Smartwatches for Promoting Behavioral Health: A Phenomenological Study

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This Clinical Research Project by Dawn McClure, directed and approved by the candidate's Clinical Research Project Committee, was approved by the faculty of the Hawaii School of Professional Psychology at Chaminade University of Honolulu in partial fulfillment of the requirements of the degree of Doctor of Psychology in Clinical Psychology.

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The purpose of this study was to explore the influences of wearable technology on an individual's motivation and behaviors related to health. Although much research has been done on the usage of smartwatches, the current study is propelled by the paucity of research presented in the lenses of a psychological perspective. This study explores the nature, experience, and meaning of utilizing a smartwatch for behavioral health. Utilizing extreme case purposive sampling the aim of the study was to capture varying experiences of individuals who had adopted and or abandoned a smartwatch. Through semi-structured interviews valuable stories were gathered that resulted in differing outcomes but presented many similar involvements with smartwatches. Findings revealed the wearability of the smartwatch played a large role in abandonment and ascribing strong meaning, such as longevity and health, to tracked behaviors propelled adoption. Both participants described self-observation as a motivating interaction with their smartwatch and feelings of guilt as discouraging. Internal motivators tended to encourage lasting behavioral changes while external incentives were temporary. The results of the current qualitative study provide evidence that many factors including wearability and varying motivations can result in continued adoption or abandonment of a user's smartwatch. Understanding the basics of what fuels the use of a smartwatch and what the nature of smartwatch use looks like opens new avenues to understanding how wearable technology can continue to be integrated into the healthcare setting.

Dedication

I dedicate this work to my unconditionally loving mother and in memory of my intelligent father.

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I would like to acknowledge Dr. Philhower, my Clinical Research Project chair, and Dr. Tanji, my Clinical Research Project committee member, for all the time, knowledge, and guidance they have offered me through my graduate studies. I want to thank my significant other, Logan Dressel, for his enthusiastic support as he journeyed beside me through my seemingly endless trek through college and graduate school. I want to credit my siblings Susan Young, Christine Garlough, and James McClure for the inspiration and encouragement I have needed to accomplish my dreams. I recognize there are numerous friends who I owe my deepest gratitude to for making my studies an enjoyable experience by celebrating even the smallest accomplishments in life together. Finally, I am forever appreciative of my participants for trusting me with their stories, which I present to you in this project.

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CHAPTER I: INTRODUCTION

Situating the Study

Situating a study, or using a contextual frame, is unique to qualitative research. When completing this portion of the research prospectus, researchers have the opportunity to state why this topic or phenomenon is personally significant to them and why they think it is important to investigate. It helps the reader or stakeholder understand how the research question came about and how it is relevant to the researcher's life and to others. To situate the study, researchers examine how their decision to conduct a study is conditioned by a personal bias regarding what is meaningful to study (Rossman & Rallis, 2012). It is important to consider what experiences have made the phenomenon of interest important to the researcher, how the researcher's experiences may shape the lends through which the study is bound, and how they impact the phenomenon being studied by the researcher's presence and assumptions (Rossman & Rallis, 2017).

I have had a great interest in health psychology and neuropsychology following my father's stroke in 2007, which altered aspects of his personality and overall health. In studying and training in these fields, I have begun to learn that an integrated approach to treatment is crucial for a patient's overall improved health and rehabilitation. Further, working in a hospital with patients of all ages I have observed an increased usage of personal smartphone and smartwatch technologies for tracking and promoting behavioral health. While completing my intervention practicum at Tripler Army Medical Center I observed practitioners frequently recommending and educating patients on the use of wearables and applications to promote and monitor healthy behaviors. During treatment, patients typically learn and practice new health skills, such as breathing properly, eating healthy, and exercising regularly.

While continuing my clinical training I began to work in community mental health at Waianae Coast Comprehensive Health Center. There, I witnessed the detrimental effects of chronic medical and mental health conditions on an individual when left untreated. Conversely, I have seen the miraculous improvements to these individual's quality of life when appropriate medical and psychological interventions are put in place. I have since pondered the question as to how we, as health professionals, can appropriately and effectively track, diagnoses, and treat patients with varying and comorbid diagnoses.

Based on a cognitive behavioral theory, patients are expected to work on learned skills outside of therapy to gain or achieve maximum benefits for integrating skills in their daily life. Now that technology, including wearable products, are used daily in modern day they have begun to be integrated into the medical field to promote healthy behaviors. Patients are now recommended by their doctors to use smartwatches and phone applications to track their sleep, exercise, eating habits, breathing patters, and much more. Many patients have preferred to utilize their wearable products to conveniently and automatically track these behaviors. However, other patients have not adopted these changes and do not utilize wearable technologies. I have become fascinated by the concept of prescribing healthy behaviors as treatment for patients. Further, I have become interested in a more general application for utilizing smartwatches to promote preventative health behaviors in the general population.

I have used smartwatches to track my own physical activity, eating habits, and sleep patterns and have found them to be helpful for setting and achieving health goals. However, I have also discovered that it can be difficult to remember to wear the product after charging it or to feel motivated to wear it if I have not been practicing health behaviors. My personal use and

observation of others using smartwatches has fed my curiosity of how these small devices can impact and individual's behaviors.

Review of Literature

A review of literature for a qualitative study includes an overview and critical examination of information that is known and unknown about a subject or phenomenon. A literature review is an important part of a qualitative inquiry because it provides information on theories and hypotheses revolving around the phenomenon being studied in the field. An integrative review provides current knowledge and understanding of the topic of interest. This type of review typically allows for defining the problem, outlining methods of data collection, data evaluation, interpretation, and presentation of findings (Moustakas, 1994). A theoretical review allows for analysis of current theories that account for the existence of the phenomenon of interest (Moustakas, 1994). A methodological review analyzes research methods that have been developed and utilized in published work (Moustakas, 1994). A thematic review presents core themes that have been found in past studies (Moustakas, 1994). For the current methodological project an integrative review will be done to gather a broad range of information surrounding the phenomenon of the personal experiences of individuals who have previously or currently utilize wearable products to promote behavioral health.

The review is helpful for understanding why the study is being done and what questions need to be asked. Glesne (2016) defines *praxis* as a relationship between thought and action, between theory and practice. Praxis refers to more than putting theory into action; it also involves continual reflection on and inquiry into experience and the meaning of concepts used in everyday interactions. It is important for the researcher to discover what is known about the

current topic while completing a literature review. Therefore, the researcher needs to continuously review findings in literature utilizing peer reviewed articles and published books to make sure they understand what the meaning of their findings are and how they can appropriately and deeply understand a phenomenon. In doing so, the researcher will increase the theoretical sensitivity and be aware of what data are relevant in their own study.

Wearable Devices

Both mobile and wearable devices have become popular and useful for engaging and motivating individuals in tracking, monitoring, and changing their fitness and health care (Asimakopoulos, Asimakopoulos, & Spillers, 2017). To delimit this study discussion of smartphone applications will be discussed only as previous methods of changing behaviors and a method of syncing data provided by smartwatches. The current study does not aim to explore the experiences of using smartphone applications as a standalone. Wearable products, defined in this paper, are any tracking device that can be worn on an individual's body to track physical activity and a wide range of biological functions. Some of the more current and popular products include Fitbit, Garmin, Polar, Apple Watch, Samsung Gear Fit, and Jawbone. In 2013, 5.9 million connected wearable devices were purchased and an estimated 310 million were purchased in 2017, worldwide (Asimakopoloulos et al., 2017; Lomas, 2017). About one third of these consumers have been found to discontinue wearable usage between 6-12 months (Ledger, 2014). This provokes questions related to what factors of human behavior and motivation are involved in the adoption and continuation or abandonment of wearable products usage.

Most research found to date has been geared toward improving technology, marketing, and consumer usability, but little addresses the motivational factors and medical and or

behavioral health aspects that could improve an individual's physical and mental health. Thus, the purpose of the current study is propelled by the paucity of research presented in the lenses of a psychological perspective. Exploration of intrinsic and extrinsic motivational factors for behavioral health will be useful in understanding individualized use of smartwatches.

Motivation

Motivation is a concept that has been studied at length for decades, typically in the context of a self-determination theory, and is often defined as an individual's ability to be moved to do something (Ryan & Deci, 2000). Motivation comes in various shapes and sizes and influences everyone differently. Two important forms of motivation to consider are intrinsic and extrinsic influences. Intrinsic motivation develops from an individual's inherent interest to accomplish a task; something that is enjoyable or pleasant to them. Extrinsic motivation is driven by external, sometimes tangible outcomes (Ryan & Deci, 2000). Wearable products can provide a user with a plethora of data and feedback that play an important role in motivating or demotivating the individual. To name a few of these wearable abilities; number of steps taken, calories burned, food intake, calories burned, sleep quality, respiration rate, heart rate, and mood monitoring. Many products have adopted capabilities of interacting and competing with other individuals (Asimakopoulos et al., 2017).

A recent study done by Karapanos, Gouveia, Hassenzahl, and Forlizzi (2016) explored the experiences of 133 wearable product users and found that a user's experience is driven by physical thriving and relatedness. Results suggest that individual's feeling of physical thriving, self-esteem, and competence sustained with their abilities to meet or surpass their set goals. The social component of sharing experiences provided feelings of belonging and social support.

Furthermore, the wearable products enhanced user's overall feelings of autonomy and relatedness, which promoted healthier lifestyles and wellbeing. Another study utilizing mixed methods reviewed four-week diaries of the experiences of 34 individuals utilizing either Fitbit or Jawbone wearable products. Overall findings suggest three factors including data, gamification, and content were important for impacting motivation and efficacy. Data such as movement and sleep statistics were presented to the individuals and were useful for setting health goals. Gamification, specifically, for Jawbone users was a positive because the individuals could join challenges to increase activity. Finally, motivational relevancy of the content provided by the two forms of smartwatches influenced self-efficacy when content supported the individual's immediate and intrinsic goals (Asimakopoulos et al., 2017).

In the previously described studies, there was a commonality among participants that included previous adoption of smartwatches, indicating intrinsic motivation for using these products. Hence, it is worth mentioning that the consumer must be motivated to want the product and further, have the financial support to be able to afford it. With these considerations, it is possible these products are appealing to populations who might need the device the least for behavior modification (Patel, Asch, & Volpp, 2015). Understanding what factors that encourage usage and behavioral changes have been useful for individuals who readily adopt wearable products. However, it is also important to consider what factors may demote adoption and behavior change.

One study recruited 26 college students and assigned them one of two types of Fitbit activity trackers to use for six-weeks. Results revealed approximately 25% of the participants had abandoned the use of the activity tracker after one week, approximately 50% at the two-

week marker, and 75% at week four (Shih, Han, Poole, Rosson, & Carroll, 2015). Issues for adoption included inability to establish routine of wearing and charging the product, interference with aesthetic, lack of support for comparing activities, integration problems to smartphone application, and technical issues or data inaccuracy (Shih et al., 2015).

Preventative Care

It is important to not only understand the use of wearable products for individuals with health problems, but also to an equal or greater extent investigate the benefits of using wearable products with individuals who do not currently have a chronic illness. The subject of personalized preventative medicine includes information about an individual's genetics and current biophysiological functioning that can help prevent disease (Swan, 2012). Preventative care can often be referred to as reducing readmissions to the hospital for existing conditions. A more general sense of preventative care or medicine is engaging in behaviors that prolong lifespan and reduce possibility of disease (Swan, 2015). For purposes of this study the focus will be on a general definition of improving quality of life and physical and mental health.

Mobile and wearable devices are already beginning to become mainstream for individuals in the U.S. Over 80% of adults in the adult U.S. population utilize Internet-connected devices to access health information online (Swan, 2015). Some medical and mental health fields have already adopted the use of mobile smartphone applications for tracking behaviors (Luxton et al., 2011). Modern medical and psychological testing and treatment heavily rely on technology. Specifically, in health psychology many psychologists currently utilize the convenience of smartphone applications with their patients in order to promote healthy behaviors (Luxton et al., 2011). Many health psychologists apply cognitive behavioral therapy (CBT)

techniques to enhance patients' outcomes. This is important because therapy only allows for a few hours a week, or less, to learn new behavioral skills with a clinical psychologist. These skills are likely to be enhanced if they are practiced and monitored outside of therapy hours.

A systematic review done by Mosa, Yoo, and Sheets (2012) found over 80 smartphone applications are already being utilized by health care professionals for disease diagnosis, drug reference, medical calculators, literature search, clinical communication, hospital information system, and medical training. What they also found was practitioners are using a variety of applications for their patients to manage chronic illness. Many of these applications are utilized to measure physical activity for cardiac rehabilitation, sugar intake and insulin control for diabetes, assessment for hearing loss, sound therapy for tinnitus, fall detector for individuals with disabilities, sleep management for insomnia, and meditation practices for overall mental and physical health.

There appears to be unlimited benefits to utilizing smartwatches for both physical health and mental health related to diagnosis, treatment and prevention. Piwek, Ellis, Andrews, and Joinson (2016) discuss at length these potential benefits. A few include identifying severity of depressive symptoms through physical activity, sleep duration, and mood tracking; management of long-term chronic illness such as diabetes, hypertension, and cardiovascular disease, and detection of breathing and movement problems like sleep apnea and Parkinson's disease (Piwek et al., 2016). Further, web-based and smartphone technologies including self-reports and feedback have previously shown to facilitate positive behavior changes for patients with obesity, anxiety, panic disorders, and post-traumatic disorder (Piweck et al., 2016). It is believed that the portability and automatic tracking abilities of smartwatches would be beneficial to the increasing

patient attrition rates. Although countless benefits have been identified for implementing wearable technology into healthcare and individual's everyday routines there still lies obstacles of adoption.

Aguilera and Muench (2012) studied a population of mental health service consumers from Australia. They found that 76% of people from this sample were interested in using mobile phones for mental health monitoring and self-management. There seems to be an interest and want to use applications by practitioners and patients. However, there were many considerations mentioned that might limit the use of smartphone applications, one being the usability and acceptance of applications. Some patients may prefer not to use them or may not have access to using them. Quality standards and safety need to be considered, as applications may not provide accurate data.

Security

Thierer (2015) speaks to the revolution of internet-enabled innovations and the opportunities that they present for the near future. All smart devices, including wearables, are part of a network referred to as the Internet of Things (IoT). Devices that fall within this network are equipped with IP addresses for internet connectivity, microchips, sensors, or capabilities to connect wirelessly (Thierer, 2015). It is fascinating to consider the technological advances that have allowed so many to enjoy the wide scope of social opportunities, endless entertainment, and limitless information provided by mobile devices and wearable technology. However, it is of equal importance to explore the advances in immediate and large-scale sharing of personal data and what threats may be posed to an individual utilizing these devices.

The biggest threat to unwarranted data sharing is due to unauthorized entry of or physical loss of a device (Luxton, McCann, Mishkind, & Reger, 2011). Many other security and privacy issues have been explored that involve the ubiquitous and continuous collection of data via various wearable devices. These concerns include: location-based privacy, concerns of audio, image, or video locations; synchronizing data, privacy from others in social network, fear that organizations or government will use personal data, and surveillance facial recognition (Motti & Caine, 2015). Other topics of research look into the potential of wearing a smartwatch with a motion sensor that can depict keystrokes to provide personal computer or mobile activity (Liu, Zhou, Diao, Li, & Zhang, 2011; Sarkisyan, Debbiny, & Nahapetian, 2015). This poses a threat of security not only through smartwatch devices but other personal devices within the IoT.

Statement of the Problem

The statement of the problem in a qualitative study is its rationale statement. It is important for justifying why the study needs to be done. This statement is made on the basis of a literature review conducted in order to reveal what might be missing from the current knowledge. By understanding what is missed, or whose story has been missed the purpose of the study can then be easily defined (Rossman & Rallis, 2012).

The need for this clinical research project is based on the paucity of information available on the general public's experiences of adoption or abandonment of wearable products for influencing behavioral health. Knowing and understanding these experiences could enhance both potential consumers and health provider's ability to enhance motivation and self-efficacy for healthy behavioral changes and treatment or preventative care.

