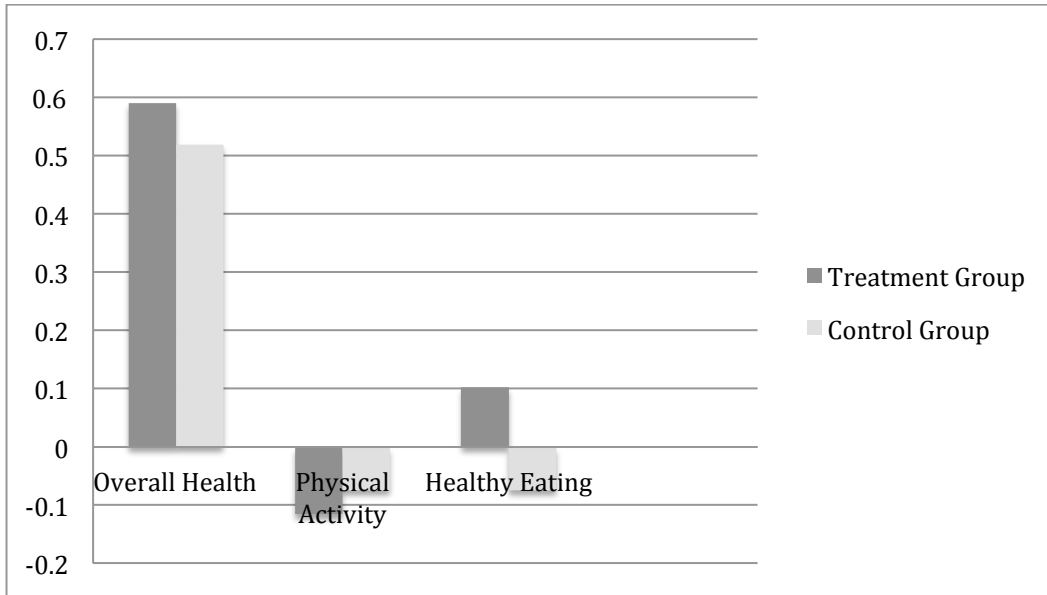
Hypothesis 2 investigated the difference in subjective norms of co-workers between the two groups regarding physical activity (H2a) and healthy eating (H2b). The differences in subjective norms of the co-workers were not significant toward physical activity (treatment: $M=.21$, $SD=1.39$; control: $M=-.52$, $SD=.90$; $t(33)=-.146$, $p=.16$) and healthy eating (treatment: $M=.13$, $SD=1.43$; control: $M=-.67$, $SD=1.26$; $t(33)=-1.48$, $p=.15$) (Figure 2).

Figure 2. Differences in Subjective Norms Between the treatment and the control condition



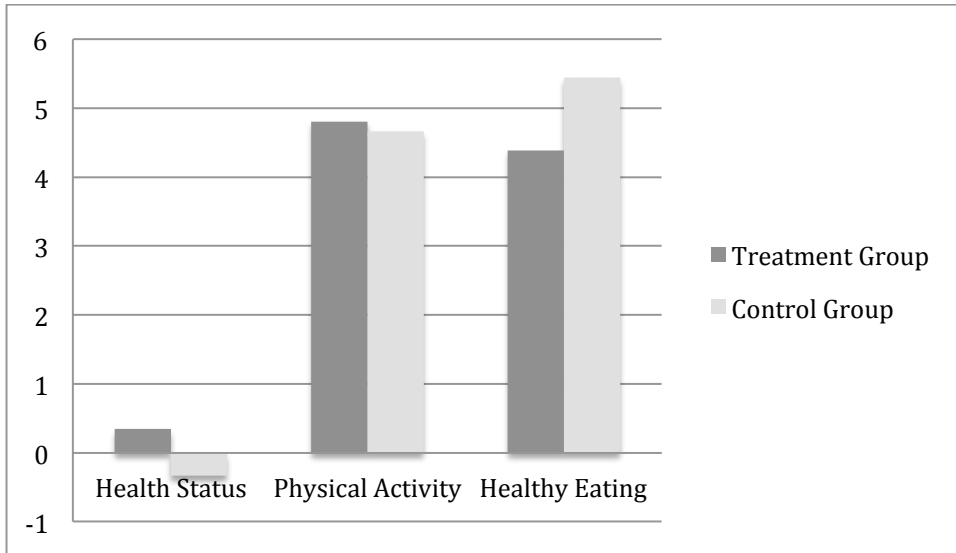
Hypothesis 3 expected to see differences between the treatment and control group and their perceived behavioral control of their overall health (H3a), physical activity (H3b), and healthy eating (H3c). Results indicated that there was no significant difference in the perceived behavioral control between the groups on overall health (treatment: $M=.59$, $SD=.62$; control: $M=.52$, $SD=.77$; $t(33)=-.28$, $p=.78$), physical activity (treatment: $M=-.16$, $SD=.52$; control: $M=-.07$, $SD=.43$; $t(33)=.21$, $p=.83$), and healthy eating behavior (treatment: $M=.10$, $SD=.49$; control: $M=-.07$, $SD=.52$; $t(33)=-.92$, $p=.36$) (Figure 3).

