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<td>Course Number [e.g. INTL699] *</td>
<td>ITCC698</td>
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<tr>
<td>Professor Name [Last, First, Mi] *</td>
<td>Marion, James</td>
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Capstone Approval Document

The Capstone thesis/project for the master's degree submitted by the student listed (above) under this title *

A USERS APPROACH TO HEALTH AND FITNESS SOFTWARE APPLICATIONS

has been read by the undersigned. It is hereby recommended for acceptance by the faculty with credit to the amount of 3 semester hours.

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<td>Dr. Jim Marion, PMP</td>
<td>Digitally signed by Dr. Jim Marion, PMP Date: 2018.04.20 08:32:55 -04'00'</td>
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<td>Signed, 2nd Reader (if required by program)</td>
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A USERS APPROACH TO HEALTH AND FITNESS SOFTWARE APPLICATIONS

A Master Thesis

Submitted to the Faculty

of

American Public University

by

Wilda L Duncan

In Partial Fulfillment of the
Requirements for the Degree

of

Master of Science

May 2017

American Public University

Charles Town, WV
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DEDICATION

I dedicate this thesis to my wife Elizabeth, my family, my three cats and the earth. My wife is my rock that motivates me to be a better person and helps me to appreciate the wonderful planet we live on!
ACKNOWLEDGMENTS

In my final year of the Navy before I retired, my commanding officer, Captain Rick Williamson required everyone in the command to “take a class”. As a result, I started taking classes in web publishing, which I completed a certification for in 2010 from American Military University. After retirement, I pursued and completed an information technology bachelors degree in 2013 from American Military University. That led to this master’s degree, all because Captain Rick Williamson required that we “take a class”. He inspired it all. Thank you, now Admiral Rick Williamson! I also want to thank Dr. James Marion, my instructor in the final capstone class who helped me through the entire thesis process. Finally, I also want to acknowledge and thank the Post 9-11 G.I. Bill and Montgomery G.I. Bill, which paid for all of my schooling.
Health and fitness applications are popular in our society today. Many people track health and fitness affects on these apps on a regular basis. This research determines what the popular health and fitness apps are and the prevalent characteristics of health and fitness apps. Further, as part of the research, a survey using an electronically distributed survey instrument was conducted to determine what the favorite features are of health and fitness apps from the perspective of the user. Additionally, user input verified what kinds of improvements or enhancements they would like to see in future developments of health and fitness apps. This research was done electronically using qualitative methodology.

*Keywords: software applications, health and fitness, technology, mobile apps*
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A Users Approach to Health and Fitness Software Applications

Introduction

Health and fitness is a popular focus among many people today. Many use software applications or “apps” to help them track data related to their personal health and fitness matters. Information that users may want to track on these “apps” could be anything from dietary needs such as tracking calorie intake to timing/measuring a jog to tracking blood sugar for diabetic reasons. Tracking such data helps users see progress or changes in their health so they are able to maintain a healthy and fit lifestyle (Kamel Boulos, Brewer, Karimkhani, Buller & Dellavalle 2014).

Problem Statement

Not much is known about the range of software applications and technological devices that are used to support health and fitness. Further, few studies have been conducted to determine how such applications and devices are used (Kamel Boulos et al., 2014). This study seeks to discover in what way health and fitness software applications are utilized and how these apps may be enhanced in the future.

Purpose Statement

The purpose of this study is to determine what applications or application features users may perceive to be most effective in achieving their health goals, along with an analysis of such applications that come closest to their perceived ideal.

Research questions

This study seeks answers to the following research questions:

1. In what way do people utilize software applications to assist them with health and fitness matters?
2. What specific features in health and fitness software applications are the most popular with users?

3. What improvements would users want in future software applications?

**Significance of the Study**

This study examines health and fitness software applications that already exist, and then collects input from users via an electronic survey process as to what improvements they would like to see in future applications that does not already exist now. The envisioned result is to discover what enhancements users wish to see in future health and fitness software applications.

**Definition of Unclear Terms**

- Apps: Software applications used on smart phones or other similar devices.
- BMI: Body Mass Index
- GPS: Global Positioning System
- Mhealth: Mobile Health
- Q&A: Question and Answer
- REM: Rapid Eye Movement
- USDA: United States Department of Agriculture
- User: A person who “uses” a software application.
- Wearables: An electronic device that can be worn on the body.

**Limitations**

- Lack of diversity in participants. A high percentage of survey participants were mostly white/Caucasian females.
- Geographic limitations. A high percentage of survey participants claim California as their state of residence.
Assumptions

- Current health and fitness software applications are adequate.
Literature Review

Introduction

Health and fitness is a focus of many people today. With more than one hundred million tablets and one billion smartphones around the world, people are as mobile as ever (López-Coronado, de la Torre-Díez & Martínez-Pérez, 2013). Mobile phones and smartphones in particular are embraced by a rising number of people worldwide and this trend is anticipated to grow even more in the future (Paschou, Sakkopoulos & Tsakalidis, 2013). In addition, smartphone users are gradually moving to apps as a “gateway” to Internet services instead of the typical web browsers. Significantly, app marketplaces for Android, Windows and iOS platforms have made it appealing for developers to create apps and easy for people to discover and use network empowered apps (Xu et al., 2011). Health and fitness software applications or “apps” assist many to maintain a fit and healthy lifestyle utilizing these mobile devices. There is thousands of health and fitness software apps available for download. Specifically, there are thousands apps for the iPhone, iPad and iPod that are available in the Apple iTunes store itself with billions of recorded downloads (Cowan et al., 2013). In addition, the other major app provider, the Google Play store offers a comparable number of apps to their customers as well (Lupton, 2014). Yet, the high volume of downloads of the iTunes and Google Play apps do not automatically coincide with the usefulness of the apps (Roehr & Zaidan, 2016).

Consequently, there are some health and fitness apps that are more popular than others are, which signify that the most prevalent health and fitness apps are popular for a reason.

Health and fitness interests range anywhere from food and nutrition, fitness, weight loss, health and wellness or overall health in general. In addition, the popularity of smartphones has increased exponentially since they were introduced and their popularity continues to grow at a
rate that is faster than any other consumer technology in recent history. Correspondingly, the most popular types of smartphone apps are those that deal with food intake, exercise routines, diets, health and fitness, games and social networking apps (Boulos & Yang, 2013).

Accordingly, there are a multitude of apps that accommodate each category. This literature review will examine data from previous studies in order to determine what the popular health and fitness apps are; logistics of health and fitness apps and who uses them; what are the characteristics of the popular health and fitness apps and the projected future of health and fitness apps. With the literature review goals established, the following examines the more popular health and fitness apps.

**Popular Health and Fitness Apps**

There are many popular apps available, but which ones are the most popular downloads? The following represents the top five grossing health and fitness apps in the United States as of March 14, 2017 from the iOS store; Sweat with Kayla - Bikini Body Workouts and Exercise, Running for Weight Loss, Calorie Counter and Diet Tracker, Headspace: Guided Meditation and Weight Watchers (Appannie.com, 2017b). Correspondingly, the top five grossing heath and fitness apps downloaded from the Google Play store in the United States as of March 14, 2017 were; Calorie Counter, Headspace: Guided Meditation, Calm: Meditation to Relax, Geocaching and 8fit Workout and Meal Planner (Appannie.com, 2017a). Even though these are the popular downloads from two different sources, this does not necessarily mean that they are the most popular apps among users.

The above data represents popular grossing downloads from the Apple iOS store and Google Play stores. Even so, the following is a sample of 15 popular apps as referenced from various sources: Charity Miles, Couch to 5K, DietBet, Fit Radio, FooduCate, Lifesum, Lose it,

Undoubtedly all of the above apps are popular, but what is the appeal of these apps that inspire users to download them? The features these apps initially appear to have in common are that they accurately measure a distance, time or an intake. Some may motivate users to exercise or diet, yet other apps may enable users to “bet” on their progress. Nevertheless, these apps have common factors that appeal to users, which motivate users to download them. The following explores logistics of health and fitness apps and who uses these apps.

**Logistics of Health and Fitness Apps and Who Uses Them**

People download health and fitness apps for many reasons. The most common reason is to track physical activity. Others reasons include tracking food intake, tracking weight or to learn new exercises. There is an abundance of apps available to accommodate different kinds of needs, which may include nutrition information, counting calories, monitoring vital signs, health tips, logging fitness workouts, calculating disease risks or measuring body mass index among others. Apps for maintaining personal health records are abundant also. Some apps are able to supply health information to emergency personnel or physicians. In addition, apps can supply tips for yoga stretching exercises, smoking cessation or give detailed data about medications. These are only a small sample of tasks users can realize using apps (Paschou et al., 2013). However, most users appear to be concerned with physical activity, food intake and weight management (Krebs & Duncan, 2015). Correspondingly, a study conducted by Schulman, Shah, Weinfurt, Eapen and Sama, discovered that fitness and training was the most popular health factor (2014). Users appear to enjoy features that include collections of exercises users can follow or predesigned
exercise plans. Other motives include having access to a health resource, such as a doctors office or gym and lastly, for diet or calorie intake reasons (2014). It is desirable to be able to track calorie consumption alongside exercise activity (Sengers, Stubler, Williams, Schwanda, & Purpura, 2011). Apparently, the reason users download health and fitness apps overall are to focus on fitness and self-monitoring (Schulman et al., 2014). On the contrary, the most common reasons people do not download health and fitness apps are cost, lack of interest or anxiety about apps collecting their data, as related to privacy concerns (Krebs & Duncan, 2015). Additionally, a study conducted by Cummiskey found that the growing popularity of smartphones could be viewed with both concern and optimism (2011). The availability of apps can be used on demand from almost anywhere and is an efficient approach to health and fitness concerns. Yet, smartphones are used mostly for non-health enhancing or sedentary activities. The study found that the top five categories of applications were weather, games, social networking, Internet searches and music. In contrast, applications related with personal health or lifestyle ranked seventeenth. Nevertheless, there are thousands of apps that can be used in physical education and health, such as those that monitor and collect data. If teachers in schools learn to promote these apps so that they improve the health of their students, the impact could be remarkable. The study concluded that the fields of health and physical education are intended to promote active, healthy lifestyles, but newer technologies can be a part of this only if we embrace them. Smartphones usage can potentially promote health and physical activity, however in contrast, these technologies can also promote an idle or sedentary lifestyle (Cummiskey, 2011). Overall, the use of these technologies is essentially up to the user.

It is also significant to note that previous studies show individuals who utilize health and fitness apps are more likely to be younger, educated, have higher incomes, have a body mass...
index in the obese range and are Hispanic (Krebs & Duncan, 2015). In addition, studies also show that young adults are more likely than other age groups to utilize their phones to manage their health and fitness data. Roughly, 24% of young adults use health and fitness app for fitness tracking purposes or managing their health (Franklin Wann, Gwin, Cheney & Gowin, 2015).

It is meaningful to note that those that use these apps regular basis have established a certain degree of comfort with these apps. In a study conducted by Franklin Wann et al., participants spoke of the app as if it were a real live person and expressed to interviewers that their app coached, motivated or even sometimes shamed or guilted them into accomplishing their goals (2015). Young adults especially, are considered “digital natives” since they have used this technology their entire lives and consider technology as a “natural extension of themselves” (Franklin Wann et al., 2015). Accordingly, Cummiskey found that their media and technology use define people born after 1990. Additionally, this generation of users loves electronic communication and the need to multitask (2011). Users of these apps also trust in the accuracy of the app and felt that their personal data was safe. (Krebs & Duncan, 2015). The Consumer Technology Association’s research validates that health and fitness devices assist users in feeling more successful in setting fitness and health goals and tracking their improvements. Consequently, users believe that their lives are enhanced because of these devices (Pai, 2015). Correspondingly, the following analyzes mobile app usage in general.

In a study conducted by Böhmer, Hecht, Schöning, Krüger and Bauer, mobile app usage behavior was analyzed (2011). The first stage in the “life” of an app is the initial download or installation of the app by the user. Another notable event is the update of an app, which demonstrates continuing interest in the app by the user. However, because updates are usually performed automatically by the system and the update depends strongly on the developer, the
insight into usage behavior from an “update event” may not be reliable or accurate. The last event that can be noted in the life of an app is the “uninstall event”, which signifies that the user no longer wants the app and is not interested in keeping it (Böhmer et al., 2011). Congruently, this study also revealed that users spend an average of 59.23 minutes per day on their devices. Yet, the average time a user had an app open was 71.56 seconds at a time. Interestingly, users spent the least amount of time on apps that ranged from finance, travel, communication, productivity, shopping and social media. In contrast, users spent the most time on apps that ranged from health, lifestyle, references, tools, themes and libraries. The following table illustrates app usage by category from the least amount of time to the most amount of time.