Purpose of the Study

The statement of purpose provides a brief statement regarding how the researcher will respond to the need for further exploration of a particular phenomenon or aspect of a phenomenon. It identifies the purpose, central concept being studied, population being studied, method of inquiry, anticipated form the presentation of results will take, and the definition of the central concept (Creswell, as cited in Rossman & Rallis, 2017). The statement of purpose should reflect the emergent quality of the approach as well as the moral praxis of the study (Rossman & Rallis, 2012).

The purpose of this study is to explore the influences of wearable technology on an individual's motivation and behaviors related to health. The concept of motivation and the relationship to behavior change will further be explored through the experiences of two individuals with differing wearable experiences. One individual who has continuously had success with adopting wearable technology and utilizing it to track and promote healthy behaviors will have the opportunity to share their perspective and experiences of using smartwatches. A second individual who has previously utilized and had difficulty incorporating smartwatches into their daily life will also have the opportunity to share their perspective and experiences of using smartwatches.

Research Questions

A research question identifies the intent of the study and what the work seeks to understand. In qualitative research, questions also stem from a problem or a need for the study (Glesne, 2016). There are four general categories for questions generated in conducting a phenomenological inquiry: descriptive, experiential, process, and meaning (Moustakas, 1994).

The first is a descriptive question that explores the nature of the phenomenon from the participant's perspective. Secondly is the experiential question that explores the participant's experience of the phenomenon. Thirdly is the process question that is important for understanding how the specific phenomenon has changed over time and how meanings are constructed and reconstructed over time. Fourth and finally is the meaning question that evaluates the significance and meaning associated with the phenomenon being investigated.

Grand tour questions are used to facilitate and gain the most information about a participant's experience and story as possible. These questions are supposed to be open ended so that the participant has the opportunity to think and tell their story through their perspective. These questions should attempt to capture the participant's feelings, beliefs, behaviors, and processes (Spradley, 1979).

The current study aims to provide insight to the follow research questions; (1) what is the nature of using a smartwatch? (2) What is the experience with adoption/abandonment of wearbales? (3) How has the experience of using wearables changed over time? (4) What is the meaning of using wearables?

Grand Tour Questions

1. How did you begin using your smartwatch?
2. Can you walk me through a typical day when you used your smartwatch?
3. What are some of the most memorable experiences you have had with using your smartwatch?
4. When do you find yourself wearing and not wearing your wearable product?
5. What have your experiences been with changes in the product? (upgrades etc.)

6. What have you learned while using a smartwatch?

Significance of the Study

The significances of a study generate a statement that explores the hopes that the researcher has for the study and identifies who the stakeholders of the study are. It provides information on who might benefit from the study or who might be interested in the study (Rossman & Rallis, 2012). By understanding the roles and benefits of the study the utility will be enhanced. The research will then be aimed toward the appropriate stakeholders and utilized by those that may benefit the greatest (Glesne, 2016).

The hope of this study is to gain a deeper understanding of individuals' experiences of motivation and or demotivation for behavioral change with utilizing wearable products. By understanding these experiences it is hoped that both practitioners and patients will benefit in knowing how to better utilize these tools to promote healthy behaviors. Practitioners might have an easier time getting their patients to adhere to treatment and patients may gain a better awareness of their health habits to enhance treatment outcomes. This information may be useful to family members of behavioral health patients, so they can understand and help with the treatment process. Further, healthy individuals who plan to further integrate preventative behaviors into their daily activities may utilize this information.

A broader and more generalized benefit of this study would include insight to how health providers can begin to provide more personalized treatment planning. By understanding the strengths of using smartwatches doctors and supervisors can guide students in utilizing appropriate and efficient applications with various patients. By understanding difficulties with using applications students and other professionals can begin to learn how to correct or readjust

how smartwatches are being recommended and taught to patients. Other stakeholders include business and marketing professionals who plan to continue to alter and improve technologies to better suit their customers. Future, researchers may find this study useful in providing foundational information to guide further assessment into improving the use and experiences of using smartwatches for behavioral health.

CHAPTER II. APPROACH

[This Chapter presents the methodology as proposed, prior to entering the field.]

Rationale for use of Qualitative Methodology

Qualitative Inquiry is a research method that investigates meaning and understanding of people and their experiences. It allows the psychologist and other professionals to delve deeper into a subject of interest that may be poorly understood especially from the emic perspective and uncommonly researched (Moustakas, 1994). This method is used to explore process and meaning questions and to build and refine theory.

There are multiple ways to use Qualitative Inquiry, first, is its instrumental use. Qualitative methodology can be used to investigate or help solve a local or practical problem. Second, it can have an enlightened use; it may be used to generate new information or to develop a new theory. This way the researcher can get intricate details on a topic that is not familiar. Thirdly, qualitative methodology can have a symbolic use; it can be used to study topics that may seem more familiar so that the researcher can further understand an individual's experiences. The fourth and final use is qualitative inquiry's transformative or emancipatory use. The researcher may use the method to study social factors, language, power, and history to understand how individual's views of reality are shaped (Rossman & Rallis, 2017).

This clinical research project reflects the enlightenment use of qualitative method. The study will begin to uncover new knowledge about personal experiences with wearable products for behavioral health management. The study may also reflect a symbolic use of qualitative methodology. It may provide more insight into what they believe is the significance of this modality.

Specific Methodology

A phenomenological method evaluates the meanings attributed to the lived experiences of several individuals regarding a social phenomenon. When conducting a phenomenological study, the researcher typically obtains information through the use of structured in-depth interviews (Moustakas, 1994). The transcendental phenomenological approach is a postmodern version of the traditional phenomenological method. It also utilizes in-depth interviewing as its primary source of information, however, places a greater emphasis on epoché, a Greek word that means to refrain from judgment (Moustakas, 1994). This approach tends to follow the individual's story rather than the researcher's ideas of what is important to explore. Thus, the researchers use a semi-structured interview protocol. The researchers also challenge their assumptive filters in relation to participants' stories (Moustakas, 1994).

Transcendental phenomenological method is useful for my research interest because of its focus on the importance of epoché or checking researcher biases in a phenomenological study. It would give my participants a chance to express their true thoughts about the use of wearable products without my thoughts influencing their decision to report positive or negative aspects. For example, I personally believe smartwatches have the potential to benefit behavioral health treatment planning but would want to refrain from stacking the study's findings by instilling that perception in my participant's thoughts. By challenging my assumptions and the impact they may have on my study, I invite the participant to have a more complex perspective on the phenomenon, to be more ambivalent perhaps.

Role of the Researcher

Inter-subjectivity assumes that the subjectivities of the participant and the researcher cannot be separated; both influence each other in a study (Glesne, 2016). The paradox, however, is that in qualitative inquiries, the researcher should try to capture the reality of the participant by being mindful of their own thoughts and positionalities (Glesne, 2016). Moustakas (1994) references Husserl's work and discusses the idea that each individual experiences the world differently and the researcher needs to be aware of his or her influence on the participant.

To accomplish this, the researcher attempts to move fluidly between being a full participant and a full observer so that he/she can capture the phenomenon and meaning from multiple vantage points (Glesne, 2016). Being a participant-observer allows the researcher to be sensitive and respectful toward the individual. A researcher cannot be a full participant because he/she cannot be a functioning member of the community that is being investigated (Moustakas, 1994). When the researcher can distance themselves enough from the social field it becomes easier for them to maintain the perspective of the uninvolved outsider (Glesne, 2016). The researcher cannot be a full observer, as this will distance the researcher too far from the individual and requires deception that can present with ethical dilemmas (Glesne, 2016). Qualitative research focuses on the participant's experience; therefore, deception is unwanted in the interview process, as it would produce inaccurate data. Deception would threaten the relationship with the participant and would appear to take advantage of the inclusion and granting of privilege given by the participant.

Ethical Considerations

Ethics are important factors in conducting sound and beneficial studies. Ethical practice may vary among individual's moral principles. However, in research there are stricter guidelines that promote ethical decisions. Ethical theories that can inform these decisions include theories of consequences, rights and responsibilities, social justice, and care (Rossman & Rallis, 2017). Consequentialist theories consider actions as good or bad depending on the outcome or consequence of the action (Rossman & Rallis, 2017). Utilitarianism is one of the best-known examples of consequentialist theory. It posits that one must decide in favor of choices that provide the greatest good for the greatest number (Rossman & Rallis, 2017). Teleological ethics are another well-known consequentialist theory. It suggests that the ends outweigh the means. This theory is not typically used in qualitative research, because some research may use deception in the process of gathering data. Deception would damage the relationship with the participant not allowing room for entry or epoché (Rossman & Rallis, 2017). Non-consequentialist theories include theories like Immanuel Kant's categorical imperative that posit that the worth of humans is inherent as an end in itself, thus assert that the researcher recognize and utilize universal standards to guide all behaviors regardless of the consequences. These ethical standards support a participant's right to informed consent; privacy; freedom of conscience; free speech; and due process (Rossman & Rallis, 2017). Critical ethics, or ethics of justice takes in the consideration of power and representation. They rely on the principles of fairness and equity to judge what is right and what is wrong. Further, they question who benefits most, the researcher, public, or participant to instill fairness (Rossman & Rallis, 2017). Covenantal ethics, or the ethics of caring, consider the fidelity of the research. They emphasize

awareness of the ecosystemic implications of information uncovered in a study and the importance of working with participants to minimize negative consequences that may be incurred during research. This means that it is the researcher's responsibility to ensure the participant has the right to an informed consent, which includes discussion of confidentiality, anonymity, risks, benefits, and their rights. Other rights include the right to opt out without negative consequence and to defer questions. The researcher also needs to address the important role that the participant's voice, collaboration, and inclusion has in the study. Further, it is important that the participant has an understanding that they have ownership and proprietorship of their stories and experiences. Finally, participants should be aware that they have interpretive authority, or the right to verify that their experiences have been presented with accuracy and respectfully.

Interviews would be held in a quiet and private location. The location would be discussed and agreed upon based on accessibility to the participant and researcher. Interviews via online video chat (Skype or FaceTime) would also be an option, if more convenient for the participant. In addition to the researcher, members of the support team would have limited access to the tapes and transcripts in order to assist the researcher. The researcher would transcribe each audiotape and audit them for accuracy. In the event that the researcher is unable to transcribe the interviews in a timely manner, they would utilize a transcriptionist. If the researcher chose to do so they would be sure this individual is educated about the importance of confidentiality and security of the data and would sign an agreement to maintain ethical standards

The support team would include Dr. Lianne Philhower, research committee chair, who would serve as the primary methodological consultant and debriefer. Her job would be to review

the rigor of work and aid in telling your story with accuracy. Dr. Joy Tanji, research committee member, would serve as the primary peer examiner. The role of my peer examiner is to check the analysis of each interview. All notes, audiotapes, transcripts, and drafts for the study's final write up would be stored using a double locked system. The researcher stores all documents in a locked filing cabinet to which only they have access to. When documents are in possession of the support team (debriefer, peer examiner, and transcriptionist) they will be secured using a password-protected file or password-protected data storage devices (USB), which would also be stored in the locked file cabinet. Team members would not be permitted to save files on their own computers.

Purposive Sampling and Bounding the Study

Purposive sampling, also referred to as purposeful sampling, aims to include information-rich cases, individuals who are part of, or experience directly and know, a social phenomenon well are asked to participate (Glesne, 2016). Qualitative research rarely uses large samples and it does not aim to make generalizations about what is average or typical about the experience of a phenomenon. By carefully selecting participants based on their experience and knowledge of a phenomenon the researcher can get a greater depth and breadth of information needed to build on their theory. This sampling is unlike quantitative sampling in that it does not aim to select individuals that would represent the normative population (Glesne 2016). Although qualitative research searches for patterns, it is not about stipulating the norm. The strength of thematic analysis, in qualitative research, is its ability to help reveal underlying complexities as researchers seek to identify tensions and distinctions, and to explain where and why people differ from a general pattern (Glesne, 2016).

The current study uses an extreme case sampling. This form of sampling allows the researcher to select cases from extremes or cases that are special in some way. This study will select two individuals. One who has adopted the use of wearable products and continues to utilize the product and a second participant will be selected on the criteria that they have attempted to utilize a wearable product but abandoned the product after some use.

Recruitment

Utilizing a transcendental phenomenological method this study would evaluate meaning attributed to lived experiences of two individuals with differing experiences with smart watches. Extreme case sampling would be used to gather information on the two experiences. This study would select two individuals. One who has adopted the use of wearable products and continues to utilize the product and a second participant would be selected on the criteria that they have attempted to utilize a wearable product but abandoned the product after some use. A transcendental phenomenological method emphasizes understanding an individual's subjective meaning and capturing the essence of their experience. This method would be most helpful in gaining a deeper understanding of lived experiences with utilizing smartwatches for behavioral health.

I would begin my participant selection by recruiting individuals who volunteer to participate in my study through an online social media forum; Facebook. I would begin with posting a description of what is necessary to participate, expected volunteer time, and a description of the purpose of the study. This information would be posted in a few health-related groups on Facebook (ex. exercise groups and healthy eating groups). Eligibility to Participate would be included on a flyer posted to social media sites. Information would include that the

current study is looking for individuals who have previously and or currently use smartwatches for tracking, monitoring, scheduling, etc. their behaviors. Volunteers had to be 18 years or older to participate in this study. Further, participants would be informed that there would be three interviews and one review session, in person or over video communication, would be held for each volunteer. Each interview would be expected to last forty-five to sixty minutes.

Data Collection and Analysis

Pre-entry and Entry

During the pre-entry phase of a qualitative study, the researcher prepares to enter the field. During the pre-entry phase, a researcher may consult with informants and gatekeepers to help with entry. During the entry phase of a qualitative study, the researcher begins to enter the field, establish contact, and build rapport or trust with the participants of the study. When there is good entry, it is likely the participant will be open about their experiences without holding back important information. A closer relationship is built between the researcher and the participant so that they can fully understand the experiences.

Part of entry is letting participants know their role in the study and their rights. A two-part informed consent protocol will be used in this qualitative methodological study so that the participant can feel confident in what she shares and how her words and experiences will be utilized. The initial consent will provide her with an overview of the study, why s/he was chosen, the possible risks and benefits of participation, confidentiality and its limits, anonymity, and participant's rights.

As governed by covenantal ethics a second consent and release of information is signed when the interviewing and the write-up are complete. This allows the participant an opportunity

to check the emic accuracy of the researcher's portrayal of her story. During this process, the participant will have the opportunity to add, exclude, or edit any quotes the research wants to use to illustrate the emergent themes found in their conversations. A two-part informed consent protocol will be used because at the outset of the study, the participant does not know yet what she will share in the study prior to the interview along with how it will be portrayed in the final write up. The second informed consent allows for the participant to review and check the researcher's work to ensure accurate information is used to portray her stories.

Qualitative research goes beyond common principles of consequential and nonconsequential ethics by including critical and covenantal ethical principles. By utilizing a two-part informed consent, the researcher can present and bring awareness to the guidelines that promote shared power, collaborative processes, conjoint ownership of research products, and interpretive authority (Rossman & Rallis, 2017). Considering these ethical guidelines, the participant has rights to their stories. When the participant understands and trusts the researcher with these rights, they are more likely to be authentic and share meaningful data, which with increase the validity and reliability of the research. If these ethical principles and rights are not followed the researcher may inflict harm on the individual participant or community of which they represent. Potential issues may include inaccurate presentation of data or release of unwarranted data to the public.

Constant Comparative Method

Constant comparative methods involve repeated cycles of data collection and simultaneous analysis that permit formulation of provisional hypotheses and revision of emerging hypotheses across repeated series, through direct and indirect data collection (Strauss

& Corbin, 1998). The simultaneous collection analysis of data allows the researcher the opportunity to rigorously test their emerging hypotheses against confirming and disconfirming evidence. By using this rigorous method, the overall accuracy of emic portrayal is refined over time (Strauss & Corbin, 1998). The current study utilizes semi-structured interviewing, data management, peer debriefing, transcription, auditing, coding, peer examining, and member checking to ensure rigor and emic data.