Figure 3. Differences in Perceived Behavior Control Between the treatment and the control condition



For hypothesis 4, I predicted there would be a difference in the health outcomes between the treatment and control group including overall health status (H4a), physical activity (H4b), and healthy eating behavior (H4c). There was a significant difference in the overall health statuses (H4a) between the treatment and control group (treatment: $M=.35$, $SD=.85$; control: $M=-.33$, $SD=.71$); $t(33) = -2.16$, $p = .04$). However, there was not significant data that supported physical activity (H4b) (treatment: $M=4.81$, $SD=1.63$; control: $M=4.67$, $SD=1.66$; $t(33) = -.22$, $p = .83$), and healthy eating (H4c) (treatment: $M=4.39$, $SD=1.92$; control: $M=5.44$, $SD=1.42$; $t(33) = 1.52$, $p = .14$) (Figure 4).

Figure 4. Differences in Health Outcomes Between the treatment and the control condition



In-depth Interviews

There were several main themes or topics that I would like to address in this section that all stemmed from the conversations I had with four participants (two from the treatment group “TG” and two from the control group “CG”): Health attitudes/why is health important; overall experience with “my fitness pal;” awareness; personal control; social support; and workplace wellness.

Health attitude/why is health important to you?

Health can mean something different to each person. Within this theme, I was able to better understand this statement, as I heard varying outlooks toward health. A few of the discussions dealt with the importance to the individual of keeping the weight off that they had lost previously, others had trouble losing weight and were still trying, and then one individual’s importance for their health stemmed from their family and because of their many health risks. Interviewee 2 stated (CG),

“I strive to live a vibrant life; a very full and holistically healthy life and that is about being healthy physically, emotionally, spiritually...I think it is all connected. I see my physical health as part of that equation in order to be vibrant, in order to be do meaningful work in the world, to be purposeful...so I really think about health as a broader thing more than just my physical body.”

It was interesting to hear these reasons of what may influence health decisions.

Overall “my fitness pal” experience

I believe it was important to capture dialogue instead of just statistical data about one’s experience with the mobile application. I wanted to find out what really they liked about the app and if there were any negative comments. The key buzzwords used to describe the app in the interviews included easy, convenient, and user-friendly. The barcode feature seemed to be the feature most of these participants raved about—not only making it easier to log in your food diary, one participant mentioned the fact that it would capture the nutrition data for odd food or drinks that you would not normally consider the nutritional value like beer, for example.

Interviewee 1 (TG): “[The app] tells you how much you would weigh if you continued to eat like you did because there were a couple of days where I felt shamed (laughter). It makes you want to do better.”

Interviewee 2 (CG): The app “kind of brings you to reality.” You ask yourself questions like “how much have you eaten today and what are your goals? What choices are you going to make aligning with those goals? It is all up to me.”

Interviewee 4 (CG): “I’m not snacking like I used too. You can have it at your fingertips and I could just sit here and enter it, so it just made it so easy and fun. I’m so glad you did

this, its awesome. Otherwise I wouldn't have known about it." I was excited to hear the participants I interviewed alluding to having a positive experience with the mobile application. However, there were a few suggested improvements: making it easier to log ingredients for recipes as it was sometimes hard to log every ingredient measurement, to have a more inclusive exercise database for group fitness classes, for example, and to have varying alarm and reminder options.