Table 1

<table>
<thead>
<tr>
<th>Category</th>
<th>Average Usage (in seconds)</th>
<th>Example Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finance</td>
<td>37.01</td>
<td>Mint.com, Bank of America</td>
</tr>
<tr>
<td>Travel</td>
<td>44.72</td>
<td>Yelp, Waze, Google Maps</td>
</tr>
<tr>
<td>Communication</td>
<td>46.92</td>
<td>Google Mail, Yahoo Mail</td>
</tr>
<tr>
<td>Productivity</td>
<td>61.49</td>
<td>Calendar</td>
</tr>
<tr>
<td>Shopping</td>
<td>61.71</td>
<td>Craigslist, Amazon.com</td>
</tr>
<tr>
<td>Social</td>
<td>62.69</td>
<td>Facebook, Twitter</td>
</tr>
<tr>
<td>Sports</td>
<td>65.98</td>
<td>ESPN ScoreCenter</td>
</tr>
<tr>
<td>News</td>
<td>68.11</td>
<td>BBC News, Reddit</td>
</tr>
<tr>
<td>Settings</td>
<td>68.71</td>
<td>Default Settings App</td>
</tr>
<tr>
<td>Browser</td>
<td>74.01</td>
<td>Default, Dolphin, Skyfire</td>
</tr>
</tbody>
</table>
HEALTH AND FITNESS SOFTWARE APPLICATIONS

<table>
<thead>
<tr>
<th>Category</th>
<th>Percent of Time Usage</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entertainment</td>
<td>76.90</td>
<td>TV Guide, IMDb</td>
</tr>
<tr>
<td>Multimedia</td>
<td>82.79</td>
<td>Pandora, Music, Camera</td>
</tr>
<tr>
<td>Comics</td>
<td>91.33</td>
<td>Dilbert Mobile, Daily Strip</td>
</tr>
<tr>
<td>Games</td>
<td>114.25</td>
<td>Solitaire, Words with Friends</td>
</tr>
<tr>
<td>Health</td>
<td>153.80</td>
<td>Cardio Trainer, Baby ESP</td>
</tr>
<tr>
<td>Lifestyle</td>
<td>167.77</td>
<td>Recipes, Daily Horoscope</td>
</tr>
<tr>
<td>Reference</td>
<td>176.26</td>
<td>Kindle Bookreader</td>
</tr>
<tr>
<td>Tools</td>
<td>206.26</td>
<td>Google, Apps Organizer</td>
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<tr>
<td>Themes</td>
<td>258.28</td>
<td>Screensaver, HomeChange</td>
</tr>
<tr>
<td>Libraries &amp; Demos</td>
<td>274.23</td>
<td>Google Services, Framework</td>
</tr>
</tbody>
</table>

*Note:* From Falling Asleep with Angry Birds, Facebook and Kindle (Böhmer et al., 2011).

It is significant to note that of the 20 categories listed, the “health” category is in the top third of time usage data. App usage behavior recognized; the following identifies diurnal patterns of various categories of apps.

A study conducted by Xu et al., analyzed diurnal patterns or app usage during certain times of day (2011). Apps overall have more activity during the day than during the night, but this statistic does not apply to every kind of app. The significance of diurnal patterns in apps is valuable because app usage data lets cloud providers know when best to optimize the network to accommodate higher usage levels during certain times of the day. The study focused on the access times consumed and traffic volumes by smartphone apps at different times of the day, collectively and with different genres of apps. The outcomes of the study discovered that there are distinct diurnal patterns of app usage by genre as well as aggregate, but the patterns of
various genres are markedly different. The popular apps were aggregate together in the same genre and the distribution of traffic volumes was computed at hourly intervals. The results revealed that there are normalized traffic volumes during the day. The traffic patterns demonstrate that different genres demonstrate different diurnal patterns. Social network apps specifically have a similar pattern as the aggregate, however, news and weather apps are more frequently utilized early in the morning hours. Sports apps tend to peak in the early evening, because users check scores or watch sporting events during these times. Game apps also proved to peak after normal working hours as expected, because the evening hours are the normal recreation time for users. Other types of apps had diurnal patterns that were less noticeable since their usage was minimal during daytime hours. The overall findings suggest that cloud platforms that host mobile app servers can leverage usage patterns in certain types of apps to maximize their resources. Again, this data allows network operators to leverage these results by optimizing their network for different kinds of apps during different times of day (Xu et al., 2011). The reason users download apps, the types of users who download apps, user diurnal patterns of apps or app usage behavior is clear. User habits established; the following explores prevalent features of health and fitness apps.

**Characteristics of the Popular Health and Fitness Apps**

The popular health and fitness apps evidently have certain key features. Apps can perform many functions as well as track data, which is their appeal. Nevertheless, what is so attractive about certain apps? Which functions drive the more popular health and fitness applications? A study conducted by Higgins noted that there are specific characteristics of the more popular apps (2015). Nineteen popular apps were evaluated with 14 of the top features noted. The top three favorite features most of these apps revealed are that they monitor exercise,
that they allow users the option to post on social media and that they provide tailored feedback. Other significant features of these apps are that they enable goal setting, they have audio cues, they synchronize with other apps and they enable users to monitor their diet. Further notable features are that they provide a “virtual coach”, have a music playlist, show progression, scan barcodes or provide a narrative story. The least favorite, but notable of these features is a sleep monitoring feature (Higgins, 2015). Even though these features appear to be popular among users, the following notes the significance of smartphone owners in relation to health and fitness apps.

According to Lupton (2014), “85% of American adults own a mobile phone. Fifty-three percent of these were smartphones and one fifth of smartphone users used their phone to download a health related app. The most popular of these apps were related to exercise, diet and weight” (p. 1). Consequently, it is evident that almost 20% of those with smartphones utilize one or more app on their device that assists in tracking or managing health (Whiteman, 2014). Unsurprisingly, it is notable that the most common downloads are “FitBit” and “MyFitness”, which are free apps that track calorie intake and fitness (Whiteman, 2014). It is noteworthy that many consumers utilize mHealth (mobile health) applications to assist with their health and perceivably to improve their lives. Many mHealth apps meet the needs of specialties in medicine and function in similar ways, whether they work stand-alone or online. The common characteristics of these apps are that they communicate with other apps in order to resolve a health issue and they record or track medical information. This data can also be sent to servers that store personal health records or they can provide the data directly to physicians (Paschou et al., 2013). It is evident that smartphone users are a significant percentage of those utilizing health and fitness apps; still, the following expands upon the more notable characteristics of popular
Cost is a notable concern with users. Free apps appear to be popular as a result. A study conducted by Krebs and Duncan discovered that a large number of users were not willing to pay for a health or fitness app (2015). Furthermore, even though users were pleased with the ease of use of certain apps, even a minimal fee presented a barrier. Many paid apps cost between $0.99 and $1.99, which is less than most would pay for a cup of coffee, but the cost of an app was still an obstacle. The reasoning behind this is that because so many apps are free, users find it unnecessary to pay for an app (Franklin Wann et al., 2015). In addition, there is evidence to support that the more popular health and fitness apps are free.

Of the top five popular downloaded apps listed above from the iOS store and Google Play store, the top 50 grossing apps were listed from each store (the top five apps were listed above for brevity). Of note, eight out of the 50 top downloaded apps in the “grossing” category in the iOS store were paid, meaning that 84% of the top 50 popular “grossing apps” were free. Similarity, five out of the 50 top downloaded apps in the “grossing” category in the Google Play store were paid, meaning that 90% of the top 50 popular “grossing apps” were free. These figures clearly suggest that “free” apps are evidently more popular than “paid” apps. However, in a study conducted by West, Hall, Hanson, Barnes, Giraud-Carrier and Barrett, it was discovered that paid apps over $0.99 were more likely to be download by users in order to prevent disease or promote health (2012). Congruently apps related to physical activity, healthy eating, wellness or personal health were more commonly downloaded than apps for mental health, emotional health, substance abuse, safety and violence prevention, or reproductive and sexual health (West et al., 2012). Even though some apps were more popular than others were in the paid category, this data does not necessarily reflect on specific features that users want. Yet, even though users
appear to prefer “free”, apps that are “usable for all” is also a well-liked feature.

Usability is notably popular. In a study conducted by Roehrer and Zaidan, the kind of app that is “usable for all” was recognized as appropriate for a wide variety of users (2016). An example of apps that incorporate “usable for all” features are those that can be utilized in different languages, include a variety of exercises, are suitable for both men or women and includes a wide range of age groups. Additionally, an app can incorporate products such as diet plans or foods that are suitable for people with varying diets, such as vegetarians, pregnant women or those with diabetes. This type of app offers many options and as a result, can attract users. Generally, this kind of app is not restricted to a specific group of users and allows for the freedom of choice (Roehrer & Zaidan, 2016). Usability established; synchronization is also significant.

Synchronization is an important aspect of mobile phone apps. Countless fitness and health apps only record a single type of data (Summers, 2013). Some mobile phone apps are able to produce more than one function when they are synchronized with other technologies. For example, a wearable medical device can provide an advantage because it can monitor and detect symptoms. The sensors in these medical devices allow for monitoring of vital signs such as heart rate, blood pressure or other body activity’s. This kind of feature can supplement diet and weight loss apps. An example of a wearable device is a smartwatch, which can synchronize with a smartphone using Bluetooth or other wireless technology (Roehrer & Zaidan, 2016). Other than synchronization, convenience is a factor.

Convenience is a popular feature. Logging food items and self-monitoring is time consuming and burdensome to users and can result in underestimation or noncompliance because data can be changed in order to avoid the inconvenience of recording. Therefore, enhanced
features such as barcode scanners can help reduce user burden as well as maintain motivation and compliance, which encourages people to keep using the app (Chen et al., 2015). Convenience aside, tracking tools are essential.

Tracking tools are definitely a popular feature of health and fitness apps. It is desirable to be able to count calories, log workouts, measure runs, measure walks or measure bicycle rides. It is also appealing for the user to be able see improvement over time by comparing workout statistics (Duffy, 2016). The Consumer Technology Associations research shows that those who focus on fitness specifically like to measure heart rate, calories burned, distance traveled, steps taken and blood pressure. Likewise, users who focus on health prefer to measure heart rate, calories burned, blood pressure, steps taken and distance traveled (Pai, 2015). Additionally, some health and fitness apps are also “coaching apps” that put users in touch with a nutritionist or personal trainer who will check on the user on a regular basis. Some apps combine all these tracking tools completely (Duffy, 2016). One example of an app with tracking tools is “MyFitnessPal” which allows the user to count calories consumed on a daily basis in addition to adding up the calories expended so users can confirm if they balance. “MyFitnessPal” can also estimate how many calories are burned by means of monitoring activity data. This feature helps the user be more aware of their eating habits as well as how much exercise is required to burn off the food consumed (Duffy, 2016). Participants of a study conducted by Franklin Wann et al., expressed how tracking raised awareness of a target behavior or provided encouragement and support via auditory or visual cues (2015). Examples of auditory cues are hearing the app “tell” users they are nearly done with a run. Examples of visual cues are being able to see calories left for the day go from “green to red” when users over consume food, or going back to “green” when burned calories exceed calories consumed (Franklin Wann et al., 2015). Weight or energy
progress charts or modifiable food databases are one of the most technology-enhanced features among health and fitness apps, along with barcode scanners and online social networking or support. Some apps are able to transfer data, either for direct access by the user or for a dietician to access and analyze. Likewise, other apps feature physical activity data tracking via a pedometer, accelerometer or connections to other types of activity monitoring apps (Chen et al., 2015).

Of note, apps that do not possess the above traits are more likely to be discarded by users. In a study conducted by Chen, Cade and Allman-Farinelli, a sample of the top 800 health and fitness apps were tested (2015). Of these apps, 55 of them met the criteria required after the initial screening for the tests and were downloaded for analysis. After one day of testing, 27 apps were omitted from further evaluation because of not being stand-alone, lack of tracking functions or duplication reasons (Chen et al., 2015). Tracking tools are definitely a popular component, but music is apparently a popular feature as well.

Many users like to listen to music while exercising. On occasion, some users like music to help motivate them. For example, the “FIT Radio” app specializes in “playlists” that a user can play during different workouts such as yoga or running. The music is streaming and has a consistent beat that matches the running or workout pace of the user. Once the app determines the running tempo of the user, it maintains the “beats-per-minute” setting so the music becomes a “metronome” of sorts. The “RockMyRun” app has a similar feature, but this app speeds up or slows down the music in real time as the users running tempo changes (Duffy, 2016). Music recognized; challenges and motivation are also high on the list of favorite features.

Apps that offer challenges often motivate the user. The “Johnson and Johnson Official 7 Minute Workout” app allows users to get a certain amount of exercise in a short amount of time,
which often presents a challenge to users. It is different from other seven-minute workout apps in that this app adjusts its level of difficulty based on the user's current fitness level, but it also includes workouts that are longer than seven minutes (Duffy, 2016). On a related note, challenges can be associated with motivation. Again, the more challenged a user is, the more motivated they may become. Motivation as associated with persuasive technology is a popular growing element of health and fitness. Fritz, Huang, Murphy and Zimmermann conducted a study concerning persuasive technology and the use of activity sensing devices (2014). Wearable devices intended to motivate and track physical activity such as the “Fitbit” or “Nike FuelBand” provided the best opportunity to study user practices over long-term use. The features of persuasion on these devices range from fitness challenges to competitions while allowing the user to set goals. The challenges encourage the wearer in certain activities and behaviors. Evolving practices and goals that users specify complicate the challenges. Another prominent motivation factor discovered is that the users can find peers with like goals either in a social network or in the real world, which tends to be more helpful than a personal connection. The study found overall that in spite of changing goals and practices over time, most users continued to get motivation and value from “wearables” technology. This suggests to the developers how to continue persuasive technologies for long-term support for health behavior as well as motivation for change (Fritz et al., 2014). Other than challenges, motivation and persuasive technology, apps that are similar to games are also popular.