Semi-structured interviews. After achieving pre-entry and some entry with the participant a semi-structured interview, with audio recording, would be conducted with the participant. For this study three face-to-face interview, approximately one hour long, would take place to collect at least three stories related to the phenomenon of study for each participant. The researcher, I, would provide open ended questions to attempt to elicit meaningful stories that relate to the experiences of utilizing wearable products.

Data management. Data management is important for keeping up with the data collected while emerged in the field. Directly following the semi-structured interview, I intended on making notes, or utilizing macro-level coding, to record themes that were apparent during the interview. I then planned to review the audiotape to create a running code to further understand themes from the data that I may have missed during the interview. Running code can be used to gain a provisional sense of what is being uncovered by the participant and point out areas that may not have been addressed during the initial interview (Glesne, 2016).

Peer debriefing. A peer debriefer is a peer who provides methodological consultation before, during, and after data collections in the field (Glesne, 2016). The researcher meets with the debriefer weekly so the debriefer can provide backup for the researcher's own internal

reflexive process of questioning inferences, exploring hypotheses, and brainstorming methodological refinements meant to address problems encountered in the field (Shenton, 2004). I would meet with my peer debriefer weekly following the semi-structured interview and discuss my initial thoughts, emerging hypotheses, and potential improvements for future interviews.

Transcription and auditing. Transcription is often used in qualitative data to capture all aspects of the data collected during interviews either from video or audio tapes. The purpose of transcribing is to save data reduction for later, recall themes of interview, and utilize quotes for the final write up (Glesne, 2016). I would transcribe the entire interview to ensure I would not miss important stories. I would audit my transcription by reviewing the audio tape while reading the transcription and checking for accuracy.

Coding. When a researcher has more resources, it is preferred to complete a microanalysis of the emerging data rather than coding by document or using microanalysis. This provides a more nuanced understanding of the participant's stories and supports greater saturation (Glesne, 2016). I planned to begin using level I, open coding. This coding involves deconstruction of text data into smaller meaning units, also referred to as phenomenological reduction (Moustakas, 1994). I would read the transcription paragraph by paragraph and write what themes or ideas I believe were being capture in this data. Level II coding, or axial coding, involves clustering of smaller meaning units into categories, categories into larger categories, and adding subcategories, this is referred to as imaginative variation (Moustakas, 1994). Process coding, a form of axial coding, is often utilized by researchers who are examining qualitative data for patterns of change over time (Strauss & Corbin, 1998). I planned to cluster smaller units of data into larger categories when coding my data; however, I only intended to use this method

to complete a narrative for thematic coding rather than completing uncategorical data. Level III, Selective coding, can be utilized when data begins to repeat codes. The researcher then can begin to select data that only adds new information and can be added to categories (Strauss & Corbin, 1998).

Peer examination. The peer examiner is a peer who is responsible for checking the fit between data units and codes assigned to them. They examine whether the coding is integrated into a unified sense of the emerging core concept or theme (Glesne, 2016). I planned to meet with my peer examiner weekly, alongside my peer debriefer, following the semi-structured interview to continue developing appropriate and fitting codes for my data and to finally write a narrative of my findings.

Generating a narrative. After collecting, analyzing, and coding data a narrative can be created to present the overall themes and findings of the study. The intent of the narrative is to capture the story of the participant with fidelity by distilling out the essence of the participant's story from the flow of descriptive information (Glesne, 2016).

Member checking. Member checking is a process of participant inclusion in the research process. The participant is asked to review the participant's work and to provide feedback that includes the accuracy of the participant's experience. The participant is allowed to retract, add, or edit their contributions to the study along with removing information that may reveal their identity (Glesne, 2016). Once I had completed my write-up I would provide a hard or electronic copy, as preferred, so that participant is allotted the time to review suggest changes to the write-up.

Methods of Verification

Validity

Validity, in quantitative research, is typically described as determining whether the current research is accurately measuring what it intended to (Golafshani, 2003). In qualitative research validity is commonly referred to as trustworthiness (Golafshani, 2003; Shenton, 2004). Trustworthiness is being aware of quality and rigor of the study (Glesne, 2016).

There are multiple ways to assess the trustworthiness of a study. One includes prolonged engagement, or immersion, and persistent observation in order to gain a vast amount of information about the participant and experience rather than just a snap shot. Triangulation is a reliable way to gather accurate information by interviewing or gaining information from three or more sources surrounding the experience. An important method is member check. This allows the researcher to have their work directly reviewed by the participant to check for accuracy. Another, of the many ways to sustain trustworthiness is to have a peer debriefer to gain an outside perspective on the process (Glesne, 2016). Further important foundational strategies include: entry; or rapport building, relational ethics, and epoché; including review of biases, and role management).

I planned to use member checking in my study. This would be crucial for making sure the practitioner's story is being accurately portrayed. Furthermore, I would ask them if I missed any details that are crucial to their experience. I planned to discuss with my clinical research chair and committee member Dr. Philhower and Dr. Tanji, as methodological consultants to check that my questions seemed to fit the research questions. I planned to stay aware of my subjectivities and how I could potentially make biased assumptions. I would work with the peer debriefer to

talk through potential biases so they would not affect my participant's story. I would also use entry, relational ethics, review of biases and role management. These could be monitored by consultations with Dr. Philhower and Dr. Tanji.

Reliability

Quantitative research defines reliability as the extent to which results stay consistent over time and accurately represent the total population (Golafshani, 2003). However, in qualitative studies the emphasis is on analytical generalizability that suggests there will be some form of transferability of thematic findings between current and future studies. Transferability can be enhanced by bounding and delimiting the study (e.g. making the topic of the study narrow and delving deep into the phenomenon though the participants experience). Using reliable data collection such as triangulation and constant comparative methods can help the researcher find common themes from various data sources or by repeatedly gathering information from a participant over time (Shenton, 2004). Moreover, it is important to document everything that was done during a study in order to have good dependability. By recording all parts of the study, it will be more likely to be replicated accurately in the future, rendering the findings across studies more comparable and allow for theoretical saturation (Glesne, 2016).

I planned to specify and narrow down my topic of interest in order to gain a deeper understanding of how practitioners perceive the use of wearable products to change individual's behavioral health. Three semi-structured interviews would be completed with each participant in hopes of gaining understanding of their experiences. Other strategies would include utilizing entry, relational ethics, epoche to use as a foundation. I would monitor the use of these strategies with my clinical research project members.

Utility

As described by LeCompte and Preissle (2003), utility of a qualitative study further assesses the rigor and trustworthiness of a study. Utility evaluates how the study has enhanced the current knowledge of a phenomenon and how well it can be utilized in the real world. There are five criteria that should be met in order to have strong utility: fairness, ontological authenticity, educative authenticity, catalytic authenticity, and tactical authenticity (LeCompte & Preissle, 2003). The first criterion is fairness. *Fairness* suggests that the presentation of multiple perspectives and realities is considered. In my methodological study, I want to make sure to gather the experiences of the practitioners along with considering views that might be held by patients who have attempted to use wearable products in their health care treatment. A second criterion is *ontological authenticity*, or a study's ability to uncover a new conceptualization of the phenomenon by gathering emic perspective. A third criterion to be met is *educative authenticity*, or a study's ability to gather a greater depth and breadth of understanding relative to the phenomenon. A fourth criterion is *catalytic authenticity*, or the ability to easily use and build on the current findings of the study in real life and in future research. A fifth and final criterion is *tactical authenticity*. Tactical authenticity suggests the study has not only benefited the stakeholders of the study, but also has the potential to help many more individuals.

In completing this methodological study, I believed using *ontological authenticity* criteria for utility would be most beneficial to gain new information from an emic perspective. I would utilize the above criteria by gathering the participants' perspectives revolving around the use of smartwatches and stay close to their words to conserve emic perspective. By using these perspectives, I hoped to gather new information and build on current information to enhance

utility. Finally, with the information gathered I hoped to present the benefits of using wearable products and include potential improvements that would benefit individuals and practitioners with their patients.

CHAPTER III: EMERGENT FIELD METHOD

[This chapter presents the field method as it was articulated in the field. It is provided for transparency.]

Pre-Entry

Review of Biases

This qualitative study utilized a transcendental phenomenological approach. The purpose of this approach was to gather the personal experiences of the participants and to portray or translate their words into text. In the attempt to translate findings while staying close to the participant's words it was important to consider the expectations and assumptions of the researcher by exploring the biases of the researcher (Glesne, 2011). Below, I have discussed and attempted to identify potential theoretical/professional, methodological, and personal biases of my own to enhance the rigor of this study.

Theoretical/professional biases. Theoretical/professional biases are linked to the researcher's participant-observer role. Interviews with a participant can begin to simulate a therapeutic interview or influence the researcher to take on a therapeutic role. These biases need to be checked so that the participant-observer does not become the leader or therapist of the interviewer. I have most experience with using cognitive behavioral therapy. One assumption of change that I hold is that if an individual can understand a potential problem cognitively than they may be able to learn new skills and habits to change this potential problem.

A possible bias I needed to be aware of was that my participants would only speak about their experiences in a positive manner and want to leave out potential drawbacks of using smartwatches. This was a professional/theoretical bias because if I believed this was the case

during the interview it may have prompted me to slip into a therapeutic role. I may have then queried about how they presented their information, rather than gathering accurate information about their own experience. I may have even began to query specifically about downsides to using smartwatches. I planned to be mindful of my questioning in the interview and to become none-directive with my questions. To my surprise both participants reported many downfalls related to their smartwatch. This bias did not seem to emerge at all since participants reported negative aspects early on in interviews and talked about how they desired they could improve.

A second bias I monitored was a belief that smartwatches would be useful for most people who own one. This is a professional/theoretical bias because it could have led me to utilize CBT techniques with my participants if they mentioned why applications had not worked for them in the past. If my participants began to express these ideas, I could have potentially begin to problem solve or set goals for how to improve smartwatch use. This would mean I had now become the professional in the interview and had not allowed them to share how they might have had problem solved, or tried new techniques of their own. I planned to stay close to my grand tour questions and only asked questions that were open ended and allowed them to insert their beliefs. I found myself asking participant two, more than once, if she would use a smartwatch again following abandonment of her smartwatch. I recognize this could have influenced her responses; although, her responses appear valuable for understanding what would prevent her from purchasing a watch in the future.

Methodological biases. Methodological biases include a researcher's previous encounters with research. I had only experienced working in a research lab that utilized

quantitative research. This could have potentially impacted my qualitative methodological research during interviewing and possibly coding.

I could have ended up trying to find fast and simple explanations, commonly utilized in logical positivism, for a phenomenon I might have missed out on other very important nuances of the participants experience or the complexities of their experiences. I could have begun to ask questions that would typically be asked in a quantitative research project. An example may be, "How many times have you worn your smartwatch and had success?" By asking this question I would gather quantitative data that would possibly include numbers or a ratio of success to unsuccessful rates. This data would not be helpful as I was not looking to use a positivistic method to compare patient data. Rather, I am was looking for stories that could relate to specific successful or unsuccessful experiences from the participant. I planned to ask myself during and between interviews what purpose my questions held and if they elicit stories or short quantitative answers. My questions were typically open ended unless I was clarifying information. This allowed my participants to speak of their experiences rather than give short responses.

Personal biases. A personal bias typically comes from personal past experiences of the phenomenon being studied or one's socialization around the phenomenon. I had found that using smartphone applications and smartwatches to track my running miles had promoted me to run more and to reach personal goals. The participant may not have found this to be the case in their own life. Therefore, I would have to be cautious not to influence her stories or select only parts of the transcript that I believed would best fit my assumptions. If I believed I knew what the participants' experiences were like I might not have cared to explore crucial beliefs and experiences that they encountered. I would utilize open ended questions that way my questions

were not leading toward a wanted answer. During the interview I planned to allow the participant to speak to their own beliefs about the phenomenon before I responded to their story. By doing so I would not be tempted to tell my own experiences that would lead her to share irrelevant stories to her experiences. I believed using a peer debriefer helped manage these biases.

Entry

Role Management

During recruitment of participants, information was posted in a few health-related groups on Facebook. Health-related group leaders quickly accepted research fliers and posted them to their group page. Multiple volunteers expressed interest in participating in the research but found it difficult to follow through with interviews due to time difference's or inability to make interview times work. Instead, fliers were then posted on the researcher's personal Facebook page requesting that friends or colleagues provide information to individuals with smartwatch experience. In selecting participants in this way meant I had a personal connection with the gatekeeper and a mutual connection with the participant that had to originally been anticipated. Although I did not know my participants on a personal level, having a mutual friend often made interviews feel comfortable and similar to a friendship.

I managed this role as the researcher by reflecting on my personal biases and consulting with my debriefer. I found myself staying cognizant not to over share my experiences or to reserve my input on conversations or questions in hopes of giving my participants the freedom to express their full experience or opinions. Because I have experience with using a smartwatch, I found myself relating to their positive and negative experiences with their smartwatches. I

attempted to monitor my nonverbal expressions during the participant's story in order to prevent my opinions from distracting them from the phenomenon they were describing.

Informed Consent Protocol

Prior to setting interview dates with both participants, I sent along the initial informed consent and allowed for them to look over the document before signing it. At the beginning of the first interview I asked the participants if they would like to review any portion of the consent form and proceeded to review and clarify each section of the consent and reiterated that they would have the opportunity to review the final write up and have the opportunity to sign the final consent before this study was submitted for completed. Participant one (P1), who continuously uses her smartwatch, reported that she did not have questions or concerns about the initial consent before the first video interview began. She was able to sign the document and submit it electronically to me, as she lives on the continental U.S. The second participant (P2), who has discontinued using her smartwatch, reviewed the consent form and submitted her signature electronically to me, as she was out of the state traveling for work. Both participants decided they would like me to maintain their anonymity and will be hereafter be referenced to as P1 and P2 in the narrative findings and quotations.

Constant Comparative Analysis

Interview Process

Participant one lives on the continental U.S. and generously scheduled three of her videoconference interviews accordingly around differing time zones. Facebook video chat was utilized to communicate during all three interviews and a recording application on my iPhone was utilized to voice record each interview for future transcription. All interviews were held on

Friday mornings around 8:30am Hawaii Standard Time and lasted approximately 45 minutes. The second interview had been canceled and a subsequent interview was successfully completed upon request.

Participant two completed her first interview via Facebook video chat on a Tuesday afternoon. Her second interview was held face-to-face at the participant's home on a Monday afternoon after the participant was completed with her day's work. The third and final interview was held via zoom. The participant was traveling for work during this time and the Zoom application was utilized for better video quality and ease of voice recording. Similar to participant one, all interviews lasted 45 minutes to an hour.

All interviews were scheduled about one week before each meeting to allow for me, and the participants, to work around our varying schedules. Both participants were notified when I would begin recordings. Neither participant requested to stop recoding at anytime during interviews. I discontinued recording following the participants last responses to interview questions. Before disconnecting videos, I would remind participants about how many interviews we had left, and I would check in to make sure they were comfortable with continuing with this study. Both participants verbally agreed to continue without hesitation.

Coding Process

Macroanalysis and microanalysis. Both Macroanalysis and microanalysis were utilized between interviews to organize data and conceptualize themes. Macro-level coding involved coding by document, picking out general themes, and keeping a running code from notes that were taken during and directly after each interview with each participant. Furthermore, while transcribing and replaying my recorded interviews I was able to create annotations and

interpretations from the data. Macro-level coding served as a data management strategy for me as each interview for a participant was held approximately three weeks apart.

Micro-level coding involves the examination of smaller divisions of data, putting both participants' quotes into subcategories, that allowed for me to better conceptualize the phenomena and appropriately direct my future questions. In my study, it included phenomenological reduction, imaginative variation, and synthesis.

Open coding. After completing all three interviews with both participants I was able to then use phenomenological reduction, which involves the deconstruction of my transcribed data into smaller units of meaning. While trying to portray the emic perspectives of my participants I used low-inference coding, also known as "in vivo", to create codes from the participants' own words. I began by selecting large quotes, within created categories, from the first interviews from both participants and paraphrasing or quoting smaller units of data to create meaning. I then completed this same coding for interview two and three. Both participants were able to provide great insight to the phenomena that was surprisingly similar despite their varying usage of smartwatches. Following completion of my open coding, I began to notice repeating themes and meanings that allowed me to further my analysis. I found it difficult at times to find where to end a quote within a participant's story. Often then spoke in paragraphs and required me to find the pungent words within stories to capture the full essence of their story.