Awareness

Along with the theme of awareness, I heard several times participants concerned with portion control specifically. Yes, "my fitness pal" seemed to make them more aware of their health decisions, but mostly in the area of food intake. Below are some examples from my conversations about these ideas:

Interviewee 1 (TG): "When I can visibly see the role that exercise has on your calorie intake...I hadn't really put that together. So it's just one of those things where a lot of it has to do with portion control for me...making sure I've got vegetables and focusing on having a larger portion of those than sometimes the main entrée."

Interviewee 2 (CG): "For me there was a big disconnect between portion sizes..." [The app] just helped create more of an awareness and I was more intentional." "You know, I consider myself to be a very conscious eater but it helped me see where my holes were. I liked that it was very specific."

Interviewee 3 (TG): "I think that it has definitely continued my sensitivity towards my health."

Interviewee 4 (CG): "I started with the app and it made aware of where I needed to stop."

Personal Control

The perspectives and the conversation regarding personal control were probably one of the most interesting for me. I enjoyed the honesty and truth in these statements:

Interviewee 1 (TG): "...otherwise it was so easy to give into temptation and grab something. I am definitely a pleasure eater...and it is something I've got to fight. Even in the office in here if I am bored working on something, I so badly want something to crunch on."

Interviewee 2 (CG) described in her dialogue about self-efficacy and how the app helped ask questions like "what am I really hungry for?" "food is only a piece of it," this participant explained.

Interviewee 3 (TG) talked about how "my fitness pal" provided a structure for them and they were able to have a more constant routine and commit to the study for the four weeks.

Interviewee 4 (CG) quoted, "there was things I would normally eat that I thought okay I can't have that because I'm almost at my limit."

Social Support

When it comes to daily health decisions, it was essential to see if there was significant data about social support positively affecting one's health. Throughout my interviews, I learned that social support can be beneficial, but it is not necessarily essential to become a more healthy person.

Interviewee 1 (TG): "In my experience, a lot of this has to do with me and my will power...my family is full of picky eaters...they don't want to eat right, they don't want to

eat healthy, and I can cook that way but they are going to make something else and the temptation is still there.”

Interviewee 2 (CG) discussed social support being more meaningful in “verbal conversations;” however, “a healthy environment definitely plays a role...it holds you accountable.” This interviewee said that “wellness support is essential to being a wellbeing...its like a ripple effect.”

In my conversation about social support with interviewee 3 (TG), they brought up using Facebook and the application, and they believe people are not using Facebook as much as they used too; they believe people are in general becoming “desensitized to it.”

Interviewee 4 (CG): “It’s a personal thing. Nobody really encourages me one-way or the other. I was kind of leery of doing the Facebook thing...I do Facebook, but I didn’t really want anybody to know that I’m dieting.”

Workplace Health and Wellness

This is a major component of this study, and since I am interviewing these participants in the workplace setting, I was interested in hearing even more in-depth about each person’s view of this theme.

Interviewee 1 (TG) expressed that they didn’t think anyone in their specific office participated in this study, but this participant did try to connect with their brother since he uses the app for his work already. When asked if they find value in a workplace wellness program, Interviewee 1 responded: “Yes, it would be wonderful if they based it on [my fitness pal] which it has the capability to do apparently.”

Interviewee 2 (CG) told a story about how sometimes they have felt guilty before having a soda during the workday, like they have to hide it. They have talked to people

before who have felt shamed if they go on a walk during the workday too. This participant really placed high value on workplace wellness mainly because “we spend so much time at work.”

When I asked Interviewee 3 (TG) if they valued workplace wellness programs, the response was as follows, “I absolutely do, I think it really increases morale and it makes people really have a community...almost like giving synergy to the environment...primarily because they have something to look forward to outside of work almost like a professional development thing.” I also found the next statements valuable:

I thought that this was a really neat way to start at least that discussion about being healthy because it is always not something that you potentially want to bring up all the time. I think that like I said it does become a tipping point for some people when you talk about it too much...almost creating an ‘us vs. them,’ if everyone is not using it.

In addition, interviewee 4 (CG) was in favor of workplace wellness and just “wishes more people took advantage of it.”

The one-on-one follow-up interviews for this study were very informative, and I appreciated the time from each person. I believe it provided a storyline more than what the experiment alone could provide. All in all, each interview was positive and offered valuable feedback and knowledge on these particular topics.