Gamification or game-related apps are growing in popularity. The more fun fitness is, the more motivating it is. Gamification in health and fitness apps is becoming more popular as demonstrated by the growing number of health and fitness apps found in app stores that include components of gamification (Brodegard, Sax, Cannon, West & Lister, 2014). Notably, gaming
HEALTH AND FITNESS SOFTWARE APPLICATIONS

apps alone are the most downloaded and utilized apps on mobile phones (Lindenauer, Kalnicki & Mendiola, 2015). Therefore, it is no wonder that gamification in health in fitness apps is an appealing feature. Many tablets and smartphones incorporate Global Positioning System (GPS) into their apps. This enables “network location” functions on mobile devices, which integrates game mechanics or gamification characteristics that involve the user beyond the basic GPS function. These functional components include distance and speed, time, elevation or location such as in an alternate “game” reality and these elements require users to perform game tasks in a certain predefined or geographical area (Boulos & Yang, 2013). Similarly, in a study conducted by Boulos and Yang, there was a relationship discovered between the motives, psychological mediators, motivation and outcomes of gamification as connected with physical activity (2013). Specifically, the motives users liked the most were appearance, enjoyment and weight loss. The meditators discovered were autonomy, competence and relatedness. The motivation factors were amotivation, extrinsic and intrinsic. Lastly, the outcomes users favored were enjoyment, activity, adherence and affect or feelings (Boulos & Yang, 2013). Other than game associated apps, money is a constant when it comes to motivation.

Money is a definite factor of motivation. “Charity Miles” is an app that tracks workouts such as bicycle rides, runs or walks while a corporate sponsor donates money for every mile the user completes. Before the workout begins, users can select a favorite charity. Corporate sponsors then pay the charity of the user’s choice after the workout is complete (Duffy, 2016). Another app that is money based is “Pact”. This app allows the user to wager money on whether they will workout as often as they claim they will. The user earns money if they keep their promise on how often they intend to workout. The app uses GPS to locate the user and confirms if they made it to the gym and then verifies whether the user remained at the gym long enough to
work out. If the user does not keep their wager, they lose their money to other users of the app (Duffy, 2016). “DietBet” enables betting challenges along with dieting. This app allows the user to select a challenge based on how long they want the challenge to last and how much money they want to wager. As a result, if the user loses at least 4% of their body weight, they can win back the money they bet on themselves plus additional money (Veling, 2017). With the overall popular features recognized above, the following defines features considered desirable in physical activity and health matters.

In a study conducted by Bock and Rabin, participants identified a number of features desired in physical activity apps (2011). The most popular feature was “automatic tracking of steps and calories burned”. Other significant features include a “daily photo” option that visually tracks progress, a graphic or table generator that displays statistics, an integrated music feature, a pacer or “metronome” type feature, and a feature that tracks history and progress toward weight goals. Other notable features are a Body Mass Index (BMI) calculator, a goal setting feature that displays how much physical activity is required to reach a goal, the ability to “pause” a workout, the ability to track physical activity during the course of the day, food consumption and weight loss tracking and finally, helpful advice or tips for increasing physical activity. The least favorite, but notable of these features is weight training videos, a scheduling feature for physical activity and surprisingly, a link to GPS to track distance traveled. The participants of this study also expressed interest in other features such as a range of activities including indoor, outdoor activities, and “one click” navigation that allows users to navigate from a main page to other features (Bock & Rabin, 2011). Additionally, in a study conducted by Paschou, Sakkopoulos and Tsakalidis, the popular features of mHealth apps were defined (2013). Specific features of mHealth apps that users preferred were a calorie calculator, a blood pressure monitor, a method
to lookup fast food calories, weight tracker, a period and ovulation tracker, an asthma log and
tracker, a body mass index calculator and a feature to track diabetic issues (Paschou et al., 2013).
Also of value are tailored data and options to manage health conditions. In addition, the option to
be able to share personal data with other specified users is also desirable (Lindenauer et al.,
2015). Popular features of physical activity and mHealth established, the following briefly
discusses the social media component of health and fitness apps.

It is worth mentioning that apps connected with social media are not always a favorite
feature, however it depends on the particular user. Some apps allow users to link and share
information with social networks. Participants of a study conducted by Yardley, Conway,
Morrison and Dennison specifically stated that some users would not want to publicize
information concerning health behaviors or goals to friends on social media sites such as
Facebook or other types of social media (2013). Users considered these sites unsuitable places to
share information of a personal nature or to ask for help or support. They believed that this made
them appear “vulnerable or weak”. However, some users like to post on social media about
distances they have run or other various accomplishments (Yardley et al., 2013). It is clear that
even though a few do, most users do not want to post personal health and fitness information on
social media.

Some other apps even though popular, may not be considered by some to be typical
health and fitness apps, but still have desirable features that are consistent with health and fitness.
“Pokémon GO” is an example of such an app. “Pokémon GO”, is not a traditional weight loss
app, but many believe this app motivates users to “get off the couch” and “walk all over the city”
in order to locate other users of “Pokémon GO” (Chokkattu, 2017). Another health related app is
“Sleep Cycle”, which is a free app that measures a users sleep cycle as its name implies. It
simply wakes the user sometime during the thirty minute window before the alarm goes off when the user is in their lightest sleep state (Watson & Cattel, 2016). In addition, a free app named “Relationup” offers relationship advice for a fee. It allows users to text with qualified and prescreened relationship counselors, who are less expensive than going to therapy sessions. Counselors are available 24 hours a day, seven days a week to assist users with anything from breakup questions to dating issues to family drama (Watson & Cattel, 2016). With various characteristics recognized, the following is an overview of a typical, popular health and fitness app.

Overall, the features of a quality health and fitness app are as follows (in no particular order):

- It has a user-friendly interface.
- It is free.
- It offers a free trial version (if a paid app).
- It is easy to initiate and is reliable during activities.
- It allows for goal setting.
- It provides personalized “real-time” feedback.
- It can be customized.
- It may provide consultation.
- It encourages behavior change.
- It motivates the user.
- It synchronizes with other apps.
- It allows for easy review and sharing of statistics.
- It supports social networking.
Specific favorite features established; the following examines control features that are common in favorable health and fitness apps.

First, “spinners” are a fast method of choosing one value from a set of options. Touching the spinner prompts a drop down menu that presents other choices that the user can select. “EditText” enables the user to type text. The text entered can be either multiple lines or single lines. “ListView” is a view group that shows a list of scrollable options. “Radio buttons” enable the user to choose from exclusive options. A “button” feature is either an icon, text or a combination of both that conveys what action happens with the user touches it. “TextView” is a feature that presents text to the user and allows them the option to edit it. Finally, “ImageView” shows an icon or an image. This feature can import images from a variety of sources (Paschou et al., 2013). Whether considering the popular features or specific control features, the most appealing health and fitness apps are intuitive and simple to use. However, as stable as the popularity of certain apps may seem, what are concerns for future development? The following explores what may in store for the future of health and fitness apps.

Projected Future Developments

Many people use health and fitness apps, however, there are a substantial number of people who do not. Even among those who utilize these apps, many stop using them for reasons such as the burden of data entry, hidden costs or merely loss of interest. This suggests issues such as the cost of the app, hidden fees or the burden of data entry should be addressed in future development. In addition, clinical trails are also necessary in order to test the proficiency of an app, which may extend the appeal of an app (Krebs & Duncan, 2015).

Some features that improve health and fitness apps are already in progress. According to
Higgins (2015), “new mHealth applications are being developed that will revolutionize how the healthcare industry interacts with patients and create virtual health records that can be accessed worldwide” (p. 18). Accordingly, the development of apps that deal with processing, acquisition, transmission, storage retrieval and use of health data are also in progress. This development is expected to help transparency between medical providers and users. Security and privacy are also future concerns for both users and healthcare providers especially. Current apps lack privacy policies and apps that do include these concerns are not always transparent (Higgins, 2015). Additionally, more gamification is anticipated in future apps. Game designs that engage users while at the same time getting them to accomplish goals is expected to increase user interest. Synchronization is already a feature among different apps, but future developments of a single app that covers most, if not all major features would eliminate the need for synchronization between various apps (Higgins, 2015).

Other anticipated developments include the increased use of sensors. The incorporation of apps supporting mobile hardware such as electronic medical records and sensors is rising (Ory et al., 2015). If mHealth developers are able to make apps compatible with eternal sensors and measurement devices, this could definitely bring value to users (Seng, Holroyd, Zhu & Liu, 2011). On a related note, “wearables” are emerging more in consumer technology. Fitness devices such as “FitBit”, “Withings Pulse” and “Nike FuelBand” are attempting to streamline how exercise is measured (Summers, 2013).

What is projected for the future of health and fitness apps in general? Almost any kind of data can be tracked or measured digitally. Specifically, digital health apps could potentially schedule appointments, notify the user if an appointment is delayed, assist to monitor the side effects of medications or assist the user in following a care plan. Advancements like this could
revolve health care in that it would involve patients with their health and health care providers more efficiently than ever before (Whiteman, 2014).

Summary

There is thousands of accessible health and fitness apps, with billions of documented downloads and no shortage of those willing to utilize these apps. However, what is the appeal of certain health and fitness apps? The following is a summary of the goals of this literature review which include; what the popular health and fitness apps are; logistics of health and fitness apps and who uses them; the characteristics of the popular health and fitness apps and the projected future of health and fitness apps.

In brief, there are many popular health and fitness apps. The typical user is younger, educated, and obese with a higher income than their peers have. Characteristics of popular health and fitness apps appear that most are free, include “usable for all” features, they are able to synchronize with other apps, they provide convenience, they provide tracking tools, they provide music, they provide challenges and motivation, they are similar to a “game” or they can inspire users with money. Future projected developments appear to range from “ease of use” to “wearable items”. Other elements that developers could add would likely improve the efficiency or effectiveness of an app, however, app developers are mostly concerned with how well an app technically works in addition to how well the user interface works (Palaniappan, Lesser, Laing, & Azar, 2013). The consumers or “users” have to be the drivers (Dawson, 2015). In brief, users must essentially “drive” the technology. Even though the above data is from previous studies, peer reviewed articles or other media sources, nothing appears to clarify favorite features desired in future health and fitness apps from a user perspective.

With the four above literature review goals clarified throughout and then summarized, the
following is user input via an electronically distributed survey instrument which examined what people desire in health and fitness apps from a user's vantage point. The survey is not only intended to identify favorite health and fitness features, but enhancements or improvements that participants desire in future health and fitness apps as well.
Research Design

Introduction

This portion of the research provides specific details of how the study was conducted in addition to the methodology used. This section starts with summaries of the research questions, followed by the variables of the research. The section following the variables describes the data collection process, followed by the limitations of the research.

Research Questions

This study pursued answers to three main research questions.

1. In what way do people utilize software applications to assist them with health and fitness matters?

   This question establishes the baseline for the research. The answer to this question will determine what health and fitness applications that people already use and prefer.

2. What specific features in health and fitness software applications are the most popular with users?

   The most popular health and fitness software applications are popular for a reason. This question intends to discover which features about existing health and fitness software applications that users prefer the most.

3. What kinds of features would users want in future software applications?

   Technology is continually advancing and that includes being able to efficiently measure different health and fitness aspects in various ways on software applications. The participants of the survey had the opportunity to express what kinds of features or improvements they desire in future health and fitness software applications. Then the study evaluated data from users via
survey input, which determined what kind of “new” features or enhancements they would enjoy in future health and fitness software applications.

**Identification of Variables**

The first variable of this research was to determine what the popular health and fitness software applications are and what users like about these applications. The other variable of this research used survey input which determined what kind of improvements or features users want to see in future health and fitness software applications.

**Data Collection Technique**

The data input for this research was from the results of a survey conducted using an electronically distributed survey instrument. The participants for this study were 69 adult men and women of at least age 18 who currently utilize health and fitness software applications in some fashion.

**Limitations**

A majority of respondents were white/Caucasian women, even though the survey was available equality to both men and women and a variety of ethnicities. Additionally, a high percentage of respondents claim California as their state of residence, which represents geographic limitations.
Results

Response Distribution and Demographics

The survey for this study consisted of 116 participants with 69 completed surveys resulting in 59% of completed responses in a three-week period. Those participating were 87.6% female while 13.4% were male noted in figure 1. The overall ages of the participants ranged from 18 to 74 with 27.9% ranging from 35 to 44 and 29.4% and ranging from 45 to 54 noted in figure 2. The majority ethnicity of participants was 82.4% white/Caucasian, while 10.3% of participants were Hispanic or Latino, 4.4% were black or African American and 4.4% chose not to answer noted in figure 3. A significant number of participants are married representing 41.2%, while 22.1% are single, never married noted in figure 4. A large percentage of participants graduated from college representing 38.2%, while 29.4% completed graduate school noted in figure 5. Many types of occupations were represented, however, “Healthcare Practitioners and Technical Occupations” represented 18.6% of the participants, while 11.8%, chose not to answer noted in figure 6. A majority of the participants is employed full time representing 78.3%, while 5.8% report part time employment and 5.8% report that they are retired noted in figure 7. The majority of participants reside in California representing 55.9% while 19.1% reside in Texas, 4.4% reside in Virginia and 4.4% reside in Florida noted in figure 8. The types of community participants reside in are mostly urban representing 59.4%, while 34.8% of participants report suburban communities noted in figure 9.
Figure 1: Participant Gender Distribution

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
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</thead>
<tbody>
<tr>
<td>Female</td>
<td>86.6%</td>
<td>58</td>
</tr>
<tr>
<td>Male</td>
<td>13.4%</td>
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</tbody>
</table>

Figure 1: Participant Gender Distribution

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<tr>
<th>Answer Options</th>
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</thead>
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<td>18 to 24</td>
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<td>25 to 34</td>
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<td>35 to 44</td>
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<td>45 to 54</td>
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</tr>
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<td>55 to 64</td>
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Figure 2: Participant Age Distribution

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</thead>
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<td>75 or older</td>
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</table>