Axial coding and synthesis. I created axial codes by clustering the smaller units of data into meaningful categories utilizing repeating themes. I met with my CRP peer examiner to review these codes to ensure emic portrayal. I was then able to utilize my axial coding to create categories for discussion. I utilize my open coding to create a fluent narrative in Chapter IV with

integrated quotes to strengthen the presented data. I found it challenging to place quotes within one category or theme since many of them offered valuable input for various themes. I often sat with a quote and carefully thought if it carried more weight for theme or another to place it correctly.

Member Checking

Both participants were contacted and provided with a final write up of this study and its findings approximately one month following their final interview. The participants were allotted sufficient time to review the document and they were encouraged to offer feedback regarding the portrayal of their experiences and to ensure anonymity. Participants were reminded that they could request alterations, elimination, or addition to their contributions of the final narrative and discussion. Participant one provided her feedback within a week and noted she was content with the narrative and did not have any requests for altercations. Participant two responded within two weeks after looking over the material and approved of the narrative with no suggestions for change. Both participant's signatures were collected on the final consent forms.

CHAPTER IV: NARRATIVE FINDINGS

Acquisition: Fitbit as a Gateway

Both participants discussed how they came across owning their first smartwatch during their interviews. Participant one bought a Fitbit out of personal interest to begin tracking her activities automatically opposed to her manual tracking routines. She found it interesting and convenient to have her Fitbit because it took pressure off having to always remember to journal her activities like she previously had.

> I've always tracked my activities. I'm extremely active and when the first Fitbit came out I thought oh well this is cool, I can just figure out what it is that I am doing anyway and if I forget to write it down then I forget to write it down. – (P1)

Participant two acquired her first smartwatch as a gift. She described how she became interested in her first smartwatch through recommendations from her mother and observation of her sister's Fitbit usage.

> I began using a smartwatch because my mom is a nutritionist and she suggested it can, I guess, mentally keep you um in mind of how much you are sitting and how much you are moving so she got me one, I think for Christmas. – (P2)

> So, I got it, resulting, part of the reason it was on my radar was because my sister had had one. – (P2)

After some use of their Fitbits both participants began looking into an upgraded smartwatch that would offer more convenience for their personal activity tracking. Participant one experienced frustration with her original Fitbit when the face of the watch fell out and she lost it. She originally went for convenience in charging features to reduce the amount of times she would have to remove her watch due to charging needs and purchasing a Garmin. She later found that it was worth it to get a new Garmin that was larger in size and that would track her bicycling activities and much more while sacrificing the convenience of less frequent charging.

> I honestly got rid of the Fitbit in favor of the Garmin Vivo because it didn't need charging. Um, and also because the other thing about the Fitbit is that it used to fall out …And after losing one and being pretty annoyed about it I said okay there has got to be a better way to do this. Um, so I got the Garmin and because it didn't require charging and then about three months ago, I bought the larger Garmin watch that does require charging, but it tracks my biking activities and I'm a distance biker. – (P1)

> When I moved up the ladder and as they changed, and I got the Garmin, the heavy-duty one, that was interesting from the perspective of being able to track pretty much everything. – (P1)

Participant two upgraded and stayed with the Fitbit brand. She too purchased a smartwatch that was of a larger size. She found it convenient to have a digital screen to view her data rather than having to use a clock for time and always logging on to the phone application for data viewing. Participant two began to discuss issues with Fitbit accuracy and indicated Fitbit has likely upgraded since she has discontinued using the smartwatch. She showed interest in Garmin smartwatches and often suggested she would choose Garmin if she were to begin using a smartwatch again.

> Then I upgraded one myself maybe four months later when I was using it for working out to track like my heartrate calories burned and that kind of thing…so I originally used the most basic Fitbit the original one that came out and then I upgraded to the Fitbit that had like a screen on it um and showed like the time and your steps right on it opposed to just having to use the app. – (P2)

> So, I think that there's maybe some flaw in um Fitbit of how they are able to track your actually moving. But I think it's probably has updated since I've had one. With Garmin and stuff, they do a really good job, but I just haven't gotten back into it. – (P2)

In reviewing upgrades and her observation of other individual's smartwatch upgrades participant two suggests that Fitbits could be the gateway to an individual's interests and goals for physical activity. Furthermore, she proposes that Garmin, along with more expensive or

advanced smartwatches, are a good match for individuals who have experience with their interests and are looking to set personal records.

> Yeah, kind of like maybe like the Fitbits are gateways to, my interest is there, I have some goals, but I'm not sure what they are versus you know the Garmin and maybe the more expensive smartwatches are kind of like I'm looking to set personal records. – (P2)

She further explains that expense is likely a factor in matching a smartwatch to their owner. It seems that Fitbit could be a gateway to more advanced watches, such as Garmin, because it has less functions and a lower cost that allows for it to be a learning device. A Fitbit allows individuals to become comfortable with the basics of a smartwatch, such as counting steps, before they are ready to financially invest in a device that may be more complex and require experience.

> I also find that the Fitbit's are more for people who are not doing high-intensity cardio and are just trying to get steps in versus um things like Phoenix watches by Garmin so the more expensive watches I find actually go to the more motivated and driven people and the less tracking maybe less expensive are the ones who are just trying to kind of step into the out of smartwatches and get their exercise first started. – (P2)

Wearability: Everyday Comfort and Convenience

The physical ability to wear a smartwatch plays a large role in the participants adaptability to or abandonment of their smartwatch. Both participants talked to their experience of when and where they wore their smartwatches.

Charging. The first experience of taking off their watch revolved around the time of day that they would charge it. Participant one preferred to wear her smartwatch as often as possible to avoid forgetting or misplacing it. She favors to take her watch off before bed to charge it because tracking sleep activity is not an essential function to her.

> I would do away with having to charge it because that's [a] pain in the butt. – (P1)

> I leave it on pretty much all of the time just so I don't leave it somewhere, which I would do. Um, and then I wait until it's almost rundown. I tend to charge it at night because I don't care so much about the sleep function. – (P1)

Participant two preferred to wear her smartwatch every day and found she only took it off in the beginning when chagrining it. She found that tracking sleep function was important to her and wore her watch most nights.

> Um I used the basic one for three months um and I originally used it every single day to track sleep. Like so, I tried to never take it off except when I had to charge it and then I used the other one for about six to nine months on and off because I started getting a pretty severe sensitivity to it … I slowly forgot to put it on – (P2)

She preferred not to take the watch off at all, but she began to have and allergy to the band. Being cautious about how the metal from the battery could cause a worse reaction with water she began charging her watch while showering and getting ready for the day. Due to continued skin sensitivity she found smartwatch usage became more sparse over time and eventually abandoned smartwatch usage all together.

> I started getting a really bad rash where the battery point was. It was like an allergic reaction kind of thing. – (P2)

> So, it was technically waterproof but because of like the battery I just felt weird about like when I would shower so that's normally when I would charge it is when I was showering or even like blow drying my hair or putting on makeup. – (P2)

Comfort. Participant two offered much information about the comfort level of a smartwatch as a whole. She asked individuals she knew if they had experienced similar problems to hers, but she was unsuccessful in finding anyone with this shared experience.

> I felt discomfort with the bands as a whole and felt like maybe they were, like if something was giving me that reaction, I probably shouldn't have it attached to my body 24/7. – (P2)

Participant two often works remotely as she travels to different events. While flying she noticed that the band she was using for her smartwatch was not very forgiving to the minor changes in her skin during flight. She found herself taking the smartwatch off until she was at the event. She would replace the smartwatch so she could have a greater understanding of her activity level during that workday.

> Yeah, I travel quite a bit and I actually tended not to wear it when I was flying because I do feel like I swell a little bit and it would get kind of uncomfortable because it was like that silicone or rubber material does pinch but I did wear it. Um, like during the day if I was doing an event to see how many steps I was getting and how active was natural that day and that kind of thing. – (P2)

She experimented with different sizing and materials to find something that would be comfortable while accurately tracking her activities. To her frustration she felt she never found her sweet sport with these modifications to her smartwatch. When asked how she personally would create a wearable that would fit her needs she suggested an interesting alternative to a wristband. She offered something less invasive, more discreate, and more comfortable that would be in the form of a tracking ring.

> I changed my band from the actual rubber band, that was on it at one point I think I had one that was too small so by changing to the bigger one it felt like, I don't like anything too constrictive so um when I changed to the bigger one it was great but it was then bouncing a little too much so I think I never found one for my total sweet spot in sizing.– (P2)

> If I could make my own it would be a ring (interviewer: oh!) Yes, because I think wristbands are so, I don't like them for me I think part of the reason why I got out of it. So, it would be something super easy and flexible. – (P2)

Unfortunately for participant two such a device is not yet on the market. She has put some thought into using a smartwatch again in the future after trying on a few of her friends' smartwatches.

> So now after using a Fitbit, after wearing for a couple runs someone else's Apple watch as well as Garmin. I would say if I were to hop back into Smartwatches, I would go for a Garmin. There were things that were more comfortable about the bracelet in terms of actual wearing that I liked better. – (P2)

Aesthetic. As mentioned above, both participants preferred to wear their smartwatch throughout the day unless they were charging it or engaging in activities where the watch might interfere. With that said, it was important to explore the participants opinion on the appearance of their wearable and how, if at all, it fit their desired style. Participant one noted she was content with her Garmin that was most recently purchased.

> It probably wouldn't look all that different from the good Garmin that I got. – (P1)

Participant two had much to offer regarding what she would desire a wearable device to look like and how to make it versatile for professional, casual, and athletic settings. Participant two, as it related to the aesthetics of the smartwatch, discussed the affordability of the product; she preferred fewer options in color or style of bands to keep the cost down.

> It's very minimal it's not something you can't wear with both outfits like your workout outfits and your fashionable ones. – (P2)

> I think too like I wouldn't get too big into the different skins that you could put on it to make it look different. I would make it super simple like a black, a nude, a white, and maybe like one weird color but I wouldn't do all the like get the gold band and watch, get the leather facing one watch, like that part to me is just a waste of money. – (P2)

Technology has rapidly been advancing over the last few decades. Personal devices seem to go through fazes of what is the best product to have abased on its most updated features and its appearance. Participant two purchased a smartwatch for a friend who liked the idea of having the newest fad; however, this fad did not match that individual's personal interests in having a watch since they had not previously worn a watch.

> Yeah, I just recently bought a watch for someone and we've since returned it which was interesting because he decided he wasn't a watch wearer and that the fad of it was cool, but that he didn't want it. – (P2)

She also discussed how this fad might evolve like most other technological devices have in the past. Smartwatches, as she predicts, will continue to be modified in their abilities and their appearance according to the wants and needs of the consumers.

> Um, I think I see them sticking around for quite some time and evolving. I kind of see them going the way I feel like a lot of technology goes is it goes from the first one comes out and then a new series of it comes out that make it a lot smaller and then all of a sudden the popular thing is to grow bigger again. It's kind of like the first iPod was so chunky and then it was the iPod mini and then it was like the iPod Square and then all of a sudden it's like no let's just make an iPad and it goes back to big so I could see it kind of going in the way. – (P2)

Accuracy: Automatic Tracking as Another Job

One of the topics discussed at length was the accuracy of tracking devices. There appears to be some speculation from both participants as to how precise their watches had been in tracking their biological functioning. Furthermore, participants suggested they would have preferred their smartwatch to have improved bodily movement tracking by having differentiating activities to choose from for their varied and personalized workouts.

> I don't really need much more than what I've got I'd like improved accuracy. – (P1)

Syncing and integrating. Both participants found themselves spending too much time tracking their caloric output and input through activities and diet. During these interviews many phone applications were mentioned as ways to track the participant's activities. The applications included the following; Strava, MapMyRide, MyFitnessPal, Garmin, Fitbit, Nike, and the Apple Health Application.

> Um, I use MapMyRide for my biking and also Strava for a lot of other things. Um, so I've got Garmin, MapMyRide, and Starva all linked together along with MyFitnessPal for tracking eating. – (P1)

> I used like Strava and a couple of the other ones. – (P2)

Both participants seemed surprised that having a smartwatch, which was supposed to automatically track things, started to require so much of their time and effort. Participant one found most of her time with tracking was spent integrating her data with various phone applications and making corrections to caloric information.

> That's yeah, for me that could grab as much as half an hour of one of my days and by the time your finished monkeying around with all of your data, making sure that it integrated the same way across all of your apps because MyFitnessPal does pick up motion and does screwy things with calories that aren't even related to what you might have burned. So, making sure that everything is accurate across the board. I use Garmin as my baseline mostly because that's what I'm using is a heartrate tracker so even I would really love two and a half hours where I kicked ass on my bike and got in 38 miles that really would be nice to think I burned off thousand calories but I know that the six hundred and something is more accurate. – (P1)

She found it strange that her Polar heart monitor and Garmin would gather differing data, which made her question the accuracy of each device. As she stated above, she typically chooses to use her Garmin as her baseline for tracking activities to keep things consistent. She alludes to the idea that if she tracked this information manually it would be accurate, but she still finds the automatic tracking to be convenient to her.

> The idea that you're getting realistic tracking as opposed to just kind of a generic. I could, if I weren't so stinking lazy, accomplish a lot of this type of tracking myself. What I do find interesting is that I will periodically throw on my polar heart rate monitor because I have a free motion bike and the polar gets picked up by the computer and it also gets picked up by most of the gym equipment whereas the Garmin does not so typically when I go out and I use computerized equipment I almost always wear the polar and they're different which they shouldn't be. – (P1)

She also found differences in data across applications and exercise machines. They tend to overestimate her caloric output.

> well the calories on the app are pretty useless. Um, for example my 30-minute the 19 miles an hour bike ride is usually about a hundred and forty calories for me as per heart rate monitor which is where I figure that's probably the most accurate. If I just went by the app where I have got nothing more than my age size and sex in there they have me burning off 400 and something that's like the machines if you look at the numbers on the machines they're just stupid.– (P1)

Even when syncing her data and spending so much time making sure her data was accurate, she found that she would lose data on some applications including the application Strava, which she used often for tracking her bicycling activities. She would then be left with just the basic mile tracking without all the bio tracking integrated with the data.

> I mean, the data is presented well. As I said with Strava I find it irritating that I can't edit it. what data I get off my watch, that's what I've got. So, I have to pull it out and then go in and edit it by hand and then there's stuff that gets lost in that because then I lose all the heart rate data and everything else so I'm just tracking miles again. – (P1)

Participant two described similar experiences with dedicating her time to tracking when it seems as though her own knowledge or manual ways of tracking could be more automatic. She suggests that once tracking brought awareness to her activities and diet, she was able to rely on her habits to keep her on track rather than repeatedly imputing the same data into her phone.

> Then it became probably an hour of my day was nothing but tracking and I was like this is another job! But definitely you, we are creatures of habit and if I make something for dinner one night I'm probably going to eat it for left overs the next day so it's like you know I already know what the caloric intake looks like, I made it, I know how much oil is in it I know what veggies are in it and so, yeah um, I kind of just like phased out. – (P2)

When describing what abilities her ideal smartwatch would provide, she emphasized the desire to have the device track both calories burned and consumed to make the tracking process less demanding.

> All the features that it can do in terms of things like the calories your consuming all also burning um, your body temperature your heartrate and stuff like that. – (P2)

> Yeah, and if there were a way of tracking my consumption of calories, I would love that because I think that would be eye opening. – (P2)

Participant one gave a tour of her Strava application that is synced to her Garmin. She presented some data shown on a map and showed how the app could rank her up to herself or to others. She prefers to use the data to compare her own actives against one another. She was overall pleased with how the data was presented and seemed to have ease with navigating it. As stated above, she had just wished she had the capabilities to edit data.

Participant two recalls a time when the application for her Fitbit had upgraded and given her more detailed data. Overall, she felt the data was better presented and informative. Although, she did hint at the idea that having too much data presented, when it was unwarranted, through notification could become invasive.