CHAPTER FIVE: DISCUSSION

In this section, the conclusions are summarized based on the data analysis, and limitations of the study are explained along with suggestions for future research.

This has been an exciting and current topic to research, and I believe this study adds theoretical and practical applications to the field of health behavior and to the evolving concept of e-health. There are very limited studies out there that have specifically investigated a mobile application intervention in a workplace setting. Specifically, this study experimented with the mobile app “my fitness pal.” It was found that 68 percent of participants in this study had used some type of mobile health application previously (60% had used “my fitness pal” before).

In regard to the descriptive statistic results, there are several interesting conclusions to consider. The answers to a question asked about health behavior and the reasons that keep people from making healthier decisions revealed understandably that the top factors were time, convenience and motivation. This validation is important because it allows health educators and coordinators to better identify what contributes to health behavior, which can in turn help them become more focused on combating these factors in their health programs.

There were many questions asked in regard to the participant’s overall experience with “my fitness pal,” and according to the results, the main functions of the app including the food diary and exercise tracker along with the nutrition summary were the features used most frequently during the study; however, the results were very close when asked what features were *most important* to the participants. The application is free, easy to use, convenient, and large food database were the top four answers rated on a 7-

point scale. I was surprised by the fact the app being free was, on average, the highest ranked answer. Participants shared that it is highly likely they would recommend the app to someone in the future, which I believe speaks volumes about the value of this topic.

The results from the data analysis did not show support for several of the hypotheses linked to the variables from the Theory of Planned Behavior, but there was significant results that showed a difference in the overall health statuses of the treatment and control groups when they were asked to rate their current health. The treatment group did show a more positive increase in response to their current health rating on a 7-point Likert scale after using “my fitness pal” for four weeks. Similar to previous articles I read relating to workplace health and wellness programs, there is conflicting evidence regarding the overall success of these programs and if they are worth the resources (e.g. Horwitz, Kelly, & DiNardo, 2013).

As I explained in my results, several prominent themes were found from the interviews conducted. Participants seemed to be in tune with the awareness aspect of the study. They explained how visually seeing their food intake and exercise made a personal impact, and gave them a better understanding of portion sizes. Like mentioned previously, Brug (2008) validates this by his statement, “studies have shown that awareness of unhealthy eating habits is a strong positive correlate of intentions to make dietary changes” (p. i52).

This personal awareness of health behaviors led to higher perceived behavioral control, according to the interviewed participants. Participants talked about the constant temptation of unhealthy eating and the way the app provided more of routine and structure to help them stay committed to the program. Perceived behavioral control or

self-efficacy is again one's perception of or confidence in one's ability to engage in a particular behavior, and can be context specific (Brug, 2008). This is an important part of the Theory, and it can influence one's behavioral intentions.

Another conclusion I gathered from this study was that social networking and social support may not be a fundamental part of behavior change. According to the descriptive data on mobile technology use, the average rating on a 7-point scale about how often the participants used the social networking features of the app was 1.66, much lower than I would have thought. Also, the social support feature came in last as far as least important to the participants compared to the other nine app features listed. Based on my interview conversations, fighting temptations like unhealthy eating and motivation for exercise seemed to be centered upon self will power.

There were some final comments from the interviews that also stood out as beneficial reflections about the study. After all was said and done, one participant advised that one must be sure to "use the app as a tool and not to become too obsessive." This is good tip because people could get completely wrapped up in the wrong aspects of the application like logging every single ingredient or searching for the exact brand name of food, instead of just using it as a convenient and simple food and exercise diary. In addition, the excitement towards the application from another participant was encouraging because this person was able to lose six pounds during the study, and expressed that losing weight was always so hard in the past. The best thing, in my opinion, is that anyone can use the app whether you are trying to lose weight, gain weight, or maintain weight. Like the participant said, "my fitness pal" is a wonderful *tool*

that is right at your fingertips to track your nutrition and exercise, and you can customize it to meet your needs.

Limitations

Since the data in the study did not support all of the hypotheses, I propose that the small sample size had a major effect on the results. I retained less than thirty participants in the treatment group and less than ten in the control group, and unfortunately this low power decreased the chance of finding significant changes in the data and being able to generalize to the larger population. I believe it is harder to retain participants for a pre- and post-intervention study without a larger incentive.