Figure 3: Participant Ethnicity

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<th>Ethnicity</th>
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<th>Response Count</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>Asian or Pacific Islander</td>
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<td>0</td>
</tr>
<tr>
<td>Black or African American</td>
<td>4.4%</td>
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</tr>
<tr>
<td>Hispanic or Latino</td>
<td>10.3%</td>
<td>7</td>
</tr>
<tr>
<td>White / Caucasian</td>
<td>82.4%</td>
<td>56</td>
</tr>
<tr>
<td>Choose not to answer</td>
<td>4.4%</td>
<td>3</td>
</tr>
</tbody>
</table>
Answer Options | Response Percent | Response Count
--- | --- | ---
Married | 41.2% | 28
Widowed | 2.9% | 2
Divorced | 10.3% | 7
Separated | 2.9% | 2
In a domestic partnership or civil union | 1.5% | 1
Single, but cohabiting with a significant other | 17.6% | 12
Single, never married | 22.1% | 15
Choose not to answer | 1.5% | 1

*Figure 4: Participant Relationship Status*
### Participant Education Data

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<tr>
<th>Answer Options</th>
<th>Response Percent</th>
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<td>Graduated from college</td>
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<td>Some graduate school</td>
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<td>Completed graduate school</td>
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</table>

*Figure 5: Participant Education Data*
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<th>Management Occupations</th>
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<tbody>
<tr>
<td>Business and Financial Operations Occupations</td>
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<td>Computer and Mathematical Occupations</td>
</tr>
<tr>
<td>Architecture and Engineering Occupations</td>
</tr>
<tr>
<td>Life, Physical, and Social Science Occupations</td>
</tr>
<tr>
<td>Community and Social Service Occupations</td>
</tr>
<tr>
<td>Legal Occupations</td>
</tr>
<tr>
<td>Education, Training, and Library Occupations</td>
</tr>
<tr>
<td>Arts, Design, Entertainment, Sports, and Media Occupations</td>
</tr>
<tr>
<td>Healthcare Practitioners and Technical Occupations</td>
</tr>
<tr>
<td>Healthcare Support Occupations</td>
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<tr>
<td>Personal Care and Service Occupations</td>
</tr>
<tr>
<td>Sales and Related Occupations</td>
</tr>
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<td>Office and Administrative Support Occupations</td>
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<tr>
<td>Construction and Extraction Occupations</td>
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<tr>
<td>Installation, Maintenance, and Repair Occupations</td>
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<td>Production Occupations</td>
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### Answer Options

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<td>Architecture and Engineering Occupations</td>
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</tr>
<tr>
<td>Life, Physical, and Social Science Occupinations</td>
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<td>Community and Social Service Occupations</td>
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<td>Legal Occupations</td>
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<td>Education, Training, and Library Occupinations</td>
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<td>5</td>
</tr>
<tr>
<td>Arts, Design, Entertainment, Sports, and Media Occupations</td>
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<td>Healthcare Practitioners and Technical Occupations</td>
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<td>Healthcare Support Occupations</td>
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<td>Sales and Related Occupations</td>
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<td>Production Occupations</td>
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*Figure 6: Participant Occupation Data*
### Answer Options

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<td>Employed, working part-time</td>
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</tr>
<tr>
<td>Not employed, looking for work</td>
<td>2.9%</td>
<td>2</td>
</tr>
<tr>
<td>Not employed, NOT looking for work</td>
<td>2.9%</td>
<td>2</td>
</tr>
<tr>
<td>Retired</td>
<td>5.8%</td>
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</tr>
<tr>
<td>Disabled, not able to work</td>
<td>1.4%</td>
<td>1</td>
</tr>
<tr>
<td>Choose not to answer</td>
<td>2.9%</td>
<td>2</td>
</tr>
</tbody>
</table>

*Figure 7: Participant Employment Data*
Participant demographics recognized above; the below sections analyze survey results as related to the research questions which examines how people utilize software applications in order to assist them with health and fitness matters. Additionally, what specific features in health and fitness software applications are the most popular with users and lastly, what kinds of features would users want in future software applications is also examined. Initially, the below

**Figure 8: Participant State of Residence Data**

<table>
<thead>
<tr>
<th>State</th>
<th>Percent</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nevada</td>
<td>1.5%</td>
<td>1</td>
</tr>
<tr>
<td>New Jersey</td>
<td>1.5%</td>
<td>1</td>
</tr>
<tr>
<td>New York</td>
<td>1.5%</td>
<td>1</td>
</tr>
<tr>
<td>Oregon</td>
<td>1.5%</td>
<td>1</td>
</tr>
<tr>
<td>Texas</td>
<td>19.1%</td>
<td>13</td>
</tr>
<tr>
<td>Virginia</td>
<td>4.4%</td>
<td>3</td>
</tr>
<tr>
<td>Choose not to answer</td>
<td>2.9%</td>
<td>2</td>
</tr>
</tbody>
</table>

**Figure 9: Participant Community Type Data**

<table>
<thead>
<tr>
<th>Community Type</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>City or urban community</td>
<td>59.4%</td>
<td>41</td>
</tr>
<tr>
<td>Suburban community</td>
<td>34.8%</td>
<td>24</td>
</tr>
<tr>
<td>Rural community</td>
<td>5.8%</td>
<td>4</td>
</tr>
</tbody>
</table>

Answer Options

- City or urban community
- Suburban community
- Rural community
lists the various health and fitness apps that are participant favorites, the types of devices
participants utilize and finally, frequency of use via survey input.

**Favorite Health and Fitness Apps and Their Usage**

There are many popular health and fitness apps listed by the participants. Among the
apps users listed on the survey were 24 mentions of “MyFitnessPal”; 17 mentions of “Fitbit”; six
mentions of “S Health”; five mentions of “Weight Watchers”; four mentions of “Nike”; three
mentions of “Spark”; three mentions of “Apple iPhone Health”; two mentions of “Runkeeper”;
two mentions of “Jawbone”; two mentions of “Charity Miles”; two mentions of “MapMyWalk”,
one mention of “21 Day Fix”; two mentions of “5K”; one mention of “Lose It”; one mention of
“Virgin Pulse”; one mention of “Interval Timer”, one mention of “Zombies, Run!”; one mention
of “Pandora Music”; one mention of “OverDrive”; one mention of “NutriBullet”; one mention of
“AllTrails”; one mention of “Pull Up Challenge”, one mention of “Push Up Challenge”, one
mention of “ThinkUp”, one mention of “myAgileLife”; one mention of “CalorieKing”; one
mention of “LifeTrak”; one mention of “CoachAccountable”; one mention of “MapMyWalk”;
one mention of “Carb Calculator”; one mention of “Easy 5K”; one mention of “C210K”; one
mention of “Walkmeter”, one mention of “OverDrive”; one mention of a period tracker and one
mention of “Podcasts”. Subsequently, the most commonly used device is smartphones with
82.1% of responses. Additionally, smartwatches represented 9% while laptop usage represented
6% noted in figure 10. Participants utilize health and fitness apps on a regular basis as 70% of
users reported using them daily while 26.7% use them weekly and 3.3% use them monthly noted
in figure 11.
**Figure 10: Participant Device Preference**

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desktop Computer</td>
<td>1.5%</td>
<td>1</td>
</tr>
<tr>
<td>Laptop</td>
<td>6.0%</td>
<td>4</td>
</tr>
<tr>
<td>Smartphone</td>
<td>82.1%</td>
<td>55</td>
</tr>
<tr>
<td>iPad</td>
<td>1.5%</td>
<td>1</td>
</tr>
<tr>
<td>Tablet</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Smartwatch</td>
<td>9.0%</td>
<td>6</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
<td>9</td>
</tr>
</tbody>
</table>

**Figure 11: Participant App Use**

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
<td>70.0%</td>
<td>42</td>
</tr>
<tr>
<td>Weekly</td>
<td>26.7%</td>
<td>16</td>
</tr>
<tr>
<td>Monthly</td>
<td>3.3%</td>
<td>2</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
<td>11</td>
</tr>
</tbody>
</table>
Clearly participates use a variety of health and fitness apps on various devices on a regular basis, but how do they utilize software applications to assist them with health and fitness matters? The following section examines favorite features that participants listed via survey input.

**Analysis of Popular Health and Fitness Features**

Which specific features in health and fitness apps are the most popular with survey participants? The following features are categorized into notable “themes” as generated from survey input.

**Theme #1: Food and calorie tracking**

Participants make many mentions of calorie tracking in general, but there are also various capacities of calorie tracking. Among those features users enjoy are an automatic calorie history tracker, knowing how many calories are in food, tracking nutrient values, calorie information of serving sizes, the ability to track calories burned, tracking calories on “leftovers” and being able to record calories from various brands and types of food. In addition, users report that they enjoy being able to view “premeasured calories lost” such as a slow walk that equals 120 calories burned. Some users like the ability to track calories and nutrients from various restaurants and being able to rate their food choices. Still, other users like being able to use the “point calculator” offered on some apps. A “preloaded nutrition information” feature is helpful in that it makes the data logging easier. One user in particular noted that “21 Day Fix tracks my weight, daily portions of vegetables, fruit, protein, nuts, oils, carbs and water. I can enter what I'm eating, when I eat it and look ahead if I need to adjust on the fly based on how I'm feeling”. Similarly, another user noted “I like when it's easy to add foods or just calories without naming foods because I find that the suggested foods are never things that I eat”. Yet, another user is particularly fond of the weekly summary their apps provide. There were also mentions of being
able to input foods, setting daily goals and being able to see how exercise affects the calorie intake. The ability to track macronutrient data to include fat, carb, and protein breakdown of foods is also an important feature to some users. One user states, “I like the ‘SparkPeople’ food diary. I can download a food and it gives me a ton of food choices that already have calories/fat/protein amounts counted for me”. In addition, having recipes accessible through apps is another feature users enjoy. One participant noted that ‘MyFitnessPal’ has multiple uses in that “it has a searchable food database, the ability to submit new foods, the ability to enter custom recipes, help with setting a calorie limit and being able to save standard meals”.

Theme #2: Exercise tracking

There are numerous user mentions of exercise or workout tracking. Different capacities of this type of tracking include pedometers or distance tracking, counting steps, timing runs or measuring and tracking bicycle rides. Other notable features users like are the ability to convert exercise into calories burned and GPS tracking that maps runs. One user in particular states, “when I log my exercise, the app brings up many results and I can choose the one that best fits the exercise I have done. Then it allows me to log in the reps and sets and then it will calculate calories burned for me”. Another user states, “help with calculating and tracking my BMI is useful”. Yet, another user elaborates, “my app tells you the weight you should be losing depending on your food and exercise choices”. Another user noted “writing down what I eat makes me more conscious of it, keeping track of my exercise is positive in helping me to see accomplishments”. Lastly, a user related tracking with integrity in that “it always helps to keep me more honest with myself”.

Theme #3: Blood pressure and heart rate tracking
Some users like the ability to monitor their blood pressure and heart rate with a “heart monitor” or “blood pressure” tracking feature. One user states, “for the heart rate, it gives me the rate and tips about fitness”. I was most interested in my device because it checks and logs my resting heart rate”.

**Theme #4: Sleep tracking**

Several users mentioned sleep trackers. One user states, “for sleep, it tells me not only how much sleep I get, but also determines how much rapid eye movement (REM) and deep sleep I get. This information is helpful when a full nights sleep isn't possible”. Another user states “'Fitbit' not only records my hours of sleep, but my restless and awake times. That really helps me see if I am getting the rest I need”. Another user elaborated, “my app has a settable alert/reminder feature that I like. I use it to wake me up on my days off, so I do not over sleep. The app that I use also has an automatic sleep tracking function, which is nice. I do not have to remember to "start" and "stop" the sleep tracking. The device automatically detects when I am no longer moving around during the times I usually am sleeping”.

**Theme #5: Barcode scanning**

Many users enjoy the barcode scanning ability. Users attest to the efficiency of barcode scanning in the following statements:

“I can scan a barcode on a food item or search the database which seems to list everything. It's especially helpful when eating out”.

“The Weight Watcher app allows you to scan labels on packaged food to get "points" and nutritional information. The app also allows you to search food at a large variety of restaurants”.

“The app has a bar code scanner which helps to easily upload information and it tells more about the fat, carb, protein breakdown of these foods”.
“I use ‘MyFitnessPal’ and I love the barcode scan feature and that the database is so large I have yet to not be able to find something”.

“‘MyFitnessPal’ allows you to look up and chose from various popular foods or restaurants and is also able to scan any pre-packaged foods”.

**Theme #6: Reminders and alerts**

Users like apps that feature reminders and alerts. This type of feature has many purposes depending on what the user needs. Reminders and alerts range from food, exercise or medical purposes. One user states that they like reminders that tell them to avoid “surgery foods” and to include “variety” in their meals. One user states their app reminds them to “go for a walk in short spurts rather than trying to set aside an hour or so”. Similarly, another user notes that their app tracks “how many steps I have walked, how many miles and it also reminds me to be more active”. Another user states “that it reminds me with messages when my activity is falling off”. Yet, another mentions “I only use the walking counter so far, but I like that my app/device has a settable/adjustable feature that lets me know if I’ve been stationary for too long. I can turn it on and off and select how long of a period before it encourages me to get up and stretch”. Additionally, another user states their apps may suggest reminders even though the user may not take its “advice” when they state “my app wants to wean me off of coffee. It is probably healthier for me, but I am not that committed.” Some users also noted that they like reminders for medical reasons, which may include alerts to remind them when immunizations are due, or reminders to take medications.