> The software there was a point when they upgraded the app so you could see more than just your calories but you could see when they happen during the day or um you could see how well you slept but you could see the exact moments that you woke up. So, when the software upgraded I found myself more involved in it, spending more time on the app and more time looking at the watch um than when I did when it first came out and the app was little bit less invasive or informative. – (P2)

Differentiation: A large factor of accuracy included differentiation of activities. They both desired more specified tracking opposed to generic tracking. Participant one found it frustrating that many activities that she engages in are not included as options on her watch. Furthermore, when weather is not in favor of outdoor bicycling she opts for her stationary bike, which does not track mileage since she is stationary and forces her to manually choose a generic cardio setting to track this activity.

> So, yesterday I was rowing I did the elliptical and I took a Pilates class and all of that kind of got lumped under the category of cardio well you know big whoo there's a little bit of difference between those three things…I would add in all of those different activities, so you know the closest thing I kind of have to pick and choose between. Do I want to call Pilates weights since a lot of it is bodyweight training or do I want to call it

yoga? It kind of depends on which instructor I go to that day. So, I think I would probably differentiate the different kinds of activity. The other thing is that, so if I do biking on that watch it is perfectly happy to keep track of all of my mileage from a GPS standpoint but when the polar vortex hit Chicago I have one option and that's the bike to nowhere. So, it doesn't exactly track that that's another thing where I have to throw in cardio that I think more than anything else is just being able to accurately track my different activities. I walk a lot differently when I go out for a walk by myself rather than when I walk the dog. – (P1)

Participant appreciated the amount of activities that were provided by the applications she used but felt there were still activities missing. She felt the range of choices did not span far enough to cover her specific daily activities. She also found that across different phone applications connected with her smartwatch, she was given different options. This may have made it difficult for her to know what all of her options were if they weren't presented in the same application.

So, with MapMyRide your choices are actually it's a fairly it's a longer list than I thought but it's all things that are really more about being mobile so they do have class workouts, never noticed that, but those are things like there's bar CrossFit, Orangetheory ,TRX, yoga; everybody seems to hate Pilates which I live in. They have machine workout, post recovery video workouts, but that's all really kind of things that are commercial. Yeah so, I never even noticed any of those. – (P1)

There are a limited number of exercises that you can track so on Starva it's ride, run, swim, walk, hike, alpine ski, backcountry ski, canoe, CrossFit, bike ride, elliptical, hand cycle, ice skate, in-line skating, kayak, kite, surf Nordic ski, rock climb, roller ski, row, snowboard, snowshoe, stair stepper, stand-up, paddle, surf, mobile ride, virtual ride, virtual run, weight training, wind surf, wheelchair workout, whatever that means that's pretty arbitrary, and yoga so that's all you can track with Strava and that doesn't do any calories MyFitnessPal is a food tracker only but it'll pick up the exercise stuff from Garmin…it's not really you know it's fine to have skiing or kayaking listed if that's place where you live all the time I mean I can do that almost three seasons but on the other hand that's not really in my daily exercise – (P2)

Participant two found similar findings as she wore her watch throughout the day. She wished her smartwatch would differentiate between not only different workouts but also daily activities including cleaning.

> It will tell me my heartrate or how many calories I have burned but it doesn't tell me like hey, during this part of your run you were running at a 7.5 versus a 6 or something like that. Um, and then it would be able to track things like, and I don't know if this is like super technology, but it would be able to track when I was cleaning the house vigorously or when I was um when I'm swimming it can track that I'm doing that or HIIT [High-intensity Interval Training] workouts or weightlifting because it's hard to track your calories burned when you are weight training opposed to when you're running. – (P2)

Since participant two had not had recent experience with her own smartwatch she expressed some surprise as to how many more options had become available on a friend's smartwatch.

> Right before he would get up to do an activity the watch would pop up and say what activity are you doing? And they had something like a hundred plus to choose from and it was like I'm walking at regular pace, I'm walking an incline, I'm walking with a dog, I'm walking with a stroller. So, like yoga, hot yoga, Bikram yoga. So, you could get very specific that they would be able to gauge better about how you're exerting yourself, which is cool. – (P2)

Gamification: I Do It for Me Not for the Stuff

Most smartwatches have rewards in the form of badges that indicate a milestone reached in your activity level. Some are daily rewards letting the individual know that they met their goals for the day. Others notify them of longer-term goals that rank the individual against themselves and or others. While speaking with the two participants it appeared badges did not further fuel their fitness level. Participant one reports she has gained numerous Garmin badges over the years but feels they are insignificant to her own accomplishments.

> I've got so many Garmin badges that I haven't been through them all in years, um it doesn't matter to me. I don't need a trophy for showing up. – (P1)

Participant two appeared to have a similar experience with badges. Even when badges were correlated with retail sales, she found that they were not the primary motivator for her. Instead, she was driven to run more because she was working with a friend to improve her running abilities.

> You can earn badges and stuff which sometimes can translate to certain stores for like 15 percent off. I never cashed those in. It was more so just like me and her were on a team and our other two friends were on a team and so just trying to log in as many miles as we can to become a stronger runner was all. – (P2)

Many companies use advertisement as incentives for their smartwatch users. The participants spoke briefly about physical incentives, such as clothing or active gear promotions. It appears the incentive needed to match the participant's interests and needed to be worth it to them to put in the work for it. Otherwise, it was not a long-lasting incentive to increase their active behaviors.

> MyFitnessPal also does that [sales promotions] and MapMyRide does that I don't think that that's anything particularly novel um most of them frankly I'm a gear snob and about the only place I shop is REI and let's see MapMyRide is tied to Under Armour I don't like their clothes at all, so I don't buy any of their stuff so the discounts are meaningless to me and I haven't seen anything on Strava where I thought oh I have to have that. On the other hand, when I get my REI garage sale notice I'd probably find something I have to have. – (P1)

Participant two did experience a time when the incentive matched her interests and for that month, she found herself logging more miles than she typically had. After the competition for the reward was over, she continued with her typical level of activity.

> My motivation was like a free pair of shorts that I really like that are like quality shorts. Um, I think if it had been any other article like if it were a water bottle from target or something that wouldn't have been enough of a motivation, but um the motivational point was there for me to really want to press for it and then if you did the 50 miles within half of a month you also got a shirt like a lululemon shirt witch I think was cool but yeah it definitely, I would say it gets you up and off the couch. – (P2)

> I wouldn't continue to do it like 50 miles a month, but I did try to continue running at least a mile a day. – (P2)

Social connection and relatedness: Motivation is Contagious

Both participants have described many times when their smartwatches were linked with tracking their own behaviors and comparing or competing against their own data. As smartwatches, along with their corresponding phone applications, continue to develop and update it seems they become increasingly linked to social outlets. Many applications, including Strava, encourage individuals to compete with one another through virtual races. MyFitnessPal allows individuals to publicly track food diaries and search each other's diaries to find food inspiration. The participants first described how their watches brought them to keep in touch with long distance friends.

> I have a couple of friends who we follow each other around Strava and we all live at different ends of the earth. So, one is in Australia another is in Toronto, I'm clearly here, one is in Denver, one's in Colorado or in California so we follow each other because we're driven to going on rides together. We do RAGBRAI [The Register's Annual Bicycle Ride Across Iowa] and this year we're helping to do the ice roads in Canada, but I can't say that it's influenced me socially otherwise. – (P1)

Participant two found that both she and her sister began working out together and experimenting with what workouts would be most demanding for them. Later, participant two's smartwatch connected her to friends from college and introduced her to class workouts, including Orangetheory.

> Yeah, so because it got me really sticking on MyFitnessPal um I started working out with my sister we ended up both getting the Fitbit and we ended up both deciding to join the same gym and so because of that we were tracking like okay you're going to try walking at an incline and I'm going to try running and let's see whose outputting more…And then it also got me on to the MyFitnessPal which got me on the Fitbit app had me connecting with people from like college that I didn't talk to in a while and like you see what they

> are doing and then it lead me to taking my first orange theory class with someone I went to college with because I saw she posted about it on the Fitbit app. – (P2)

Early during the third interview with participant two she noted that the meaning of getting a smartwatch had a bit to do with a sense of community. That was true for her as she began her gym sessions with her sister and later when she reunited with college friends to complete virtual running events. However, she spoke at length about what a sense of community meant to her while working out. Today, many class workouts exist that typically include a trainer and a group of regular members who attend and support one another. Participant two noted how its more of the energy and liveliness of an environment that feeds her motivation rather than the appraisal or encouragement from others.

> I like communication in a sense that I feel physical bodies around me working out. It's like I can feed off the energy of we're all going at it, but I don't want to be talked to in the community. I don't want you to put like, oh you saw that I ran three miles. I don't want you to comment on it and be like hey good job. That makes me uncomfortable but if I'm running on the treadmill and I see someone who's running faster than me I feed off of that and then I think to myself why can't I push a little harder? So, I like being at it, I like working out by myself, but I like working out by myself in a productive active clean gym. – (P2)

She enjoys exercising on an independent level but becomes energized when witnessing others around her being productive. She gave a great analogy to describe how important the environment around her was for adapting certain behaviors.

> Yes, so there's something like I take my workouts, not privately, I think that for some people it's super cool. Like I love seeing when other people are working out. I love seeing what they're doing and I get inspired and motivated by that, but it's not my makeup to then present it back. Um, but like if I see someone post something online that they just did a hike or something I find myself saying what did I do to get sweaty today? What did I do to get a workout today? And then whether they know it or not, I'm taking motivation from them to go do it. I just then don't want to be necessarily talked to about it by the community that I'm involved in… It's like when you're at, you know a group coffee shop or something and you're there to work and everyone around you or like finals week when everyone's really hustle-bustle and they have that mentality. You can feel that energy and

> put yourself in the same zone. But I don't necessarily want to talk to you about it. Like this unspoken. – (P2)

Privacy: Tracking for Myself Not for Others

> Yeah, not even like I have anything to hide I don't, I just don't like that idea of somebody knowing that much about me. – (p1)

As previous research has found there has been a general sense of concern regarding wearable devices and protecting an individual's information from the public. Most devices have the capabilities to link with other devices such as a personal mobile device or computer along with desired social forums. Unfortunately, with modern technology there are always safety issues regarding security of an individual's device and data. Most devices gather general information with keeping anonymity of the users. This information is likely used for future development of devices. Participant one notes she feels comfortable with anonymous data but is against companies, including insurance companies, from using her individual data.

> For example we get discounts if we fill out a certain quiz that gives you data that we do and everything else, do we belong to a gym etc., but I think the use of Fitbit and smartwatch came up last year I don't remember. So, that sounds to me that the insurance companies are starting to think about how to dig into this data on a wholesale way that makes wholesale for trends, that's fine; If they want my individual data the F word to you.– (P1)

She has personally taken steps to limit the frequency or extent to which companies can use her data.

> I disabled my Garmin's connection to the health app my iPhone the one that comes with it. I decided you know what there's a limited amount I'm letting my data out and that doesn't get to go anywhere. – (P1)

Participant two was aware of previous security issues and how they could apply to her own situation. She gave examples of news reports of children being abducted through pictures

from school being uploaded to social media at similar times in the day. She then expressed concern for runners who run at regular times and locations each day that would make them susceptible to danger if someone tracked their location from their smartwatch.

> Yeah, I think when I had my Fitbit there was a security breach and at the time the only thing I had in there was like my weight, my height, and probably like my billing zip code or something. So, for me, it wasn't too big of an issue, but the idea of having a piece of equipment that can track, you know, if I have a normal running path and if that got out into a public world where they knew every single day between 5:00 and 5:30 they could find me in the woods at this running path. You don't know what someone's willing to do with that kind of information. So, I think the more information they take from you there isn't much that someone can do knowing your blood pressure but there's a lot someone could do knowing that you're in the exact same trail inside a battlefield every day at night you know, that's kind of information I think is just as important to hide it as a credit card number because that's really easy to be picked up and um have safety issues that way. – (P2)

Mindset: Health is a Delicate Balance

During multiple discussions both participants described what seemed to be different mindsets that were prompted using their smartwatches. Some were more favorable than others.

Awareness. Smartwatches were created to make individuals aware of their behaviors so they could track or alter their behaviors accordingly to their desired lifestyle. Participant two began using her smartwatch, as recommended by her mother, to become aware of how often she was moving or stationary. She found that it did in fact make her aware of her daily activity and corrected her perception of caloric output that she had previously predicted.

> Yeah I definitely think that I imagined it would sky rocket my, what's the word I'm looking for, sky rocket not just my motivation but my awareness to be more physically active so I assumed it would make me aware that I had sat for two hours straight or that I had only done three thousand steps when I think that I was very much over assuming my activity. How many calories I was burning and that kind of thing before the fitness tracker. So, for example if I ran a mile, I got in my head that that was probably 200 to 300 calories burned realistically it is 100 or 110. So, that was something I ended up finding in a result but to start I definitely thought it would increase my activity and also make me more conscious of what I was eating. – (P2)

> So, for me that I guess is valuable information to have a general idea of my input versus my output for the day. – (P2)

Participant one began using her smartwatch because it was convenient for her rather than having to manually track her activities in a notebook. She reports adoption of daily use of her smartwatch was easy, since she had previously tracked her activities manually with a notebook. She discovered that she was learning more about her level of activity through her daily movement because she typically did not include activities such as walking. Utilizing her smartwatch painted a picture of her full day's experience rather than snippets from when she designated time for higher intensity physical activity.

> Actually, it was easier for me and the interesting thing is that I never really bothered to track my walking before because it was just something, I did… So, I think I just probably have a better idea of how much I actually move versus before where you had to be an activity that I either planned or okay your working out this is what you write down I wouldn't of bothered to keep track of how far I was walking. – (P1)

Obsession. Both participants spoke positively about having awareness of their behaviors. However, they both brought up the words obsessed without prompting. It appears having a magnified view of biological functioning, food intake, and caloric output began to generate a sense of obsession over data. Participant one observed these obsessive behaviors in herself when more data became available to her.

> I think that at a certain point it becomes intrusive and almost you get too obsessed with the data. Particularly for those of us who aren't professional athletes. – (P1)

She has noticed that having visuals of her data helps her gage if she needs to push harder or to step back to rest and repair a bit before going on. So, it seems there is a balance that happens for her. She has moments when she spends more time analyzing and organizing her data but in some ways the data validates her level of activity and helps monitor that balance.

> I think for those of us who really want to understand what we're doing every day and it's a combination of a motivator and a curse to be honest because part of it's okay I can't, well you know I can't have incomplete circles or I can't have anything on the calendar that's incomplete so there's a little bit of obsession there, but it also from my hand it pushes me okay I got X many miles in this amount of time yesterday what can I do better today oh gee you've really been driving yourself a little bit hard no wonder you hurt why don't you back off a little bit. I think, I do think that there are some people who become so obsessed with the data that it impairs how they function in the same way that too much screen time for anything probably isn't good for you. – (P1)

Participant two found that she would specifically obsess over caloric intake. After using her smartwatch and phone applications for some time it seems as though her obsessions served as validation to her typical lifestyle as well. Keeping stability between movement and stagnation along with caloric intake and output was reason for obtaining her smartwatch. What she learned was that she already had her own balanced that typically fit the 80-20 rule that she was comfortable with.

> The only thing I would say is I have never been one to obsess over calorie intake like I'm very much a balance kind of person, 80-20 rule and I would find myself becoming slightly obsessive and that I did not like. – (P2).

Guilt. As discussed previously, tracking is somewhat of a balance game for most. Typically, this means measuring the body's intake and comparing it with its output. This balance is most often measured with calories. For both participants, while wearing their smartwatch and being cognizant of their caloric intake they occasionally felt guilty for eating anything that would be considered unhealthy to them. They both seemed to acquire debt for calories that needed to be repaid by equal or greater caloric burn.