There are a few threats to validity for this study to mention including the role of the researcher and the participant selection. It is important to note the bias that could have possibly affected the outcomes based on my role as the researcher. During the study, I was a UK employee in the Enrollment Management department, where I recruited participants for the treatment group. Now, this may have influenced the reason why I was able to recruit more people in this group versus the control group due to higher credibility. On the other hand, knowing many of the participants could have resulted in a participant not being completely honest during the study, even though confidentiality was ensured from the beginning.

Among the participants in the control group, several of them were from Health and Wellness, which falls under the Human Resources department at the University. Naturally, I feel people in this department would be more interested and more inclined to participate than others. The characteristics of this selection could have swayed this data due to the nature of their environment.

Other limitations include the fact that this study required a participant to own a smartphone, but not everyone owns a smartphone, so this limited the number of participants for the study. After my recruitment e-mail was sent, a few people responded saying they would be interested, but they did not have a smartphone. This is a consistent problem of e-health. There is a digital divide where certain communities may not have access to the internet or other new technologies, or there are certain populations that just are not as “tech-savvy” or even interested in using a mobile-based health program, for example. Noar and Harrington (2012) explain that most times these disadvantaged populations are the ones who need the e-health programs the most, so we must not leave them out of these types of initiatives. How do we involve these types of communities and maybe bring the technology to them? Nonetheless, at a workplace like the University of Kentucky, which has more than 12,000 employees, many who rely on technology to perform daily job requirements, seems to be an ideal community to target for health and wellness programs.

Finally, I want to point out the timing of this study possibly being a limitation. I believe the results could possibly vary depending on what time of the year the intervention is implemented. For example, if data were collected closer to the beginning of the year, I perhaps would have received more participants and may have found more significant results because of the New Year’s resolution health craze. Essentially, I think either way people are motivated at different times of the year, which could potentially skew the data.

Suggestions

Future research looking to motivate and change people's health behavior is relevant and important because to be frank, we are living in a dangerously unhealthy society. Recent research in the field has started to consider modern technology, and it is necessary to continue building upon this foundation exploring new and creative ways that can make an impact within communities. The enthusiasm for applications like "my fitness pal" that I heard especially from my interviewees should be taken to heart by those dedicated to promoting wellness and health education. How could a program with an app like "my fitness pal" be applied to you and your environment? Studies like this one offer insight on how to implement and run health and wellness programs.

Another area of research that could progress the knowledge base in this field of health behavior is like what Gebhardt and Crump (1990) discussed as "Level III of Fitness and Wellness Programs," and making an effort towards building an environment that helps people sustain healthy behaviors (p. 263). It is notable for someone to make conscious daily health decisions, but how long will this positive behavior last? According to Neuhauser and Kreps (2003), there is little evidence about the sustainability of behavior changes facilitated by e-health interventions" (p. 15).

All in all, mobile technology is growing and the workplace setting is one area where a mobile application like "my fitness pal" could be targeting. While an environment that supports healthy behavior is important, efforts may need to be more focused on individual goals and behaviors than a group as a whole, according to this study. I look forward to seeing the ways scholars will study this topic in hopes of motivating and helping people make healthier decisions.

Appendix A: Recruitment E-mail

Seeking staff members from University of Kentucky to participate in a study investigating mobile health technology and health behavior. I am conducting this research study for my thesis in order to complete my Master's degree in Community and Leadership Development within the UK College of Agriculture.

Your participation will consist of downloading a mobile phone health application, "my fitness pal," utilizing this application for four weeks, and taking a brief pre- and post-questionnaire. A few participants will be randomly selected to also complete a one-on-one interview.

Upon completion of the study and submission of both questionnaires, participants will receive a \$10 check.

Additional incentives (\$10 check) will be given for the participants who will have an interview.

The only requirement is you must own a mobile smartphone, iPod, or any other tablet device that allows you to download applications.

Interested? Please email me to sign up for one of the sessions below where you will fill out the pre-questionnaire:

Date, Time, and Location

or

Date, Time, and Location

Questions? Please feel free to contact me at rach.adams10@uky.edu or 859-257-5091.

Thank you!

Appendix B: Items Used to Construct Variables

1. Attitudes

(1) Physical Activity

(Pre: $\alpha=.86$; $M=6.25$, $SD=1.03$; Post: $\alpha=.92$; $M=5.74$, $SD=1.39$)

For me to participate in regular physical activity over the next four weeks will be...