**Theme #7: Progress tracking**

Users enjoy being able to track progress. This feature allows users the ability to monitor daily or weekly statistics, weight management, trends or goals. One participant states, “I like
‘MapMyRun’ because I can set the preferences to keep me informed of my progress. I hate running so the ability to know when every quarter mile is done is huge to me”. Another user likes that they are able to track their steps and their exercise goals, while another states that they enjoy an app that “sets goals and celebrates my accomplishments”. Yet, another user states, “tracking weight loss progress is also nice. On ‘MyFitnessPal’, you can snap a photo of yourself at a certain weight and compare. It's a nice feature”. Another user likes rewards as related to tracking features; “I like that it reminds me to track my progress. My app is also affiliated with ‘Under Armour’, so if I track a certain number of days in a row I often get coupons for ‘Under Armour’ products, which encourages further fitness”. One user simply states, “I like tracking how much water I drink each day”. Finally, a pregnant user states she uses the “Sharp Baby Mobile App” in order to “help with what is happening now and what to expect next”.

**Theme #8: Demonstrations and suggested activities**

Many users like apps that offer demonstrations or suggest activities. Several users mentioned that they like features that include videos, additional exercise suggestions or prepared workouts. One user states they enjoy suggested activities such as “cleaning house, washing the car for exercise and to burn calories”. Another user states that they enjoy the “excessive number of fitness activities so I can customize it and get credit for the things I do such as hiking, yoga, elliptical machines, swimming, and etcetera”. Yet, another user claims that they enjoy being able to “select topics or other activities that pertain to a wide range of health issues with just as many benefits. It also allows you to complete activities in short sessions in as little as five minutes”.

**Theme #9: Music and audible stories**

Some users indicate that they enjoy music or audible stories on fitness apps. Users like this feature because it provides a “distraction” while exercising. Another related feature users
like is the ability to track distance while integrating the workout with music. A user notes, “the ‘Pandora’ app or other music apps play music that I can enjoy and that helps me zone my brain out while running”. Another user states “the ‘OverDrive’ and ‘Audible Audiobooks’ apps play books on tape that really help me mentally focus on something else which enables me to keep running”. Finally, another user states, “the Podcasts app plays news and podcasts that help me mentally focus on something else while running”.

Theme #10: Motivation and challenges

Users like apps that motivate or challenge them. One user simply states that their app “motivates me to walk” while another user enjoys being able to implement challenges on their app. One user states “‘ThinkUp’ has good motivational tools which uses positive affirmations to remind me of my goals”. Another users specifically likes “Zombies, Run!” for motivation purposes. “It motivates me to actually get out and run each day because it offers in-app rewards for completing a run, and it also has an interesting story to listen to while I run. Lastly, every now and then they make zombie sounds like you are being chased to motivate you to run faster, and you lose some of your in-app rewards you have picked up if you get caught”. Another user states, “I like challenges to complete goals”. Another user noted that they are motivated by less “nagging” by stating “the no-nagging" part helps me work towards change rather than making me feel terrible if I miss something”. Finally, a user states that they like the ‘Charity Miles’ app because it motivates them to run so sponsors will donate to charity.

Theme #11: Networking and communities

Users enjoy being able to network with other users and be a part of a community. This feature allows users to link with one another while also allowing them to be able to compete with friends. Networking also allows users to ability to view workouts of other users, view input from
other users and to synchronize with other programs. One user states, “I like community, or the ability to communicate with other users and "like" their statuses”. Another user states, “I do like that my fitness app syncs with the ‘Weight Watcher’ app. It makes tracking exercise (as related to my eating plan) easier”. Yet, another user also combined networking with motivation by stating, “I know a lot of these apps have communities and I am sure they are great resources, but it's not something I use. That being said, I still believe having social aspects to the apps is helpful and encourages motivation”.

Theme #12: Ease of use

Participants like apps that are user-friendly with easy, efficient tools and layouts. Simplicity is the main objective of this feature. Users also like the accuracy and accountability features of these apps. A user states, “I like an app that is easy to use. I don’t have to calculate calories consumed or burned during exercise because the app does it for me”. Other users attest to user-friendly features in the following statements:

“I don't have to do work or research, I can just scroll and click”.

“My questions are answered in general terms that anyone can understand”.

“I like to be able to just look for the food I eat and click on it”.

“Even if the app is not “on”, it still tracks me”.

“I enjoy being able to save my favorite meals and my own concoctions”.

“It's simple. It doesn't track calories, it tracks types of food in the pre-agreed on quantities”.

“The fitness workout is pre-agreed, so I simply need to record whether I did it or not”.

One user noted “pushing for health and wellness is already not everyone's favorite past time so if apps are not easy to use, people will not use them”. Finally, the ultimate in “ease of use” that one user noted is that “it's free”. With favorite features via user input established, the following
examines participant input concerning future improvements or enhancements for health and fitness apps.

**Analysis of Future Improvements**

What kinds of features would users want in future health and fitness apps? The survey asked two open-ended questions from which users gave significant suggestions. These two survey questions are:

- Do you have any other comments or input concerning health and fitness apps?
- If you were to have input into a “tool” or a software design that would assist you with health and fitness matters, what kind of feature(s) would you want it to have? (Preferably, feature(s) that would enhance or improve the software; preferably feature(s) that do not already exist in current software, such as calorie counters or measuring runs). Ideas for new kinds of health and fitness related software applications (apps) overall are also valued.

The following features are categorized into notable “themes” as generated from survey input.

**Theme #1: Improved synchronization**

Users expressed much interest in combining features of several apps into one general app. The following are user suggestions of desired improvements in this area:

- “There needs to be one app that covers everything such as food, fitness, heart rate tracking and workouts to complete. Like a ‘P90X’ / cross fit combined with renaissance periodization dieting”.
- “It would be nice if more of the apps interacted with each other to track various activities”.
- “I would like to see an app that links the step counter that comes standard on the phone to my fitness app”.
- “I would like to see the same features on my device that are available on my desktop dashboard”.
One user in particular elaborated on specific details: “I'd like a ‘MyFitnessPal’ type of app that limits the calorie listings to actual ‘United States Department of Agriculture’ (USDA) estimates not user entered information. I would also like a comprehensive, biometric app that can track my total caloric expenditure, caloric intake, menstrual cycle, exercise, sleep pattern, time of day, time of year and mood (as entered by the user when prompted by the app at regular intervals). I would like this information displayed in graphs, so I could look at my mood tracked against the time of year, or my menstrual cycle or my sleep pattern”.

Theme #2: Improved reminder prompts

Several users expressed interest in improved reminders about actions they need to perform. The following are user suggestions of desired enhancements in this area:

“I would like a feature that prompts action for the day”.

“I would like to find an app that has pre-planned reminders that fit my schedule”.

“I would like to see more robust reminders to use the app”.

“Also, reminders to stretch (maybe even with suggestions) right after my fitness level drops after a run or cycling, and etcetera.”

Theme #3: Improved ease of use

Users like apps that are easy to use or user friendly. Many users expressed ideas for improvement in this area. The following are user suggestions of desired enhancements:

“I would like a resource section that provides various workouts and a ‘Q&A’ (question and answer) section where you actually interact with a health professional, not just other people using the app”.

“Improving parts of the interval timer device would be helpful. I would like to be able to copy and paste interval sets within a workout.”
“Perhaps adding a required workout schedule in order to fulfill a specific weight loss goal”.

“Voice recognition needs to be developed”.

“It seems like most health and fitness apps are for beginner level or casual exercises. I do a lot of research online to formulate my diet and exercise plans rather than using an app. Enhanced features of this type would really be helpful”.

“I would like to be able to lower the volume of the music or story I'm listening to and raise the volume of the ‘Zombies, Run!’ app so I can hear that when it comes on during the run”.

“I would like better depth of information available when I need reference tools”.

“I would like to see lots of pictures and “how to's” with demonstrations.”

“I would like to see better conversion options.”

“I would like to see enhanced privacy features and improved battery usage.”

Theme #4: Automation and intuitive features

Automation and intuition is important to users. An app that can track and anticipate the needs of a user is a prominent feature some participates would like to see in future developments. The following are user suggestions of desired enhancements in this area:

“I think apps should be more helpful in achieving your goals. It could suggest food choices, for example, based on your profile”.

“As I get older, I would like something that can help monitor for warning signs of heart disease or things of that nature”.

“I want an app that records calories burned just by doing daily activities, work, errands, etcetera, without having to enter activities manually”.

“I would like to see an app to help track water consumed, with a way to measure dehydration as well”.
“It would be almost impossible to do, but the ability to measure if your muscles are approaching training limits so you can stop training before damage or overtraining occurs”.

“I would like an improved way to input strength training regimes very easily, like scanning my written sheet or something along those lines”.

“I would like an app that suggests ideas for snacks or foods that will help you round out your fat/carb/protein intake for the day. I often find myself having to look up something like 'high protein, low carb snack’”.

“I wish you could just type one cup of oatmeal and it would pop up and track the number of calories. I would use calorie trackers but I don't want to look the calories up and add them manually for everything I eat”.

“I want to just take a picture of food and have the app figure out what's in there, and then document and track it automatically”.

Theme #5: Enhancements from a diabetic perspective

Some users claim that there are limited apps for specific diabetic purposes. One user expresses interest in an app that could automatically measure blood sugar as related to “intuitive or automation” apps above. This user claims “it would be nice to get a smart phone to measure my blood sugar throughout the day without having to poke my fingers all the time”. Yet another diabetic user expressed interest in a more customized app for diabetics by stating “I would like a tool that suggests what foods I should pair. For example, I have gestational diabetes and I was given a diet to help keep blood sugars down. I have this list of food items to include one carb, one protein, one fat and etcetera. It would be helpful if the app knew what combinations of foods I should be eating and with which meal. Perhaps even suggestions inspired by the food I have already input on the app. In addition, if there were an app created specifically for pregnant
women with gestational diabetes there would be a market for it. There is not an app directed at this population, just apps for diabetes in general. My needs are different from someone with type one or two diabetes”. Clearly, there was no shortage of ideas for future enhancements of health and fitness apps. Undoubtedly, these suggestions could make the apps more efficient for users. The following is an overview of the study results.

**Discussion and Conclusion**

An electronically distributed survey instrument was utilized to find answers to the three original research questions. The following is an overall analysis of participant responses to each of the research questions.

The first research question was intended to discover how people utilize software applications to assist them with health and fitness matters. There were a number of apps listed by users, but the top four apps mentioned by participants were “MyFitnessPal”, “Fitbit”, “S Health” and “Weight Watchers”. Users report that the most commonly used device is smartphones, with smartwatches a distant second while laptops have the third most usage. Survey results also note that most participants utilize health and fitness apps on a daily basis, while about a third of participates reported using them weekly and a small percentage report using them monthly.

The second research question was intended to discover what specific features in health and fitness software applications are most popular with users. The results were separated into “themes” inspired by user input. The themes revealed were food and calorie tracking, exercise tracking, blood pressure and heart rate tracking, sleep tracking, barcode scanning, reminders and alerts, progress tracking, demonstrations and suggested activities, music and audible stories, motivation and challenges, networking and communities and finally, ease of use. The study found that users like to be able to track and monitor data involving runs, walks, weight, calories
or other types of activities. Users like motivation type features that inspire them to perform certain tasks, as well as alert features that also remind them to perform tasks. Convenience is also a noted feature. The easier it is to enter data, the better. Additionally, most of the features concerning data entry options or other such conveniences appear to be the user favorites of food and weight related health apps. Similarly, user favorite features that users enjoy about health related apps are similar to the other categories but mostly include tracking features, convenience or synchronization options. Congruently, a majority of these features that offer tracking options, motivation, reminders or awards also appear to be a common theme in general to users of health and fitness related apps. It is apparent that the preferred features overall implicate efficiency and convenience.

The final research question was intended to discover what kinds of improvements users would want in future software applications. There were many significant suggestions from participants for future enhancements of health and fitness apps. These results were also separated into “themes” inspired by user input. Users appear to want improved synchronization, improved reminder prompts, improved ease of use, automation and intuitive features in addition to potential diabetic developments meant to assist diabetic users. Enhanced ease of use, intuition and improved efficiency appears to be the main argument of most suggestions. It is clear that users desire apps that would implement these kinds of improvements while decreasing user burden at the same time. In general, users appear to want a higher level of automation, intuition, synchronization and efficiency.

It is significant to note that the majority of participants who completed the survey are educated with at least some college to graduate degree level. Additionally, the majority of participants were married, white/Caucasian females, who are employed full time, ranging in age
from 35-54. Even though the survey was made available to both genders and a variety of ethnicities via Facebook and email, it appeared that the main group of respondents that took the time to complete the survey were well educated, white/Caucasian women from California.

Summary

The literature review accomplished the goals of determining which health and fitness apps are user favorites, which features users find desirable, and how the development of future apps may look. The results of the survey also confirmed that user favorite features are similar to the user favorite features discovered in the literature review.

The results of the survey satisfied the research questions in that participants verified favorite user features which mostly involve efficiency and convenience. Users also identified what they would want to see in future developments of health and fitness apps, which in brief is improvements concerning automation, intuition, synchronization and increased efficiency.

Overall, this study concludes that there is room for improvement in the future developments of health and fitness apps. Most users appear generally pleased with them presently, but they also pointed out a number of areas that could be significantly enhanced in future developments.