> It was like oh I haven't moved for over an hour I need to like to add an extra mile to my gym time tomorrow or like I ate way too much this morning and feeling guilt. Um so, that was another reason that I didn't strive to find a watch that worked for me because I found that mindset was new for me and I did not care for that. – (P2)

> Yup, um from that perspective it might modify my eating behavior but on the other hand maybe not. Um if I'm going to be a real pig then I might say okay well how many miles you gunna ride to get rid of this? – (P1)

For participant two she reports even having some fear around logging food, sometimes skipping it, because she didn't want to feel guilty or as if she failed the whole day when exceeding her calorie intake goal.

> I did not like the feeling of guilt I did not like the feeling of um being scared to login my food because I didn't want to see the calorie intake go over or um knowing that I didn't walk enough to meet what I ate for lunch or like being nervous to put things like that in because you knew that you failed for the day. – (P2)

Participant one, like participant two, occasionally would not log calories that may exceed her goals so that she would not have to see it on her food log and feel guilty about it.

> You know I will admit to that there are times when I have been an absolute pig where I have not recorded it because I don't want to look at it. – (P1)

Distraction: Most smartwatches have options to receive notification of when you have reached your goals. Some smartwatches even have features that send you reminders to move every so often. Smartwatches with screens tend to show data including heart rate, pace, time, and distance. All of these features seem very helpful if they are presented when desired. However, participant two gave many examples as to when all these features may begin to become a little too much.

> Um and even the people that have the text messages to their watch and stuff I put my phone in do not disturb so much because I don't want to know what is on my screen. So, for me it's actually like when I'm working out it is too much of a distraction to watch while I'm doing it um so if there is a natural break between my cardio sessions and my weight session I will check did I do enough in cardio? Do I need to go back on it? but I don't want to be focused on it the whole time because one, it makes my workout feel so much longer while I'm watching the minutes but two, I just find it to be a waste of my time and I get out of the mental state of like push, push, push, and look at the reward that kind of a thing after. – (P2)

Participant two had experience with being distracted during her workout which made time feel like it was inching by because it redirected her attention away from her work out. She also described times when she was at work, in a meeting, and her smartwatch became distracting by telling her to begin moving at a time that was not feasible.

> I can appreciate the little reminders but it almost became like I got a reminder when I was in a meeting then I would be like okay there is nothing for me to do about it but I would get in my own head of like wow I've been sitting for a long time. I should stand up but I need to be focused in this meeting so especially with my job but also the way that can get anxious about working out and stuff it was just a marriage that was not working anymore. – (P2)

She found that setting verbal prompts to be most desirable while working out. She preferred to set the automated voice for each mile during her jogs, so they were brief and informative to keep her on pace without getting her out of her zone.

> I find that when I'm on a treadmill I cover the screen of the treadmill I don't want to know how far I have gone or how long I've gone because I'm a watcher. If I do, so if I'm aware of the time at any point in my run I know how long the songs on my playlist are so I will then track the entire, how long I have gone and estimate how far I've gone. That drives me insane and it makes it so much longer. So, when they just tell me, like I get in my zone, and it's a really quick voice that says he you've reached a mile in 8 and a half minutes and it pops right away I can hop right back in my mental state of like just running versus this continuing to watch a screen that's just not for me. – (P2)

Participant one expressed frustration with the reminders spread throughout the day to get steps in. The one thing she wishes could change about her Garmin is its ability to track differing activities, as discussed above. Unfortunately, her Garmin did not register that she was still being active throughout the day while riding her bike long distances and continued to reminder that she needed to move.

> I think quite possibly one of the things that was the most annoying about the original Garmin is that once a year I ride my bike across Iowa there's a giant bike ride that's called the RAGBRAI, Ride or the Registers Great Bike Ride Across Iowa, and its nearly 500 miles in the space of a week um, third week of July, and there is about 20 thousand

> people who do it. So this is not a time when you get in all your steps you get a couple thousand steps a day maybe but it's a little bit irritating to be told that you are a slug when you're not getting your septs in but you are riding anywhere between 70 to 100 miles a day and up to five thousand feet In elevation. – (P1)

Motivation and Meaning: Logging for Longevity

Personal traits. While exploring the meaning of having a smartwatch, a few things came to mind for the participants. Through their personal experiences, they both described traits that an individual may possess in order to stay active and motivated for a healthy lifestyle. Participant one has seen a lot of determination from active individuals and noticed this trait has been there from early on in their life.

> It's an awful lot of determination and it's just that they've never in their life been quitters and aren't going to start now. So, there's just a certain amount of determination and a certain amount of fighting spirit that they're gonna get things before they get them. – (P1)

Participant two initially observed individuals who have a lot of drive continue to stay active. She later recognized that individuals who are driven to start their journey to an active lifestyle continue to use their smartwatch to keep them moving toward their goals.

> It's interesting because in my head at the very like the first thought of a SmartWatch where to me would be someone who's already incredibly active very motivated very driven but I would actually say the majority of people that I know still wear and use them are ones that struggle with motivation struggle with gym time…so the more expensive watches I find actually go to the more motivated and driven people and the less tracking maybe less expensive are the ones who are just trying to kind of step into the out of smartwatches and get their exercise first started. – (P2)

Participant one shared an inspirational story about a friend of hers who endured a lot of adversity and thrived beyond it. Participant one has pondered on the nature-nurture argument and how some individuals foster a strong internal drive to succeed.

> All the things that could happen to warp someone in early childhood and make them not push forward. She did it anyway, so that's one of those big nature-nurture questions and I

> don't know what switches have to be flipped because some people can have all of the chances in the world and they don't take advantage of any. – (P1)

Quality of life. Early during the interview process, participant one shared her own story of determination as she fought to regain her ability to walk again. She had been hit by a car while riding her bicycle to the gym and severely injured.

> That was rehab work and that required for one thing for my mental health I needed to see progress and when you had an extreme injury, so I broke my hip, my pelvis, and my lower back. Three months in a sling before I actually got to the point where I was upright again and it made a mess of my legs as well and so every, so the beginning of rehab is when you see a lot of progress. Then as you move forward the progress becomes less noticeable and for me I needed to see "yes you are still moving forward" even though it didn't feel like it. – (P1)

She described the tedious road to recovery. She has always been a very active person and staying still for so long became mentally demanding. Her initial recovery lasted for three months in a sling. She then began her journey of rehabilitation one step at a time and found aquatic rehab was a great fit for her recovery.

> For one thing there were very few steps. Um, a lot of that was spent in a walker. For me it was really more of an okay how long can you actually be physically up? How far can you go? Can I make it across, how many times can I make it across the living room today? Um and then it was getting into the pool that was the first thing that they did with me once I got past a lot of basic rehab stuff was to put me in the water where there was no impact and then it was okay we are going to count laps. 25-yard pool first time I could get a third of the way down and then um it was really about counting that. – (P1)

Participant one's friend had developed a phone application for deep water running, as she had also benefited from aquatic rehabilitation in her own life. This further assisted participant one in making strides in her overall physical health.

> A lot of my rehab was done in the water. And as, so I have a firm appreciation for what hydrostatic pressure does for you and so she started this deep water running classes and then she turned it into an app and it's basically a belt and waterproof earphones and you get the classes on your phone and she walks you through this whole thing. – (P1)

Participant one's meaning for staying active is obtaining and maintaining overall mental and physical health. She does not want to be limited by her health as she has already experienced immobility and would prefer to take advantage of her autonomy.

> I have two, one which is to keep my head clear and the other is to keep me from being and old lady who can't do anything. – (P1)

Reflecting on her family's history she witnessed what poor behavioral health has resulted in and she has become determined to have a better quality of health by fighting gravity.

> When our grandparents were our age it wasn't that they seemed old to us because we were little kids but in a lot of ways, they were old, and they died younger their quality of life wasn't as good – (P1)

> I think a lot of it has to do with seeing people who weren't an aren't active so and where they wind up versus, we're people who fight the gravity, so to speak, wind up. – (P1)

Summary

Utilizing extreme case purposive sampling my aim was to capture varying experiences of individuals who have adopted and or abandoned a smartwatch. In interviewing my two generous participants I gathered valuable stories that may have resulted in differing outcomes but presented many similar involvements with their smartwatches. Participant one and participant two began with very similar smartwatches and from there their stories paralleled with upgrades to smartwatches that offered further tracking abilities and convenience. Differences in adoption and abandonment occurred during these upgrades.

Participant one reported contentment with comfort an aesthetic with her smartwatch whereas participant two experienced discomfort, including an allergic reaction, with her smartwatch. Participant two offered many suggestions for how a future wearable device could accommodate for issues she had experienced with a watch. She suggested smart rings or smart headphones for discreate, comfortable, and accurate tracking. Both participants desired changed

processes for charging their smartwatch so that they would not have to remove their smartwatch throughout the day or the night so it would not interfere with tracking.

Although participant one did not desire to change the look or ergonomics of her smartwatch, she did emphasize frustrations with the accuracy of her device. She felt much of her time was spent on syncing her data across different applications and that she would often lose data if she needed to manually alter her data for accuracy. Both participant one and two expressed concern regarding accuracy in accurately differentiating physical movement and having options on their smartwatches to fit their personalized activities. Participant two's emphasis was on the social aspects of having a smartwatch. She, on multiple occasions, connected with family members and friends through smartwatch applications and participated in workouts with them. She described being surrounded by motivated individuals as energizing and that she preferred to be in that environment while completing her own individual tasks. When considering social linking abilities both participants expressed awareness of privacy and security concerns and have taken precautions to prevent their personal data from being shared with undesired entities.

Self-observation was a major point of discussion. Both participants enjoyed the sense of being aware of their activities but described obsession and guilt as negative side effects of having an abundance of personal data presented to them. They seemed to find their own sense of balance and validation for their level of performance through their awareness and decreasing intrusiveness or distraction of unnecessary notifications or data. Participant one beautifully described the meaning of staying active and being aware of her behaviors. Quality of life and longevity seemed to drive her to push forward and to succeed in her personal goals.

CHAPTER V: DISCUSSION

Conceptual Model of Findings

Much of the previous literature was reflected within the participants' experiences of owning and utilizing a smartwatch for various behavioral tracking and modifications. From the current data, many themes became apparent and central to portraying the participants' experience with their smartwatches: (1) Acquisition (2) Wearability (3) Accuracy (4) Gamification (5) Social (6) Privacy (7) Mindset, and (8) Motivation and Meaning.

Presented below are my research questions as headers with supporting literature and the current correlated themes. In presenting the data this way, I attempt to answer my research questions by marrying the previously reviewed literature with my participants' lived experiences.

What is the nature of using a smartwatch?

Acquisition. As previously mention in the literature review wearable products are defined as any tracking device that can be worn on an individual's body to track physical activity and a wide range of biological functions. The current study interviewed participants on the specific use of smartwatch, one of the most popular wearable products on the market during this study. Most of the research included in this paper includes smartwatches as their focus. However, some research may refer to wearables as a whole and is still valuable to understanding the nature of using technology to influence behavioral health. Some current and more popular products include Fitbit, Garmin, Polar, Apple Watch, Samsung Gear Fit, and Jawbone (Harrison, Marshall, Bianchi-Berthouze, & Bird, 2015; Karapanos et al., 2016). Both participants acquired a Fitbit as their first smartwatch device. Participant one later upgraded to a Garmin and participant two upgraded to a more advanced Fitbit before she abandoned the use of her smartwatch.

In 2013, 5.9 million connected wearable devices were purchased and an estimated 310 million were purchased in 2017, worldwide (Asimakopoloulos et al., 2017; Lomas, 2017). The participants of the current study acquired their smartwatches in dissimilar ways. Participant one purchased one as a gift for herself. She came across them in her environment and believed it could be convenient for her to automatically track her physical activity and digitally track her caloric input. Participant two became interest in obtaining a smartwatch as she observed her sister's smartwatch usage and eventually received one as a gift from her mother who believed it could help the participant monitor her daily activities. Taking into consideration the number of wearable products purchased in the recent years it is no surprise that both participants were aware of the smartwatch products at the time they acquired their first smartwatch.

The following are a few wearable abilities discussed in the literature; number of steps taken, calories burned, food intake, calories burned, sleep quality, respiration rate, heart rate, and mood monitoring (Piwek et al., 2016). To fully understand the nature of how each participant utilized their smartwatch they were asked to describe a typical day while using their smartwatch. Both participants preferred to leave their watches on all day so that it would not be forgotten, and their data would continuously be recorded. Most functions discussed in the literature were utilized by the participants. Most of the tracking abilities used by the participants included; heartrate, sleep time, REM sleep, walking, steps, calories, pace, swimming, running, biking, deep water running, diet, Pilates, Orangetheory, elliptical workouts, high-intensity interval training, weight training, and rowing.

Social. Many products have adopted capabilities of interacting and competing with other individuals (Asimakopoulos et al., 2017). Participant two shared some valuable information as to

how she used her smartwatch in competitive and collaborative ways. She began with using her smartwatch data to compare activity level with her sister. She later connected her smartwatch to the application called Strava and ran a virtual relay race with a friend. Participant one was aware of the virtual capabilities but preferred to compete against herself to further her personal goals on Strava.

What is the experience with adoption/abandonment of a smartwatch?

Both participants were selected based on previous smartwatch usage; with participant one continuing usage and participant two discontinuing usage. The research question regarding adoption and abandonment is fueled by curiosity of what personal experiences lead to the opposing outcomes.

Wearability. Research shows that approximately one third of smartwatch consumers discontinue wearable usage between 6-12 months (Ledger, 2014). A study done by Shih, Han, Poole, Rosson, and Carroll (2015) showed that 25 percent of their participants had abandoned the use of the activity tracker after one week, 50 percent at the two-week marker, and 75 percent at week four. Issues for adoption included inability to establish routine of wearing and charging the product, interference with aesthetic, lack of support for comparing activities, integration problems to smartphone application, and technical issues or data inaccuracy (Shih et al., 2015).

Many participants in the previously mentioned study found it difficult to establish and maintain a schedule for wearing the Fitbit. Numerous times participants would forget to replace their smartwatch on their wrist after charging it (Shih et al., 2015). Participant one described her adoption of a smartwatch as easy since she already had a routine for recording her activities, she was mindful to wear her watch each day. She created a habit of wearing her smartwatch all day

so that she would not forget or misplace it when she took it off. She even purchased a smartwatch that did not require charging before upgrading to a more advanced smartwatch. Participant two wore her smartwatch daily for the first few months before she slowly decreased usage following charging times. Shih et al. (2015) reported a few participants had experienced discomfort with their smartwatch because it felt awkward or intrusive to their daily activities and exercise. Participant two's primary reason for discontinuing usage of her smart watch was due to discomfort from a skin rash resulting from the smartwatch battery. She further described dislike for the bulkiness of the product and desired something more discrete. Participant two dedicated time and money into trying new smartwatch band sizes but was unable to find the correct fit for her wrist.

How has the experience of using a smartwatch changed over time?

Both beginning with the first and most basic Fitbit available the participants decided to purchase upgraded smartwatches as the technology appeared to advance. With the physical changes of the watch came change in how the participants used them. As more advanced tracking and data presentation became available the participants often became concerned with the accuracy of their tracking.

Accuracy Asimakopoulos et al. (2017) found that their participants' motivation and self-efficacy were dependent on successful data, gamification, and content design of the apps as well as sensing context and providing appropriate motivational feedback to them. This was true for both participants of the current study. Participant one's primary concern was related to accurate bio-tracking and integration of data across all her smartwatch connected phone applications. She found herself spending more time than desired manually altering data to ensure accuracy and

became frustrated when data would get lost. Participant two reported glitches while using multiple phone applications that deterred her from using those applications in the future.

Harrison et al. (2015) examined reasons for abandonment and delineated barriers to smartwatch engagement by exploring how users overcome problems by emphasizing tracking accuracy and rewards, social comparisons, and application customization. They found that participants were dissatisfied with the accuracy of non-step-based activities because they were required to log those activities under more general categories. This was very much true for both participants of the current study. Both participants had great appreciation for the ever-expanding selection of workouts listed on their smartwatch applications. However, they felt they needed further specificity with tracking body movement related to their desired activity. Participants believed additional bio-tracking including body temperature respiration rate in combination with heart rate could increase accuracy as it would be personal to their physical activity output rather than being generalized by their height, weight, and age.