Bad	1	2	3	4	5	6	7	Good
Useless	1	2	3	4	5	6	7	Useful
Worthless	1	2	3	4	5	6	7	Valuable
Unpleasant	1	2	3	4	5	6	7	Pleasant
Unenjoyable	1	2	3	4	5	6	7	Enjoyable

(2) Eating Healthy

(Pre: $\alpha=.83$; $M=6.33$, $SD=.93$; Post: $\alpha=.91$; $M=6.03$, $SD=1.11$)

For me to eat healthy over the next four weeks will be...

Bad	1	2	3	4	5	6	7	Good
Useless	1	2	3	4	5	6	7	Useful
Worthless	1	2	3	4	5	6	7	Valuable
Unpleasant	1	2	3	4	5	6	7	Pleasant
Unenjoyable	1	2	3	4	5	6	7	Enjoyable

2. Subjective Norms

(1) Physical Activity

(Pre: $\alpha=.80$; $M=5.60$, $SD=1.16$; Post: $\alpha=.87$; $M=5.60$, $SD=1.16$)

Please indicate on the scale below how much you agree or disagree with each statement.

1= strongly disagree; 4= neither disagree or agree; 7= strongly agree

My Co-workers...

Think I should exercise regularly	1	2	3	4	5	6	7
Approve of me exercising regularly	1	2	3	4	5	6	7
Support me in exercising regularly	1	2	3	4	5	6	7

(2) Eating Healthy

(Pre: $\alpha=.83$; $M=5.51$, $SD=1.21$; Post: $\alpha=.86$; $M=5.50$, $SD=1.26$)

My Co-workers...

Think I should eat healthy	1	2	3	4	5	6	7
Approve of me eating healthy	1	2	3	4	5	6	7
Support me in eating healthy	1	2	3	4	5	6	7

3. Perceived Behavioral Control

(1) Overall Health

(Pre: $\alpha=.44$; $M=5.66$, $SD=.86$; Post: $\alpha=.89$; $M=6.23$, $SD=.96$)

Please indicate on the scale below how much you agree or disagree with each statement.

1= strongly disagree; 4= neither disagree or agree; 7= strongly agree

I am capable of improving or maintaining my health.	1	2	3	4	5	6	7
I am confident I can make healthy decisions.	1	2	3	4	5	6	7
I feel in control of my personal health.	1	2	3	4	5	6	7

(2) Physical Activity

(Pre: $\alpha=.88$; $M=5.58$, $SD=1.37$; Post: $\alpha=.87$; $M=5.48$, $SD=1.45$)

I am confident I can participate in regular physical activity.	1	2	3	4	5	6	7
Participating in regular physical activity will be extremely easy for me.	1	2	3	4	5	6	7
I have control over my decision to participate in physical activity.	1	2	3	4	5	6	7

(3) Eating Healthy

(Pre: $\alpha=.65$; $M=5.51$, $SD=1.04$; Post: $\alpha=.81$; $M=5.57$, $SD=1.07$)

I am confident I can eat healthy.	1	2	3	4	5	6	7
Eating healthy will be extremely easy for me.	1	2	3	4	5	6	7
I have control over my decision to eat healthy.	1	2	3	4	5	6	7

Health Outcomes

(1) Health Status (Pre: $M=5.50$, $SD=.97$; Post: $M=5.60$, $SD=.91$)

Please rate your current health.

Not very healthy	1	2	3	4	5	6	7	Very Healthy
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(2) Physical Activity ($M=4.66$, $SD=1.85$)

In the past four weeks...

1= strongly disagree; 4= neither disagree or agree; 7= strongly agree

I exercised more regularly.	1	2	3	4	5	6	7
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(3) Healthy Eating ($M=4.77$, $SD=1.61$)

In the past four weeks...

1= strongly disagree; 4= neither disagree or agree; 7= strongly agree

I ate healthier in the past four weeks.	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

Appendix C: Interview Question Guide

Health Attitude & Behavior

1. Is your health important to you? Why?
2. How would you describe your level of health-consciousness before and after using “my fitness pal?”

Probing questions: Did you consider the calories/fats nutrition of the foods you intake before participating in this study? Or amount of physical activity?