Recommendations

There were a number of meaningful findings from participants about what they would want to see in future developments of health and fitness apps. The most consistently mentioned feature is automation. Future studies in this area could focus more on automation features of health and fitness apps and how this may affect or assist users as well as the impact to the health and fitness app industry. Additionally, gamification is rising in popularity. Future studies could be conducted to investigate more about gamification features users desire in addition to how
gamification may affect the health and fitness app industry. Finally, the emergence of the iPhone in 2007 and subsequent smartphone technology is a relatively new development in the information technology world (Rakestraw, Eunni & Kasuganti, 2012). This technology has not existed long enough to determine the long-term health benefits for those that consistently use health and fitness apps. Studies investigating the influence of health and fitness app usage and the impact this usage makes on health and fitness pursuits over time could be another possible area of interest for future studies. Overall, it is important that the interface of an app works well, but it is also necessary that app developers cater to users (Rakestraw et al., 2012). It may be just as beneficial to the health and fitness app industry, or the app industry in general if this industry were to cater more to user needs, by providing features on apps that users specifically want.
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Appendix A

Survey Questions

Health and Fitness "App" Survey

Welcome to My Survey!

ONLINE SURVEY CONSENT FORM

Welcome to my survey for my study titled "A Users Approach to Health and Fitness Software Applications".

The purpose of this research project is to discover what users desire in future health and fitness application software or "apps".

This is a research project being conducted by Wilda L Duncan, a student at American Public University System.

You are invited to participate in this research project because you are a user of health and fitness software apps.

Your participation in this research study is voluntary. You may choose not to participate. However, if you decide to participate in this research survey, you may still withdraw from the study at any time. If you decide not to participate in this study or if you withdraw from participating, you will not be penalized. You may choose to skip any questions you do not wish to answer.

The procedure involves filling an online survey that will take approximately 20 minutes. Your responses will be anonymous and we will not collect identifying information such as your name, email address or IP address.

The survey questions will be about health and fitness software apps.

All data is stored in a password protected electronic format. To help protect your identity, the surveys will not contain information that would personally identify you. The results of this study will be used for scholarly purposes only. The data may be shared with my faculty advisor.

This research has been reviewed according to American Public University System IRB procedures for research involving human subjects. If you have any questions about the research study, please contact: the IRB Chair at American Public University System, apus-irb@apus.edu.
Thank you for your time and participation!

ELECTRONIC CONSENT

By selecting DISAGREE, you do not wish to participate in the research study, and may exit your browser.

By selecting AGREE, you consent that:

• You have read and understand the information above regarding this study;

• You are voluntarily agreeing to participate in this study and understand that I can opt out at any time without penalty; and

• You are at least 18 years of age.

* 1. Please select your choice below:

☐ Disagree

☐ Agree

2. What are your favorite software application(s) or apps that you use for health and fitness purposes?

3. What type of IT device do you use for health and fitness purposes?

☐ Desktop Computer

☐ Laptop

☐ Smartphone

☐ iPad

☐ Tablet

☐ Smartwatch

Other (please specify)

4. If you use a software application(s) or app to assist with food choices, what are the features you enjoy or what do you like the most about it?

5. If you use a software application(s) or app to assist with fitness options, what are the features you enjoy or what do you like the most about it?

6. If you use a software application(s) or app to assist with health matters, what are the features you enjoy or what do you like the most about it?
7. How often do you use your health and fitness app(s)?

- Daily
- Weekly
- Monthly
- Other (please specify)

8. Are there any other features you like about the software applications you use for health and fitness purposes not covered in previous questions?

9. Do you have any other comments or input concerning health and fitness apps?

10. If you were to have input into a “tool” or a software design that would assist you with health and fitness matters, what kind of feature(s) would you want it to have? (Preferably, feature(s) that would enhance or improve the software; preferably feature(s) that do not already exist in current software, such as calorie counters or measuring runs).

   Ideas for new kinds of health and fitness related software applications (apps) overall are also valued.

11. What is your age?

- 18 to 24
- 25 to 34
- 35 to 44
- 45 to 54
- 55 to 64
- 65 to 74
- 75 or older
- Choose not to answer

12. What is your gender?

- Female
- Male
- Choose not to answer

13. What is your ethnicity? (Please select all that apply.)

- American Indian or Alaskan Native
- Asian or Pacific Islander
☐ Black or African American
☐ Hispanic or Latino
☐ White / Caucasian
☐ Choose not to answer

14. Which of the following best describes your current relationship status?

☐ Married
☐ Widowed
☐ Divorced
☐ Separated
☐ In a domestic partnership or civil union
☐ Single, but cohabiting with a significant other
☐ Single, never married
☐ Choose not to answer

15. What is the highest level of education you have completed?

☐ Graduated from high school
☐ Some college
☐ Graduated from college
☐ Some graduate school
☐ Completed graduate school
☐ Choose not to answer

16. Which of the following best describes your current occupation?

☐ Education, Training, and Library Occupations
☐ Construction and Extraction Occupations
☐ Legal Occupations
☐ Personal Care and Service Occupations
☐ Arts, Design, Entertainment, Sports, and Media Occupations
☐ Management Occupations
☐ Healthcare Practitioners and Technical Occupations
☐ Architecture and Engineering Occupations
☐ Food Preparation and Serving Related Occupations
Sales and Related Occupations
Building and Grounds Cleaning and Maintenance Occupations
Protective Service Occupations
Computer and Mathematical Occupations
Healthcare Support Occupations
Farming, Fishing, and Forestry Occupations
Community and Social Service Occupations
Business and Financial Operations Occupations
Production Occupations
Life, Physical, and Social Science Occupations
Office and Administrative Support Occupations
Installation, Maintenance, and Repair Occupations
Transportation and Materials Moving Occupations
Choose not to answer

17. Which of the following categories best describes your employment status?

Employed, working full-time
Employed, working part-time
Not employed, looking for work
Not employed, NOT looking for work
Retired
Disabled, not able to work
Choose not to answer

18. What state do you reside in?

Suburban community
City or urban community
Rural community
Choose not to answer

19. In what type of community do you live?
Appendix B

Survey Summary

2. What are your favorite software application(s) or apps that you use for health and fitness purposes?

Fitbit
Myfitness pal
Google maps for distance
Pinterest for food
My fitness pal
Box breathing
My Fitness Pal and Map My Run
Stepz on my iphone
Map my Ride
Life Trak on my Android phone.
Apple Health
None
I watch, Fitbit, CalorieKing
MyAgileLife produced by Sharp Rees Stealy Medical
S Health
My fitness pal
21 day fix, 5k pro, map my walk, strava
Fitbit
Coach Accountable
MapMyWalk
MyFitnessPal
Nike running
Carb Calculator
Weight Watchers
Just bought the Peloton bike to do live streaming
Fitbit
My Fitness Pal
I use period tracker to keep track of my pmdd and the symptoms of mental health that comes with it
Easy 5K, My Fitness Pal, Map My Run
Fit bit charge 2
Map my ride
Weight Watchers app
Fitbit Alta and the Fitbit app
Fitbit
MyFitness Pall
Fitbit connect
Nike Run app
Fit Bit
My Fitness Pal
S Health
Health
S Health on my Samsung Galaxy S4
My fitness pal
C210k
My chart through the hospital, linking all doctors. It's a way to send a direct message easily, receive a response and receive lab reports without needing a doctors appointment.
Fitbit
Apple one
Weight watcher tracker
Jawbone
My fitness pal
Calorie tracking
My Fitness Pal to track food/calorie consumption
Apple iPhone Health app for activity
myhealthvet
Samsung Health
S health and Moves
Fitbit, Running for Weightloss, My Fitness Pal, Map My Run
none
My fitness pal
fit bit
Strava
Map My Run
FitBit
Whil
MyFitnessPal
My Fitness Pal
Walkmeter
StepZ
Strava
Fitbit
Apple Health
Shealth
Lose It
My fitness pal
MyFitnessPal
FitBit
Nike Training App
Run Keeper
My Fitness Pal
Virgin Pulse
Fitbit
My Fitness Pal

www.bodybuilding.com for the forums/recipes/workout tips.
Runkeeper
Runkeeper
My Fitness Pal
Charity Miles
IntervalTimer
Zombies, Run!
Pandora
Music
Audible
OverDrive
Podcasts
S health
Weight watchers
My fitness pal
Fitbit
MyFitnessPal
AllTrails
NutriBullet Recipes
NikeTraining
FitBit
SparkRecipes
None
Map My Walk/Run
Pull up challenge
Push up challenge
Jawbone Up
Spark people
I use the SparkPeople mobile app
I also use the fit bit app on my mobile phone that goes with my fit bit
My Fitness Pal
Weight Watchers
Think Up
Charity Miles is the only one I have.
Runkeeper Fitbit

3. What type of IT device do you use for health and fitness purposes?

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</tr>
<tr>
<td>Smartwatch</td>
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<td>6</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
<td>9</td>
</tr>
</tbody>
</table>

4. If you use a software application(s) or app to assist with food choices, what are the features you enjoy or what do you like the most about it?

N/A
Myfitness pal pro gives me macro breakdowns which helps a lot

Pinterest it has links to the recipes

My favorite thing about My Fitness Pal is the ability to track calories. I can scan a barcode on a food item or search the database which seems to list everything. It's especially helpful when eating out.

Recipes from Facebook

Don't use one

I don't use mine for food choices.

None

N/a

The automatic caloric history. I generally eat the same things most of the time.

Reminders to avoid sugary foods and to have variety in my meals.

N/A

I don't

N/a

21 day fix tracks my weight, daily portions of veges, fruit, protein, nuts, oils, carbs and water. I can enter what I'm eating, when I eat it and look ahead if I need to adjust on the fly based on how I'm feeling. It also tracks my workout for the day.

There is also a facebook page dedicated to those doing the same thing from around the country to motivate and ask questions.

I like having a general idea of how many calories are in food.

Depth of brand names

Ease of serving size calculations

N/A

Log food per meal - choices from drop down and wide range of items available to choose from.

Ability to log fluids and exercise. How it links to other apps.
Weight Watcher app allows you to scan labels on packaged food to get "points" and nutritional information. The app also allows you to search food at a large variety of restaurants.

Barcode scan

Ability to track calories

Ability to input recipes from other websites

That I can just look for the food I eat and click on it.

Calories and nutrient values.

Macro tracking/distribution.

Tracking progress of weight loss.

n/a

I use Weight Watchers for food choices because I like their points calculator.

I use my fitness pal and I love the barcode scan feature and that the database is so large I have yet to not be able to find something.

Want something that figures out calories and more from my own original recipes.

I like being able to attribute a particular activity to the fitness level output. It lets me know what is really working and what isn't.

My Fitness Pal, it allows you to look up and choose from various popular foods, restaurants, and uses a scanner to scan any pre-packaged foods.

N/A

I like when it's easy to add foods or just calories without naming foods because I find that the suggested foods are never things that I eat.

Also, my app gives a weekly summary of the calories I eat vs expend with a resulting deficit or excess.

Serving size and calories of food consumed.

none

It offers different brands of foods and their calories, rather than just a type of food.
I like that Fitbit has an extensive database of known individual foods, restaurants and fast food. For example, I can type in burrito and Taco Bell and it lists all the options to quickly choose and/or get calorie information from it.

N/A

"The app has a bar code scanner which helps to easily upload information and it tells more about the fat, carb, protein breakdown of these foods.

I also like that I have the ability to easily enter/track food leftovers.

Tasty.com makes cooking look easy.

No food choice app used at this time.

Writing down what I eat makes me more conscious of it, keeping track of my exercise is positive in seeing accomplishment.

Inputting what foods I ate, counting calories within my set daily goal and how exercise affects the calorie intake.

Calorie counting from pre-existing database.

NA

I use My Fitness Pal to track what I eat and I like to see what the nutritional information is for my food and daily intake.

Meal tracking

Calorie counting

Macronutrient breakdown

Calorie calculation on foods

N/A

My Fitness Pal has a searchable food database, the ability to submit new foods, the ability to enter custom recipes, help with setting a calorie limit, saving standard meals, the option to scan bar codes on food packaging in order to instantly enter that food's information, and the ability to geolocate restaurants and choose from their menu in the My Fitness Pal database, though this feature is not perfect.
A variety of restaurants listed

I’m frustrated with most of them. Can’t stand my fitness pal

Accurate macronutrient documentation

Calorie tracker/counter

UPC Scanning abilities

Restaurant nutrition menus

N/a

I like the preloaded nutrition information. It makes the data logging easier.

Being able to save favorite meals and my own concoctions.

I like the Spark People food diary. I can download a food and it gives me a ton of food choices that already have calories/fat/protein amounts counted for me.

Use friendly search tools. Easy to add water exercise food

The point value of weight watchers is a simple way to rate your food choices.

N/A

No

5. If you use a software application(s) or app to assist with fitness options, what are the features you enjoy or what do you like the most about it?

Seeing the production daily.

Wodify tracks my best scores and graphs my progress over time

Google sheets. My coach puts up me weekly workouts

I like May My run because I can set the preferences to keep me informed of my progress. I hate running so the ability to know when every quarter mile is done is huge to me.

Tracking metrics: Distance and speed

Distance walked.

Counting steps
My Apple Watch gives me a daily breakdown of calories burned.

Reminders of how to "go for a walk" in short spurts rather than trying to set aside an hour or so.

It tells me how many steps I have walked, how many miles, reminds me to "Be more active".

I don't

Adding calories eaten and see more available to be eaten after adding exercise

The fitness is pre agreed, so I simply need to record whether I did it or not.

Being able to track calories burned

The tracking of distance and the ability to integrate with music

I like seeing my daily and weekly stats and being able to monitor my heart rate.

Demonstrations of exercises, easy of use

Linking to the other apps.

I enjoy that it tracks steps and activity without much extra work on my behalf besides syncing (and exercising of course). The ease of it is probably my favorite feature. I also like it better because it looks nicer and fits better on my wrist than previous trackers I have used.