Gamification. Gamification of smartwatches includes anything including rewarding personal notifications when completing goals, receiving virtual badges that can be shared for short and long-term goals, competing against another individual's activity, virtually competing with another individual, or receiving discounted or free products for personal accomplishments. Asimakopoulos et al. (2017), while analyzing participant's four-week diaries of smartwatch activities, found that motivation influenced by gamification fluctuated throughout the study. They propose that motivation is a dynamic phenomenon that is contextually driven. Approximately one third of their participants participated in duels or competition suggesting fitness trackers are valuable for self-efficiency and not as significant for social motivation

(Asimakopoulos, et al., 2017). Many benefits have been reported for including gamification in health applications including self-care. It is suggested that inter-personal competition is suitable for fitness trackers and intra-personal competition is most beneficial for health related applications because it allows patients to be engaged in their health by receiving badges for health accomplishments and gaining education about their health from animated learning (Anderson, Burford, & Emmerton, 2016; Zichermann, 2011).

Participants from the current study engaged in different forms of gamification through their smartwatch usage. Both noted that they had received multiple virtual badges for their accomplishments, some badges included sales incentives, but neither of them found badges to be a source of inspiration. Participant one found that physical incentives including clothing or exercise gear for completing tasks did not match her interests or style. She suggested that she may have utilized offers if the incentive included products from Recreational Equipment, Inc (REI) where she shops frequently for active gear. Participant two reported she never utilized discounts linked to her badges but found herself competing in a virtual marathon with her friend to receive free shorts and a shirt from her favorite athletic store, Lululemon. She noted that her activity level increased to receive this incentive but slowly reduced to typical levels following the competition. She noted that if the incentive had been a product of lesser value or different brand, she was not likely to join the competition. In sum, gamification findings were similar to the previous findings suggesting inter-personal competition fluctuated for individuals who engage in gamification. Interestingly both participants reported a level of worth of physical incentives that would be necessary to keep them engaged in gamification. These findings support

the theory that motivation is a dynamic phenomenon that is influenced by multiple factors and likely fluctuates over time.

Privacy. As previously mentioned, with continued development of wearable devices comes further concern for privacy and security. Motti and Caine (2015) discovered wrist-mounted device users' primary concern was related to GPS sensors. This is a concern because their location is sensed, stored, and often shared online through social media forums. Other concerns were related to user unawareness of how their information might be shared, continuous storage of data without capabilities to delete, display of personal information on device screens, and fear of surveillance.

Participant one had concerns as to how far is too far when it comes to the development of smart devices. She discussed recent developments related to personal access to restricted areas at work with identification chips being inserted in people's hands. She believes this is where the future is going for personal information; however, she was concerned this was taking technology too far and it was a matter of "could and should." She expressed similar concerns to the previous research including concern for her personal information being shared without her knowledge. She had previously disabled the apple health application on her phone because she wanted to limit the potential for her data to be released to others. Participant two noted that her smartwatch applications were linked only to her height, weight, gender and general zip code; and she felt comfortable if that information was shared. However, she set privacy settings for her food diaries and expressed great concern for her running applications monitoring and sing her jogging routs and time. She believed that information could make her susceptible to dangerous interactions.

What is the meaning of using a smartwatch?

Mindset. Karapanos et al. (2016) divided up their participants' data into purposive group, individuals who purchased their wearable device with set goals that may include losing weight, changing lifestyle, or overcome barriers to being active. The second group was explorative group that that received wearable devices as gifts, or purchase as impulse due to trust in brand, or purchase to support loved ones in accomplishing their goals. This is interesting data considering participant one, of the current study, would fall into the purposive group since she already understood her activities and personal goals from manually tracking her data. Participant two, of the current study, would fall into the explorative group since she received her watch as a gift and wanted to join her sister in completing fitness goals. During the Karapano et al. study they found the explorative participants experienced negative interactions with their wearable device when beginning. They speculate this may be due to the "truth" about their activities or inactivity became apparent to them. For some explorative users this became a wake-up call or motivator to begin increasing their activities, but for others this resulted in reduced self-esteem and gradual disengagement with their wearable device.

Through the narrative of this study it became apparent that awareness, or self-observation, was a principal topic for both participants. As activity fluctuated over time for both, they report that one important take away from utilizing a smartwatch was becoming aware of their activities and habits. Participant one's level of activity was validated by her personal achievements recorded on her smartwatch and justified feeling of being overworked if she noticed she pushed her numbers too far for one week. Participant two found validation when she found that her activity and dietary habits were more balanced than she had expected and felt

pushing her numbers too far was not sustainable for health. Shared negative attitudes amongst the participants included obsession and guilt. They believed that when more information was available to them, they would obsessively log or check their data. Furthermore, they felt guilty if the data that they were logging was not balanced. This typically was related to the amount of calorie input to calorie output. Participant two felt presentation of data during exercise became distracting and pushed her out of her mental workout zone.

Motivation and Meaning

Ryan and Deci (2000) describe two important modes of motivation that play a dynamic role in everyone's life. Intrinsic motivation develops from an individual's inherent interest to accomplish a task; something that is enjoyable or pleasant to them. Extrinsic motivation is driven by external, sometimes tangible outcomes. As previously discussed, gamification was a shifting external motivator for some. Participant one and two described personal traits that presented from more internal drives. Participant one explored the question of nurture versus nature. She gave an inspiring example of personal drive for life from her friend who experienced great adversity throughout her childhood. Participant one's experience with personal drive and thriving seem to develop early one in an individual's life. Participant two has observed a similar drive in individuals she knows. She has mad correlations with level of personal drive to continuous smartwatch usage.

Karapanos et al. (2016) reported that feelings of physical thriving, self-esteem, and competence sustained with participant's abilities to meet or surpass their set goals. The social component of sharing experiences provided feelings of belonging and social support. Furthermore, the wearable products enhanced user's overall feelings of autonomy and

relatedness, which promoted healthier lifestyles and wellbeing. Participant one shared her inspiring story of rehabilitation following a debilitating accident with a car while riding her bike to the gym. Participant one discovered her internal drive of meaning for staying active is overall mental and physical health. She has always been a driven individual and feels she wants to fight gravity after witnessing the lifestyle and quality of life lived by her older relatives. Furthermore, She does not want to be limited by her health as she has experienced immobility and would prefer to take advantage of her autonomy.

Clinical Implications of the Study

In reviewing the scarcity of research related to the development and usage of smartwatches as they apply to lifestyle changes and potential clinical application the current study provides a variety of clinical implications. The first is the how the study provided further insight to the personal experiences of adoption and abandonment of a smartwatches and how this could influence future patients and their behavioral health changes. Adoption of a smart watch includes many factors, one including financial means. This study established a better understanding of how one continues to utilize their smartwatch and how another might rapidly or gradually grow out of using one. Specific to this study, a major factor of abandonment included wearability.

Second, how external motivation, gamification, has differing and fluctuating impacts on and intervals' behavior change and internal motivators including desire to good quality of health and longevity presented as personal drive and dedication may play a longer lasting role in adoption of smartwatches and long-term behavior modifications. These findings are important to

continuously evaluate in the clinical setting when utilized with a patient who is working toward changing or modifying their behaviors.

Third, highlights the paucity and the need to further explore and develop research related to smartwatch use within a healthcare setting. Although the current participants were from the general population and without reported chronic illness information related to rehabilitation and preventative care were highlighted in the participants' stories. As mentioned previously, earlier research is primarily related to the technological development and marketing campaigns for wearable devices and does not completely cover the scope of wearable devices through the psychological lens.

Limitations of the Study

The following are identified limitations to the current qualitative study. First, gathering participants through a social media forum excludes individuals who do not utilize online communication and may not fully or accurately represent this population. This may speak to the participant's technological understandings and may discount the experiences of individuals who would likely need further time to develop technical abilities to utilize a smartwatch and sync their data to phone or computerized applications. Furthermore, individuals who do not utilize social media may have differed experiences with the social influences of utilizing a smartwatch.

Second, interviewing only individuals who have previously utilized wearable products excludes perceptions of wearable adoption/abandonment from individuals who chose not to try wearables or could not access wearable products. Further, individuals who previously used wearables may have been motivated for behavioral changes with initial purchase of wearables and could exclude individuals whose motivation was further driven by their smartwatch usage.

Third, all but one interview was completed via video chat. Interviews were held via video chat for convince in respect to time and location. This may have limited participant's ability to present their wearable devices or to communicate descriptions of their usage. Using video may have interfered with developing a closer and more personal way of communication opposed to face to face communication that allows for nonverbal social cues that may influence trust and understanding.

Recommendations for Future Study

The results of the current qualitative study provide evidence that many factors including wearability and varying motivations can result in continued adoption or abandonment of a user's smartwatch. Understanding the basics of what fuels the use of a smartwatch and what the nature of smartwatch use looks like opens new avenues to understanding how wearable technology can continue to be integrated into the healthcare setting. Future research may include participants who utilize smartwatches to manage chronic mental health and or medical diagnoses to paint a descriptive picture of the experiences with modifying behaviors with the practice of smartwatch use. Future research may even peer into the experiences of medical and mental health provider's experiences with patients utilizing smartwatches to monitor and modify behaviors for their patient's improved health.

Conclusion

This study presents findings from six total interviews with two participants with differing smartwatch adoption and abandonment experiences. These participants were selected on the basis of their previous smartwatch usage and continued or discontinued usage to gather varied opinions and experiences. As technology advances in the United States personal devices

included within the IoT have popularized at surprising rates in the past decades. Technology is now used in the workplace, home, hospital, gym, and other public places. It is no surprise that personal wearable devices have found their way into the health field because they offer continuous monitoring of an individuals' behaviors. This study provides greater insight as to how these little devices can make a large impact in someone's life if they "fit" properly.

Understanding the physical functions and comforts of a smartwatch has been helpful in further knowing who may benefit from them. Further, important findings related to internal and external motivators are helpful in further understanding how practitioners can help their patients integrate smartwatch usage into their health routines. For participant one in this study, accuracy was her main concern; she wanted precise data that was easily integrated. Participant one emphasized internal drive to be healthy and to maintain her quality of life. Participant two was most concerned with the wearability of her smartwatch and desired a comfortable and hypoallergenic device to continue usage. Participant two ascribed much meaning to the community that her smartwatch provided and occasionally participated in competitions for external incentives. Although both participants' results in smartwatch usage varied many of their daily experiences with their smartwatches corresponded and emphasized the negative and positives of utilizing a smartwatch for monitoring their behavioral health. The findings of this qualitative research provide a foundation for future research and how modern technology will consciously integrate into individual's lifestyles.

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Appendix A

IRB Certification Letter

ARGOSY UNIVERSITY

November 21, 2018

Dawn McClure
46-369 Haiku Rd., F5
Kaneohe, HI 96744

DawnMMcClure4@gmail.com

Your Level 2, Smartwatches for Promoting Behavioral Health: A Phenomenological Study," is fully certified by the Institutional Review Board as of 11-16-2018.

You need to abide by the requirements in any letters of permission you have obtained.

Please note that research must be conducted according to this application that was certified by the IRB. Your proposal should have been revised to be consistent with your application. Please note that you also need to abide by any requirements specified in your letter of permission. Any changes you make to your study need to be reported to and certified by the IRB.

Any adverse events or reactions need to be reported to the IRB immediately.

Your full application is certified for one year from 11-16-2018. Please be aware that if your study is not likely to be completed one year from 11-16-2018, you will need to file a **Continuing Review for IRB or Continuing Certification of Compliance** form with the IRB at least two months before that date to obtain recertification. If your proposal is not recertified within the year specified (365 days), your IRB certification expires and you must immediately cease data collection.

When you have completed your research you will also need to inform the IRB of this in writing and complete the required forms. You may use the **Project Completion Report** form for this purpose. Records must be retained for at least three years.

Good Luck with your research!

Please be careful not to lose this letter.

If you have questions please feel free to contact me.

Sincerely,

Robert M. Anderson Jr., Ph.D., Co-Chair
Institutional Review Board

cc: Dr. Lianne Philhower

Institutional Review Board.
Chair: Helen Turner, Ph.D.
Vice-Chair: Claire Wright, Ph.D.
Vice Chair: Darren Iwamoto, Ph.D.
irb@chaminade.edu

May 17th, 2019

Ms. Dawn McClure
Psy.D. Program
Chaminade University

Dear Ms. McClure

This letter is to confirm receipt of your Argosy University Institutional Review Board (IRB) approval for " Smartwatches for Promoting Behavioral Health".

The CUH IRB IRB00007927 reviewed the above IRB external approval.

The Chaminade University IRB will accept your current number and will not require reapproval at this time. Your Chaminade IRB protocol number is CUH 102-2019. You will now be entered into our annual report cycle (due date below). Please use the attached Form IV to complete your annual reporting.

Your Argosy approval data was November 21st 2018. The final date for your CUH approval is November 21st 2019. Continuation of research after this date will require:

1. Submission of Form IV Final Report; and
2. Request for an extension letter to be submitted to irb@chaminade.edu 30-days prior to the expiration date of your Argosy approval. The Board may require a new protocol submission, so please do this as early as possible.

Effective proposal approval date: November 21st, 2018

Date of annual or final report due to Chaminade IRB: November 21st 2019

Please submit a copy of your current CITI training certificate by email to irb@chaminade.edu. Please be advised that if you submit future protocols to our IRB we will require updated CITI certification aligned with Chaminade's requirements.

Please feel free to contact the IRB above with any questions or concerns.

Kind Regards,

Helen Turner, PhD
Chair, Chaminade IRB Committee

Appendix B

Smartwatches for Promoting Behavioral Health: A phenomenological Study

Hawai'i School of Professional Psychology at Chaminade University of Honolulu

INITIAL CONSENT FOR PARTICIPANTION IN RESEARCH

1. *Who is the researcher?* Hi, my name is Dawn McClure and I am a student at the Hawai'i School of Professional Psychology at Chaminade University of Honolulu. I am conducting this study in partial fulfilment of my requirements for the Degree of Doctor of Psychology, in Clinical Psychology.

2. *What is the aim of the study?* The aim of this qualitative study is to explore the influences of wearable technology on an individual's motivation and behaviors related to health. The ultimate aim of this study is to help me understand more about your experiences. And what they have meant to you.

3. *How was I chosen?* I will be interviewing you and one other individual with experiences using smartwatches for tracking, monitoring, and planning behavioral health habits. I have chosen you because I think you have valuable insights to offer as you have experiences with utilizing a smartwatch in the past.

4. *What will be involved in participating?* I would like to schedule four meetings with you; Three (3) Interview sessions and one (1) final meeting to verify that I have accurately captured your stories accurately. Ordinarily the interviews will last between an forty five minute to an hour. During our meeting, I would like to explore your experiences of utilizing smartwatch applications in your personal life. With your permission, I would like to tape our conversations and make transcriptions from our tapes, so that I may attempt to represent your perspectives with great accuracy. During our last meeting, I would like to review your transcripts with you and my understanding of what you have shared with me.

   Interviews will be held in a quiet and private location. Locations will be discussed and agreed upon based on accessibility to you. We may also decide to conduct some interviews via online video chat (Skype or FaceTime) if that option is more convenient for you. Prior to our last meeting I will provide you with completed transcripts and narratives based on your experiences, so you have the opportunity to review them thoroughly before we meet. During the final meeting I will begin by reviewing the consent agreement. Then you may decide if you would like to add, remove, or adjust the write-up at that time. I will be sure to take notes of any alterations and allow for you to review edits to the write up to check for accuracy. You will additionally have the opportunity to revisit your decision to remain anonymous in the final document or to

select a pseudonym to be used in the final write up.