Mobile application feedback

3. Tell me about your experience with “my fitness pal”.

Probing questions:

- a) Was it easy to use?
 - b) What steps did you take to help reach your goal?
 - c) What did you like about the application? Dislike?
4. Overall, what is your perspective on mobile health applications?
 - a. Are they valuable? Do you have any suggestions of how to improve “my fitness pal”?

Perceived Behavioral Control

5. In the past four weeks, do you feel like you have become more aware of your health decisions?
6. Describe how you felt when you tracked your calories, did you feel more in control of your health when you could see it?

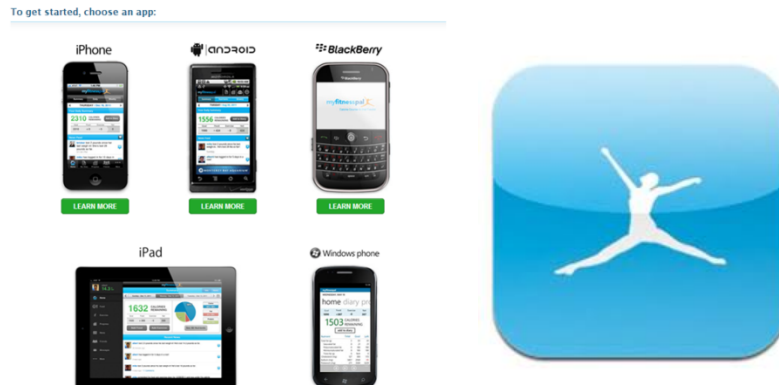
Social Support

7. How important is social support to you in your daily health decisions? Why or why not?
8. Do you find value in workplace wellness programs?
9. Has this experience motivated you to continue using the application or participate in other programs similar offered at UK?
10. Do you think there is value in mobile health application programs?
 - *After participating in this study, I want to know the overall positive/negative perspective of mobile health applications.*


Appendix D: Participant Instruction Sheet

Introduction to “My Fitness Pal”

Step 1: Download the free mobile application by searching your app store for “my fitness pal”



Step 2: Create your own personal account and set goals

 Create Your Free Account - Step 1 of 3

Your Account Information

Username: 4-30 characters, no space

Email Address:

Password: 6-30 characters, no space

Receive our free newsletter with diet tips, recipes and more!

[CONTINUE >](#)

By clicking Continue you're indicating that you have read and agree to the Terms of Service and Privacy Policy and that you're at least 18 years of age.

▶ Already have an account? [Click here to log in.](#)

▶ Forgot your username or password?

Step 3: Start Using “my Fitness Pal” and Discuss progress with your co-workers



About “My Fitness Pal”

“My Fitness Pal...”

- is an easy way to track your daily net caloric intake and physical activity with one of the largest food databases
- Provides useful nutritional summaries based on your personal goals
- is an opportunity to build a supportive community

“My Fitness Pal” Features:

- “My Home”: a quick snapshot of your daily net calorie target and how well you're meeting that target for today.
- Revisit “My Goals” at any time, and feel free to customize your goals.
- Food Diary: “The more you use it, the easier and faster it will be to track each meal.” Search for foods, submit your personal recipes, or use the *barcode scan option* to submit your foods.
- Exercise Log: “Exercise is an essential part of any weight loss program.”
- Message Boards: An open, welcoming, and supportive community.
- “Check-In”: Weight yourself at least once a week.

“My Fitness Pal Tips on Tracking”:

- Make sure to track everything you eat. Those little snacks can add up!”
- If you can’t find a food, create your own by entering the “Nutrition Facts” from the label on packaged foods, or estimate...it is better than nothing. It is better to get to the habit of tracking everything, even if it is not always perfect.
- Set reminders on your mobile device to remind you to track your foods, or under the “settings” option.

Appendix E: Participant Checklist Card

Mobile Technology and Health Behavior Research Study Checklist

- ✓ Submit informed consent form and pre-questionnaire.
- ✓ Download and utilize the free mobile application: “my fitness pal” for four weeks.
- ✓ Add your friends through the app and share your progress with co-workers.
- ✓ Come by one of the sessions at the end of May to submit post-questionnaire and W-9 Form and you will earn \$10.
- ✓ A few participants will be randomly selected for an interview regarding your “my fitness pal” experience, but you will receive an additional \$10, if selected.

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VITA

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