Not a necessary feature, but I do enjoy being alerted when I reach my goals for the day and I also like the little badges that put how many miles I have walked into a bigger scheme.

Let's me keep track of my progress

I don't have to do work or research, I can scroll and click.

Mile/run tracking, calorie counting, step tracking, sleep patterns, heart rate, etc.

Conversion of exercise to calories burned.

mostly just use it for step counting. Enjoy the incline data.

S Health-It keeps my walking and running history, my basic information like current weight. It does have other options for food intake, but again I opt to use the Weight Watchers website for that information and tracking. I prefer to keep it on me whenever I walk because it totals my daily steps.

I use c210k and like the layout and count down feature.

N/a

When they have videos
Apple Health app - tracks steps and heart rate

N/A

It tracks an excessive number of fitness activities so I can customize it and get credit for the things I do (ex. Hiking, yoga, elliptical, swimming, etc). And the GPS will track my hike which is cool.

GPS tracking for running and walking, calories burned.

none

It includes activities such as cleaning, washing the car etc. for calorie burning/exercise.

I don't really use the fitness options. I think they are fake and I know people in my office trick it to get "steps". I have also read that scientifically they are bull shit and not accurate. Doesn't mean they don't work to motivate people which is the good part.

Keeping track of activity level

I like that it takes into account my weight and height when telling me how many calories I likely burned doing an activity.

I also like that there are ideas for more activities to try.

GPS and step count and that you can participate with friends

1. I use it to motivate me to walk.
2. It keeps track of my activity.
3. Even if the app is not "on", it still tracks me.
4. It shows my trends.
5. It reminds me with messages when my activity is falling off.

Inputting what exercises I do and how it affects calorie intake for the day

Don't use for fitness.

The variety of options (short, long, easy, hard, etc)

The challenges so you can compete against friends/family to be the most active

That it times things for you and lets you know how long you've gone or when it's time for the next activity

I use Fitbit to see how many steps and stairs I have gotten during the day. I like that it tells me I need to move every hour.

same as above
Seeing workouts for other users

Runkeeper tracks everything from your miles, calories burned, time, maps your workout, and allows you to implement challenges.

Tracks distance and avg. time

Shows current and previous weeks distances and times, so that I can monitor my growth

Voice reminders during the workout about distances and time, which helps me push myself harder

Sets goals and celebrates my accomplishments

Ranks my distance and time and notifies me of my ranking (i.e. 3rd fastest time!)

Allows me to play music while the app is tracking

Interval Timer helps me switch between walking and running and time the intervals precisely to help me work up to the level of workout I am aiming for.

Charity miles has sponsors donate to charities for every time I run.

Zombies, Run! motivates me to actually get out and run each day because it offers in-app rewards for completing a run, and it also has an interesting story to listen to while I run. Lastly, every now and then they make zombie sounds like you are being "chased" to motivate you to run faster, and you loose some of your in-app rewards you have picked up if you get "caught".

That it captures all activity.

Time, heartrate, distance

Workout tracker

Accuracy

Availability of Prepared workouts

Map my walk links directly to my music on my phone, but sometimes when I try to pause the music I end up pausing the entire work out without realizing it. I lose time/distance when that happens.

The pull up/push up challenge apps are super simple to use as the are basically just timers.

I only use the walking counter so far, but I like that my app/device has a settable/adjustable feature that let's me now if I've been stationary for too long. I can turn it on and off and select how long of a time period before it encourages me to get up and stretch. Great for work!

Premeasured calories lost. Ie slow walk 5 min = 120 cal loss.
When I log in my type of exercise the app brings up many results and I can choose the one that best fits the exercise I have done. Then it allows me to log in the reps and sets and then it will calculate calories burned for me.

Accountability

Think Up is a good motivational tools, using positive affirmations to remind me of my goals. Just measures how far I walk or move.

Keeping track of my runs.

6. If you use a software application(s) or app to assist with health matters, what are the features you enjoy or what do you like the most about it?

N/A

Currently sharp baby to help with what's happening and what to expect

N/a

I don't really track my health.

Don't use one

Amount of time I sleep per day.

N/a

Na

This one gives me friendly reminders to take my medication, take care of my feet (diabetic) and focus on the positive effects healthy behaviors will bring. It does not nag!

I don't use it for health matters.

I don't

it doesn't track calories, it tracks types of food in the pre agreed on quantities. It's simple.

N/a

My questions are answered in general terms that anyone can understand.

I can print the info to give to my doctors. I can see how my behavior relates to my feelings and cycle and I keep track of what meds I started and what helped by tracking the symptoms

Info about health issues. Links to other apps.

Ease of use and helpful information. I like to be able to look stuff up on my apps and get the information that I need.
I like the heart monitor.
I like the sleep monitor.
I like to see how much I slept last night and how many steps I walk each day.
Tracking water intake and sleep patterns.
Tracking macros.
I don't have a particular health app that I use at this current time.
I like tracking appts and cycle.
I like knowing when my immunization says are due.
Tracking BP
N/A
Calorie counting, pedometer
N/A
none
Help with calculating BMI is helpful.
nope
n/a
Whil allows you to select topics that pertain to a wide range of health issues with as many benefits. It also allows you to complete activities in short sessions, as little as 5 minutes.
NA
Tracking dietary consumption including macronutrients
Program syncs with other programs
I don't use an app for health matters anymore because none worked with my doctor and I did not see any point.
N/A
Don't use for health matters other than calorie counting and weight loss.
The sleep tracker
I use Fitbit and My fitness Pal to track weight. I use Virgin Pulse to track other good habits.
same as above
Input from other users
I do not use apps to assist with health matters.
Available healthy recipes
Menu substitutions
I was most interested in my device because it checks and logs my resting heart rate and also tracks/records my sleep. For the heart rate, it gives me the rate and also tips about fitness. For the sleep, it tells me not only how much sleep I get, but also determines how much REM and Deep sleep I get. This info is helpful when a full 8hr nights sleep isn't possible.
I like that is is easy to use....I dont have to calculate calories eaten or burned in exercise. The App does it for me.
On my fit bit...I like when it tells me I have reached my steps/exercise goals. The fit bit also records my hours of sleep and my restless and awake times That really helps me see if I am getting the rest I need ."
Helps me to manage my weight
N/A

7. How often do you use your health and fitness app(s)?

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<th>Response Count</th>
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</tr>
<tr>
<td>Weekly</td>
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<td>16</td>
</tr>
<tr>
<td>Monthly</td>
<td>3.3%</td>
<td>2</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td></td>
<td>11</td>
</tr>
</tbody>
</table>

8. Are there any other features you like about the software applications you use for health and fitness purposes not covered in previous questions?

It's easy and i always have my phone
Tracking weight is also nice. On My Fitness Pla you can even snap a photo of yourself at a certain weight and compare. It's a nice feature.

Nope
Not really.
The no "nagging" part helps me work towards change rather than making me feel terrible if I miss something.

Nope.

No not really

Being able to look up exercise done. Plus length of time exercised and then find calories expended on app (granted it's a bit subjective)

Map my walk and strava both track the distance I walk and strava calculates calories burned.

None

No.

I do like that my fitness app/device is made to also sync with the Weight Watcher app. It makes tracking exercise (as related to my eating plan) easier.

Colors and not to cluttered of screens are important to me.

Community - ability to communicate with other users and "like" their statuses.

Challenges to complete goals.

No.

I like how Fitbit tracks my sleeping and weight.

No

No

No.

none

It tells you the weight you should be losing depending on your food/exercise choices.

logging water and keeping track of calorie intake.

I like that it reminds me to track and it is also affiliated with underarmor so if I track a certain number of days in a row I often get coupons to underarmor to encourage further fitness.

Being able to find calorie info for foods I consume

Shealth is watching me.

Ease of use, any time of day, private

No.
No

I like tracking how much water I use each day.

I'd like a My Fitness Pal type app but that limited the calorie listings to actual USDA estimates not user entered information. I would also like a comprehensive, biometric app that could track my total caloric expenditure, caloric intake, menstrual cycle, exercise, sleep pattern, time of day, time of year and mood (as entered by the user when prompted by the app at regular intervals). And display the information in graphs so I could look at my mood tracked against the time of year, or my menstrual cycle or my sleep pattern.

N/A

It's free :)

The Pandora and Music apps play music that I can enjoy and helps me zone my brain out while running.

The OverDrive and Audible apps play books on tape that really help me mentally focus on something else mentally and keep running.

The Podcasts app plays news and podcasts that help me mentally focus on something else while running.

I like FODMAPS

voice recognition to use application

My app has a settable alert/reminder feature that I like. I use it to wake me up on my days off, basically so I do not over sleep (is that possible?) The app that I use also has an automatic sleep tracking function, which is nice. I do not have to remember to "start" and "stop" the sleep tracking. The device automatically detects when I am no longer moving around during the times I usually am sleeping.

They are both easy to use and on my phone.

No

N/A

9. Do you have any other comments or input concerning health and fitness apps?

I feel by using the app and having friends as a motivator it helps to achieve your goals daily.

There needs to be one for everything, food fitness, HR and workouts to complete. Like a P90x / crossfit combo with RP dieting

They are great!!! We need more. The easier info is tonfind the more people will at least try.

None
No. I mainly use mine to see how far I walk on my walks.
I am sure the watch does many more things than what I use it for.
I really like the S Health app. It's a help for me to remember to walk.

Nope
It always helps to keep me more honest with myself

Allow them to be simple to use and if there are a lot of features, make them optional for those who want to additional data tracking.

Would be nice if more of the apps interacted with each other to track various activities.

I would like a feature that prompts action for the day.

No

No

I know a lot of these have communities and I am sure they are great resources, but it's not something I use. That being said, I still believe having social aspects to the apps is helpful and encourages motivation.

There are a ton of them on the market right now. I don't have to pay for the ones I use.
They are a good overall guide, but, it takes consistency. The market is flooded with options.
I wish S Health was easier to navigate. I don't find it easy to maneuver around.

I use them daily and I have almost 5 years of data I can look at
The more intuitive the better.
Privacy and battery usage
none
not really
It needs to be so easy to use!
Pushing for health/wellness is already not everyone's favorite past time so if this part isn't easy, people will not use it.

No

I think that an app should be more helpful in achieving your goals. It could suggest food choices, for example, based on your profile.

No.
Pretty good idea if someone could figure out a way for it to not be a big bother to use.

Seems like most health/fitness apps are for beginner level/casual exercises. I do a lot of research online to formulate my diet and exercise plans rather than using an app.

Not that I can think of.

I'd like to find an app that has preplanned reminders that fit my schedule.

My app wants to wean me off of coffee. It is probably healthier for me, but I am not that committed. :D

none further

No

10. If you were to have input into a “tool” or a software design that would assist you with health and fitness matters, what kind of feature(s) would you want it to have? (Preferably, feature(s) that would enhance or improve the software; preferably feature(s) that do not already exist in current software, such as calorie counters or measuring runs). *Ideas for new kinds of health and fitness related software applications (apps) overall are also valued.*

N/A

See above

Lots of pictures and how to's with demos

I think it would be nice to just be able to use one app to "map my run" and count my calories. I need an Apple Watch...perhaps that would do it!

Would be nice to get a smart phone to measure my blood sugar through the day without having to poke my fingers all the time.

No new ideas.

Yeah I'm not sure

I can't think of any.

Intuitive

Depth of information available if I need reference tools

Conversion options

Link the step counter that comes standard on the phone to the fitness app.

Reward system or badges to keep motivation
Same features on device as available in desktop dashboard.

Not sure if other apps already have this, but I would like a resource section that provides various workouts a Q&A section where you actually interact with health professional (not just other people using the app).

As I get older, I would like something that can help monitor for warning signs of heart disease or things like that.

Also, reminders to stretch (maybe even with suggestions) right after your fitness level drops (after a run or cycling, etc.)

Heart monitor that works with what I have and is on my wrist somehow.

Nothing I can think of.

Hard to say. Most apps come with features I wouldn't have thought of, but end up using because they're already there.

I would like a tool to suggest what foods I should pair. For example I had gestational diabetes and was given a diet to help keep blood sugars down. I had this list of items i.e. 1 carb, 1 protein, 1 fat etc. it would be nice if the app knew what combos I should be eating and at what meal. Maybe even suggestions by the food I've inputted. The diet was created by a dr at EVMS. They don't like us to track electronically because they say people don't track. I had to transcribe into a book. If there was a way to create an app specifically for this diet for pregnant women with gestational diabetes there would be a market for it. Currently, 6-8% women are DX with GD. They are thinking of lowering the numbers when the test is taken so that percentage could increase. This population also has a higher risk of developing type 2 later in life. There isn't an app directed at this population. Just apps for diabetes in general. My needs were different than someone with type 1 or 2.

An app to help with drinking water, and measuring dehydration would be very helpful. I think we all feel like we drink enough water but in reality we don't.

none

Calories burned just by doing daily activities, work, errands etc.

no

A way to input strength training regimes very easily (like scanning your written sheet or something)

Ideas for snacks or foods that will help you round out your fat/carb/protein intake for the day (I often find myself having to look up something like 'high protein, low carb snack')

None

Make it talk instead of beep and gurgle. Those get lost in the sauce.
Good luck on your Masters.

I think more features are available if I were to pay for the service, but I just use what's free.

I think my fitness pal covers everything I need in a fitness/health app.

Take a picture of food and have it figure out what's in there.

Would be almost impossible to do, but the ability to measure if your muscles are approaching training limits so you can stop before too much damage/overtraining occurs

Perhaps adding a required workout schedule in order to fulfill a specific weight loss goal.

Improving parts of the IntervalTimer would be helpful. Being able to copy and paste interval sets within a workout would be helpful.

Being able to lower the volume of the music or story I'm listening to and raise the volume of the Zombies, Run! app so I can hear that when it comes on during the run would be nice.

That's all I can think of right now.

voice recognition

a data base of foods/exercises with calories and calories burned is a must for me.

I would like to see more robust reminders to use the app

I wish you could just type one cup of oatmeal and it would pop up the number of calories. It's frustrating having to look everything up! I would use calorie trackers but I don't want to look the calories up and add them manually for everything I eat.

11. What is your age?

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 to 24</td>
<td>4.4%</td>
<td>3</td>
</tr>
<tr>
<td>25 to 34</td>
<td>17.6%</td>
<td>12</td>
</tr>
<tr>
<td>35 to 44</td>
<td>27.9%</td>
<td>19</td>
</tr>
<tr>
<td>45 to 54</td>
<td>29.4%</td>
<td>20</td>
</tr>
<tr>
<td>55 to 64</td>
<td>16.2%</td>
<td>11</td>
</tr>
<tr>
<td>65 to 74</td>
<td>2.9%</td>
<td>2</td>
</tr>
<tr>
<td>75 or older</td>
<td>1.5%</td>
<td>1</td>
</tr>
<tr>
<td>Choose not to answer</td>
<td>0.0%</td>
<td>0</td>
</tr>
</tbody>
</table>

12. What is your gender?

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

|                      |                  |                |
|                      |                  |                |
13. What is your ethnicity? (Please select all that apply.)

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Indian or Alaskan Native</td>
<td>1.5%</td>
<td>1</td>
</tr>
<tr>
<td>Asian or Pacific Islander</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Black or African American</td>
<td>4.4%</td>
<td>3</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>10.3%</td>
<td>7</td>
</tr>
<tr>
<td>White / Caucasian</td>
<td>82.4%</td>
<td>56</td>
</tr>
<tr>
<td>Choose not to answer</td>
<td>4.4%</td>
<td>3</td>
</tr>
</tbody>
</table>

14. Which of the following best describes your current relationship status?

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>41.2%</td>
<td>28</td>
</tr>
<tr>
<td>Widowed</td>
<td>2.9%</td>
<td>2</td>
</tr>
<tr>
<td>Divorced</td>
<td>10.3%</td>
<td>7</td>
</tr>
<tr>
<td>Separated</td>
<td>2.9%</td>
<td>2</td>
</tr>
<tr>
<td>In a domestic partnership or civil union</td>
<td>1.5%</td>
<td>1</td>
</tr>
<tr>
<td>Single, but cohabiting with a significant other</td>
<td>17.6%</td>
<td>12</td>
</tr>
<tr>
<td>Single, never married</td>
<td>22.1%</td>
<td>15</td>
</tr>
<tr>
<td>Choose not to answer</td>
<td>1.5%</td>
<td>1</td>
</tr>
</tbody>
</table>

15. What is the highest level of education you have completed?

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduated from high school</td>
<td>1.5%</td>
<td>1</td>
</tr>
<tr>
<td>Some college</td>
<td>16.2%</td>
<td>11</td>
</tr>
<tr>
<td>Graduated from college</td>
<td>38.2%</td>
<td>26</td>
</tr>
<tr>
<td>Some graduate school</td>
<td>13.2%</td>
<td>9</td>
</tr>
<tr>
<td>Completed graduate school</td>
<td>29.4%</td>
<td>20</td>
</tr>
<tr>
<td>Choose not to answer</td>
<td>1.5%</td>
<td>1</td>
</tr>
</tbody>
</table>

16. Which of the following best describes your current occupation?

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management Occupations</td>
<td>5.9%</td>
<td>4</td>
</tr>
<tr>
<td>Business and Financial Operations Occupations</td>
<td>1.5%</td>
<td>1</td>
</tr>
<tr>
<td>Category</td>
<td>Percent</td>
<td>Count</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td>Computer and Mathematical Occupations</td>
<td>7.4%</td>
<td>5</td>
</tr>
<tr>
<td>Architecture and Engineering Occupations</td>
<td>2.9%</td>
<td>2</td>
</tr>
<tr>
<td>Life, Physical, and Social Science Occupations</td>
<td>1.5%</td>
<td>1</td>
</tr>
<tr>
<td>Community and Social Service Occupations</td>
<td>5.9%</td>
<td>4</td>
</tr>
<tr>
<td>Legal Occupations</td>
<td>2.9%</td>
<td>2</td>
</tr>
<tr>
<td>Education, Training, and Library Occupations</td>
<td>7.4%</td>
<td>5</td>
</tr>
<tr>
<td>Arts, Design, Entertainment, Sports, and Media Occupations</td>
<td>4.4%</td>
<td>3</td>
</tr>
<tr>
<td>Healthcare Practitioners and Technical Occupations</td>
<td>17.6%</td>
<td>12</td>
</tr>
<tr>
<td>Healthcare Support Occupations</td>
<td>7.4%</td>
<td>5</td>
</tr>
<tr>
<td>Protective Service Occupations</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Food Preparation and Serving Related Occupcations</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Building and Grounds Cleaning and Maintenance Occupations</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Personal Care and Service Occupations</td>
<td>1.5%</td>
<td>1</td>
</tr>
<tr>
<td>Sales and Related Occupations</td>
<td>5.9%</td>
<td>4</td>
</tr>
<tr>
<td>Office and Administrative Support Occupcations</td>
<td>7.4%</td>
<td>5</td>
</tr>
<tr>
<td>Farming, Fishing, and Forestry Occupcations</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Construction and Extraction Occupcations</td>
<td>1.5%</td>
<td>1</td>
</tr>
<tr>
<td>Installation, Maintenance, and Repair Occupcations</td>
<td>1.5%</td>
<td>1</td>
</tr>
<tr>
<td>Production Occupcations</td>
<td>2.9%</td>
<td>2</td>
</tr>
<tr>
<td>Transportation and Materials Moving Occupcations</td>
<td>2.9%</td>
<td>2</td>
</tr>
<tr>
<td>Choose not to answer</td>
<td>11.8%</td>
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</table>

17. Which of the following categories best describes your employment status?

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employed, working full-time</td>
<td>78.3%</td>
<td>54</td>
</tr>
<tr>
<td>Employed, working part-time</td>
<td>5.8%</td>
<td>4</td>
</tr>
<tr>
<td>Not employed, looking for work</td>
<td>2.9%</td>
<td>2</td>
</tr>
<tr>
<td>Not employed, NOT looking for work</td>
<td>2.9%</td>
<td>2</td>
</tr>
<tr>
<td>Retired</td>
<td>5.8%</td>
<td>4</td>
</tr>
<tr>
<td>Disabled, not able to work</td>
<td>1.4%</td>
<td>1</td>
</tr>
<tr>
<td>Choose not to answer</td>
<td>2.9%</td>
<td>2</td>
</tr>
</tbody>
</table>

18. What state do you reside in?

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
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<td>Alabama</td>
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<td>Alaska</td>
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</tr>
<tr>
<td>Arizona</td>
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<td>0</td>
</tr>
<tr>
<td>Arkansas</td>
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<td>0</td>
</tr>
<tr>
<td>California</td>
<td>55.9%</td>
<td>38</td>
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<td>State</td>
<td>Percentage</td>
<td>Count</td>
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<td>------------</td>
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<tr>
<td>Colorado</td>
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<td>Connecticut</td>
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<tr>
<td>Delaware</td>
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<td>0</td>
</tr>
<tr>
<td>District of Columbia (DC)</td>
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<td>0</td>
</tr>
<tr>
<td>Florida</td>
<td>4.4%</td>
<td>3</td>
</tr>
<tr>
<td>Georgia</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Hawaii</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Idaho</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Illinois</td>
<td>1.5%</td>
<td>1</td>
</tr>
<tr>
<td>Indiana</td>
<td>1.5%</td>
<td>1</td>
</tr>
<tr>
<td>Iowa</td>
<td>0.0%</td>
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<tr>
<td>Kansas</td>
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<tr>
<td>Kentucky</td>
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<tr>
<td>Louisiana</td>
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</tr>
<tr>
<td>Maine</td>
<td>0.0%</td>
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</tr>
<tr>
<td>Maryland</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Massachusetts</td>
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<td>0</td>
</tr>
<tr>
<td>Michigan</td>
<td>1.5%</td>
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<tr>
<td>Minnesota</td>
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<tr>
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<tr>
<td>Missouri</td>
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<tr>
<td>Montana</td>
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<td>0</td>
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<tr>
<td>Nebraska</td>
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<td>0</td>
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<tr>
<td>Nevada</td>
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<td>1</td>
</tr>
<tr>
<td>New Hampshire</td>
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<td>0</td>
</tr>
<tr>
<td>New Jersey</td>
<td>1.5%</td>
<td>1</td>
</tr>
<tr>
<td>New Mexico</td>
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</tr>
<tr>
<td>New York</td>
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<tr>
<td>North Carolina</td>
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<tr>
<td>North Dakota</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Ohio</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Oregon</td>
<td>1.5%</td>
<td>1</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>South Carolina</td>
<td>0.0%</td>
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<tr>
<td>South Dakota</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Tennessee</td>
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<tr>
<td>Texas</td>
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<tr>
<td>Utah</td>
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<tr>
<td>Vermont</td>
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<tr>
<td>Virginia</td>
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<td>3</td>
</tr>
<tr>
<td>Washington</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>West Virginia</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>0.0%</td>
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</tr>
</tbody>
</table>
19. In what type of community do you live?

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>City or urban community</td>
<td>59.4%</td>
<td>41</td>
</tr>
<tr>
<td>Suburban community</td>
<td>34.8%</td>
<td>24</td>
</tr>
<tr>
<td>Rural community</td>
<td>5.8%</td>
<td>4</td>
</tr>
<tr>
<td>Choose not to answer</td>
<td>0.0%</td>
<td>0</td>
</tr>
</tbody>
</table>

Wyoming  
Choose not to answer
Appendix C

LIST OF TABLES

1. Average Usage Time of Apps from Opening to Closing ..................................................9
### Appendix D

**LIST OF FIGURES**

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Participant Gender Distribution</td>
<td>29</td>
</tr>
<tr>
<td>2.</td>
<td>Participant Age Distribution</td>
<td>29</td>
</tr>
<tr>
<td>3.</td>
<td>Participant Ethnicity</td>
<td>30</td>
</tr>
<tr>
<td>4.</td>
<td>Participant Relationship Status</td>
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<tr>
<td>5.</td>
<td>Participant Education Data</td>
<td>31</td>
</tr>
<tr>
<td>6.</td>
<td>Participant Occupation Data</td>
<td>33</td>
</tr>
<tr>
<td>7.</td>
<td>Participant Employment Data</td>
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</tr>
<tr>
<td>8.</td>
<td>Participant State of Residence Data</td>
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</tr>
<tr>
<td>9.</td>
<td>Participant Community Type Data</td>
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<tr>
<td>10.</td>
<td>Participant Device Preference</td>
<td>38</td>
</tr>
<tr>
<td>11.</td>
<td>Participant App Use</td>
<td>38</td>
</tr>
</tbody>
</table>
Appendix E

School of Science, Technology, Engineering, and Math

MS in Information Technology

The thesis for the master’s degree submitted by

Wilda L Duncan

under the title

A Users Approach to Health and Fitness Software Applications

has been read by the undersigned. It is hereby recommended for acceptance by the faculty with

credit to the amount of 3 semester hours.

(Signed, first reader) __________________________ (Date) ______________

(Signed, second reader, if required) ________________________ (Date) ______________

Recommend for approval on behalf of the program

(Signed) ______________________________ (Date) ______________

Recommendation accepted on behalf of the program director

(Signed) ______________________________ (Date) ______________

Approved by academic dean
Appendix F

Date ____________________________

I, Wilda L Duncan owner(s) of the copyright to the work known as “A Users Approach to Health and Fitness Software Applications” hereby authorize American Military University to use the following material as part of their thesis to be submitted to American Public University System.

<table>
<thead>
<tr>
<th>Page</th>
<th>Line Numbers or Other Identification</th>
</tr>
</thead>
</table>

________________________________________

Signature
Institutional Review Board (IRB) Approval Letter

Application Number: 03-2017-033
Application Title: A Users Approach to Health and Fitness Software Applications

March 31, 2017

Dear Wilda Duncan,

The APUS IRB has reviewed and approved the above application.

Date of IRB approval: 03/31/2017
Date of IRB approval expiration: 03/30/2018

The approval is valid for one calendar year from the date of approval. Should your research using human subjects extend beyond the time covered by this approval, you will need to submit an extension request form to the IRB.

Changes in the research (e.g., recruitment process, advertisements) or informed consent process must be approved by the IRB before they are implemented. Please submit a protocol amendment form to do so.

It is the responsibility of the investigators to report to the IRB any serious, unexpected, and related adverse events and potential unanticipated problems related to risks to subjects and others using the unanticipated problems notification.

Please direct any question to apus-irb@apus.edu. The forms mentioned above are available on our IRB Application page; listed under downloadable documents.

Sincerely,

Patricia J. Campbell
IRB Chair
Appendix H

This capstone has been approved by Dr. James Marion for submission, review, and publication by the Online Library.

Author’s name: Wilda L. Duncan

Title: A Users Approach to Health and Fitness Software Applications

Professor: Dr. James Marion

Second reader, if required: _________________________________________________

Program: Master’s of Science in Information Technology with a concentration in

Enterprise Software Development

Pass with Distinction:

[ ] Contains Security-Sensitive Information