5. *Who will know what I say?* In addition to me, members of my support team will have limited access to your tapes and transcripts in order to assist me. Currently, I plan to transcribe each audiotape and audit them for accuracy. In the event that I am unable to transcribe the interviews in a timely manner, I will utilize a transcriptionist. If I chose to do so I will be sure this individual is educated about the importance of confidentiality and security of the data and will sign an agreement to maintain ethical standards

   My support team will include Dr. Lianne Philhower, my research committee chair, who will serve as my primary methodological consultant and debriefer. Her job will be to review the rigor of my work and aid me in telling your story with accuracy. Dr. Joy Tanji, my research committee member, will serve as my primary peer examiner. The role of my peer examiner is to check my analysis of our conversations. All notes, audio tapes, transcripts, and drafts for the study's final write up will be stored using a double locked system. I will store all documents in a locked filing cabinet to which only I have access to. When documents are in possession of my support team (debriefer, peer examiner, and transcriptionist) they will be secured using a password-protected file or password-protected data storage devices (USB), which will also be stored in the locked file cabinet. Team members will not be permitted to save files on their own computers.

6. *What potential risks may be associated with participation?* Although I do not foresee any major risk to you, talking about your experiences may bring up some unexpected memories and insight that can be upsetting. The remembrance and experience of intense feelings associated with critical experiences may be painful and unresolved. Should this happen, I would like to stop the interview, turn off the recorder, and take time off the record to better understand what is coming up for you. Then, I would like to support you in deciding what may be the most helpful way to address these concerns. This might include withdrawing from the study. Your welfare, above all else, is important to me. Whatever we discuss off the record will not be included as part of the data in the study. I will allow you to determine when we will turn the recorder back on.

   During the study, I will attempt to protect not only your confidentiality but your anonymity as well. Since this is a small community, though, there is always the possible risk that despite my efforts, someone who reads the study may be able to figure out who you are. To minimize this risk, your name will not appear on any transcripts or in my provisional write-up. In addition, when not in use, I will store your tapes and transcripts in a locked filing cabinet to which only I have the key/combination. The peer debriefer, peer examiner, auditor, and research consultants will only have access to these materials when performing their duties as described above. In my journal entries and discussions with them, I will not refer to you by name. Instead, I will use a code name of your

choosing. Please indicate the name you would like me to use for you in my study: _____.

Your confidentiality will be protected at all times, as the law requires, with the following exception: I am required by law to inform an appropriate other person if there is reasonable suspicion that a child, elder, or dependent adult has been abused by you. My intent would be to ensure your safety and the safety of others by networking you to resources that could support you through current challenges. In such an instance, we might also decide to temporarily stop the interviews until you have a chance to access these resources.

7. *What are potential benefits of participating?* Sometimes people find participating in a focused conversation to be beneficial insofar as it gives them a chance to talk about things that matter to them. I hope the same will be true for you as well.

8. *What are my rights as a participant?* You may ask any questions regarding the study, and I will attempt to answer them fully. You may withdraw from the study at any time without having to provide a reason and without fear of negative consequences with me, the members of the team, or Chaminade University. Your participation is voluntary. If at any time, you would like to speak off the record, you may turn off the tape recorder, then turn the tape recorder back on only when you feel ready. Anything you discuss during this time will not be entered into the data unless you discuss them on the record at a later date. You may waive any question you do not wish to answer. You also may defer and answer a question at a later date. You have the right to review my work at any point in the process. After I have generated a narrative of what you have shared with me during the study, I will give you an opportunity to add, revise, and remove material you believe does not accurately represent your experience.

   When I have completed the requirements for this study by June 15, 2019 I would like to return the tapes of our conversations to you. Please indicate which of the following you would like me to do at that time (Please check all that apply):
   ___ Please Return my tape(s) to me.
   ___ Please provide me with transcript(s).
   ___ Please destroy my tape(s).
   ___ Please provide me with a copy of your clinical research narrative write-up.

   I am required by the Chaminade University Institutional Review Board (IRB) to keep the audiotapes and transcripts of the study for three (3) years following completion of the study. This is so I will be able to respond to inquires by other researchers regarding the findings and approach. On June 30, 2022, I will shred the paper documents I have that are associated with the study and erase the audio recordings of our interviews.

9. *What will be published?* As mentioned above, I would like to review the narrative write-up of my findings with you during our last meeting. At that time, I will ask you for permission to use certain quotes from our conversations to illustrate your experiences more clearly to others. You have the right to review these materials and decide which quote you will allow me to include in my final write-up. You may also reword, add to, or decline my use of others. The final write up of this study, including materials you have reviewed and given consent to use, will be published as part of the Chaminade Universitye-library. The study may be presented at a conference. Prior to any presentation of information, you will be contacted and consulted regarding what will specifically be presented in the presentation. You will have the opportunity to agree to what will be presented.

10. *If I want more information,* If at any point in the study, you have questions about my study, you may contact me at DawnMMcClure4@gmail.com or (603) 703-6164.

    This study has been approved by the Institutional Review Board of Chaminade University, Hawai`i. Thus, if you have questions regarding your rights as a participant od ethical concerns, you may contact th Chair of the Institutional Review Board at Chaminade University, Hawai`i, Dr. Robert Anderson, at: (808) 791-5207. If at any time in the study, you may contact my clinical research chair, Dr. Lianne Philhower at (808) 791-5243.

By written notification to Dawn McClure, below, I indicate that I am an adult (18 years or older), that the information presented in this document has been reviewed and explained to me to my satisfaction, but that this procedure does not preclude me from seeking further clarification of items in the future. I understand the nature and intent of this study. I also understand my rights and what is being asked of me as a participant. I understand all of the above and provisionally agree to the conditions specified. I understand that I will be given an opportunity to complete this informed consent procedure at the completion of my participation—after I have had a chance to review the materials I have provided for this study. This will allow me to make any corrections, changes, or additions to the study's portrayal of my experiences. I understand that I still maintain the right to revoke this consent at any time during the study without cause.

_____

Participant, please print name

_____ _____

Participant, please sign name Date

_____

Interviewer, please print name

_____ _____

Interviewer, please sign name Date

Appendix C

Smartwatches for Promoting Behavioral Health: A phenomenological Study

Hawai'i School of Professional Psychology at Chaminade University of Honolulu

FINAL INFRORMED CONSENT AND RELEASE OF INFORMATION FORM

I, _____ , hereby authorize Dawn McClure to submit the following information, collected in the course of my participation in the study indicated above, in partial fulfillment of her requirements for the Doctor of Psychology degree in Clinical Psychology, through the Hawai'i School of Professional Psychology at Chaminade University. I hereby indicate that I have made the necessary corrections, additions, and retractions to my interview transcripts, and have reviewed the narrative and/or analysis of my story for accuracy.

I hereby authorize the use of these materials as part of Dawn McClure's clinical research. I also authorize the use of the highlighted quotes in the final write-up to illustrate the perspectives/themes they are being used to represent.

My signature, below, indicates that I am and adult, 18 years of age or older. It indicates that the nature and intent of the study, as well as my rights as a participant, have been reviewed, again, so that I may refresh my memory of the issues reviewed in the original informed consent procedure. I have been informed that since this project is being conducted as part of a class, the provisional findings will not be published or presented in any professional forum. I understand the material reviewed and agree to the conditions specified now that I know what I am specifically contributing to the study. I have been informed that the tapes, transcripts, and analysis for this class project will be maintained until June 30, 2022. I understand that the final write up of this study, including the materials I have reviewed and given my consent to use, will be published as part of the Chaminade University e-library.

_____

Participant, please print name

_____ _____

Participant, please sign name Date

_____

Interviewer, please print name

_____ _____

Interviewer, please sign name Date

Appendix D

Smartwatches for Promoting Behavioral Health: A phenomenological Study

Hawai`i School of Professional Psychology at Chaminade University of Honolulu

Script for Audio Recordings

I intend on using the following scripts for turning on the recorder/video when beginning a session and turning off the recorder/video in order to give the participant notification each session. This script is also a courtesy to the participant, so they can prepare for the interview process.

Turning Video Recording On

Researcher: "Hello _____. I appreciate the time you are taking to do this interview with me today. As previously discussed, our meet will be approximately forty-five minutes to and hour long, with breaks as needed. When you are ready I will begin the recording for the interview.

Wait for verbal approval from participant to begin

Researcher: Great. As a reminder I want you to know you may speak off record at any time during our interview without negative consequences. You may turn off the recording or indicate to me that you would like me to stop the recording. At that time, I will be sure the recording has stopped, and we may discuss matters off record. If or when you decide you would like to begin the recording again I will start the recording.

Press record and begin

Turning Recording Off

Researcher: Thank you _____ for all your time and for sharing these experiences with me. I feel we have discussed some great stories and can conclude our meeting for today. Are you ready for me to stop the recording?

Wait for verbal approval from participant

Researcher: Great, thank you again for your time.

Stop recording

Participant Requests Break of Off-Record Discussion

Participant indicates they would like to stop the recording or turns off recording on their own.

Researcher: That is not a problem at all. Would you like to take a break and/or have a discussion off record?

Turn of recording

(1) Participant decides to take a break and indicates if or when they want to begin recording again

Researcher: Okay, it seems as though you are ready to begin recording again

Wait for participant's verbal approval

Start recording again

(2) Participant indicates they want to have a discussion off record

Turn off recording

Researcher: Okay, that is not a problem at all. I want to remind you that anything you say to me off record will remain confidential and will not be used for the study. If you care to share that information with me later on record you may do so.

Insure the participant's safety is attended to and offer resources if necessary

Researcher: It seems as though you are ready to begin recording again

Wait for verbal confirmation

Start recording again

Appendix E

Smartwatches for Promoting Behavioral Health: A phenomenological Study

Hawai‘i School of Professional Psychology at Chaminade University of Honolulu

Confidentiality Agreement for Debriefer/Peer Examiner/Auditor

As a member of Dawn McClure's research team, one of my priorities is to uphold and protect the confidentiality of the participant in her study. The nature of the information in the audiotapes/transcripts may be personal and sensitive and must keep confidential in order to protect the privacy of the participant. By signing this agreement, I acknowledge the importance of protecting the participant's confidentiality and agree to protect the information contained in the audiotape/transcripts, including the identity of the participant. The limits of confidentiality extend throughout the duration of the study and even after the study has been completed.

I, _____, have accepted the responsibilities of reviewing and discussing transcriptions and recordings as part of the research support team for Dawn McClure's clinical research project. I understand that during the course of the study, I will be provided with a thumb drive which I will use to store all transcriptions generated. While in my possession, I accept responsibility for keeping the documents provided, thumb drive, and transcripts secure. I have been trained on the manner in which the tapes will be received from and returned to the above named researcher. No copies of the transcripts will be retained by me during or after the study. I understand the importance of keeping all audiotapes, transcripts, and the information contained in these documents secure and confidential. I will not release these tapes and transcripts to, and will not discuss their contents with, anyone other than the researcher, Dawn McClure.

I have read the terms and conditions of confidentiality listed in this document. By signing this agreement, I agree to protect the identity of the participant(s) in the study. I also agree to keep all documents, audiotapes, and transcripts secure, and agree to protect the personal and sensitive information contained in these materials.

_____

Debriefer /Peer Examiner, please print name

_____ _____

Debriefer /Peer Examiner, please sign name Date

_____

Researcher, please print name

_____ _____

Researcher, please sign name Date

Appendix F

Smartwatches for Promoting Behavioral Health: A Phenomenological Study

Hawai`i School of Professional Psychology at Chaminade University of Honolulu

Community Resource List for Oahu, Hawai`i

A top priority during this research is to ensure the welfare and safety of the participants. Below I have compiled a list of mental health centers with many services available to you, along with a 24-hour crisis line should you experience feelings of distress.

Mental Health Centers:

Kalihi-Palama Community Mental Health Center
1700 Lanakila Ave
Honolulu, HI 96817
808-832-5770

Oahu Community Mental Health Windward
45-691 Kea`ahala Rd
Kaneohe, HI 96744
808-233-3775

Waimanalo Health Center
41-1347 Kalaniana`ole Hwy
Waimanalo, HI 96795
808-259-6449

North Shore Mental Health
46-001 Kamehameha Hwy #213
Kaneohe, HI 96744
808-235-1599

Crisis Line:
24-hour 7 days a week Access line 808-832-3100 on Oahu or 1-808-753-6879.

Aloha United Way
2-1-1 can be called to find accessible community resources on Oahu

Appendix G

Sample Coding

Interview One Coding

Category	Participant Quote	Open Coding	Axial Coding
Smartwatch Acquisition	"I've always tracked my activities I'm extremely active and when the first Fitbit came out I thought oh well this is cool I can just figure out what it is that I am doing anyway and if I forget to write it down then I forget to write it down so something else. Doing it for me, um, that's really how I use it." – (P1) "I began using a smartwatch because my mom is a nutritionist and she suggested it can I guess mentally keep you um in mind of how much you are sitting and how much you are moving so she got me one, I think for Christmas." – (P2)	Tracking my activities I wanted it because I was curious about what activities I was already doing. Forgetting to manual tracking Someone recommended getting a smartwatch for me. Knowledge of what I'm doing Keep in mind of sitting and movement	Awareness Mindful
Upgrades	I honestly got rid of the Fitbit in favor of the Garmin Vivo because it didn't need charging. Um, and also because the other thing about the Fitbit is that it used to fall out … And after losing one and being pretty annoyed about it I said okay there has got to be a better way to do this. Um, so I got the Garmin and because it didn't require charging and then about three months ago, I bought the larger Garmin watch that does require charging, but it tracks my biking activities and I'm a distance biker." – (P1) "Then I upgraded one my-self maybe four months later when I was using it for working out to track like my heartrate calories burned and that kind of thing… so I originally used the most basic Fitbit the original one that came out and then I upgraded to the Fitbit that had like a screen on it um and showed like the time and your steps right on it opposed to just having to use the app. – (P2) "the software there was a point when um they upgraded the app so you could see more than just your calories but you could see when they happen during the day or um you could see how well you slept but you could see	Didn't need charging Annoyed with product for falling out and getting lost. Has to be a better way to do this does require charging, but it tracks my biking activities. Upgrade to one with a screen Opposed to just having to use the app See more than just calories but when they happen More involved with it Open to the idea of using another one Range of quality Rather put money toward classes Not just tracking what I'm doing but I'm actually doing something	Convenience Faulty Give and take Quality Involved

	the exact moments that you woke up so when the software upgraded I found myself more involved in it , spending more time on the app and more time looking at the watch um than when I did when it first came out and the app was little bit less invasive or informative." – (P2) "I would be open I guess to the idea of using another one, but I guess I look at it and I'm like okay the range for a quality one hundred, two hundred dollars or so. I would rather put that money towards classes, like yoga classes or cycling classes where I'm not just tracking what I'm doing but I'm actually doing something about it." - (P2)		
Wear-ability	"I leave it on pretty much all of the time just so I don't leave it somewhere, which I would do. Um, and then I wait until its almost rundown. I tend to charge it at night because I don't care so much about the sleep function. Um, and I know what my heartrate is at night we have already pretty much bench marked that so that isn't of much interest to me so that's when I charge it." – (P1) **"**Um I used the basic one for three months um and I originally used it every single day to track sleep. Like so I tried to never take it off except when I had to charge it and then I used the other one for about six to nine months on and off because I started getting a pretty severe sensitivity to it … I slowly forgot to put it on and then it would be like well I didn't want to wear it when I was at work or wear it to when it would vibrate and distract me Um and then also I started getting a really bad rash where the battery point was. It was like an allergic reaction kind of thing." – (P2) "I felt discomfort with the bands as a whole and felt like maybe they were, like if something was giving me that reaction, I probably shouldn't have it attached to my body 24/7. So um then I was just kind of turned off by them because of just the metal that was in them and stuff." – (P2)	Leave it on all of the time Leave it somewhere Charge it at night Don't care about sleep function I used it every single day Track sleep I tried to never take it off except when I had to charge it Slowly forgot to put it back on Allergic reaction Discomfort with bands Shouldn't be attached to body 24/7 Waterproof Charge it when getting ready Never found the sweet spot in sizing	Daily Use Forgetting Sleep Tracking Take off for charging Allergy Discomfort

	"so it was technically waterproof but because of like the battery I just felt weird about like when I would shower so that's normally when I would charge it is when I was showering or even like blow drying my hair or putting on makeup." – (P2) "Yeah, I changed my band from the actual rubber band, that was on it at one point um I think i had one that was too small so by changing to the bigger one it felt like, I don't like anything too constrictive so um when I changed to the bigger one it was great but it was then bouncing a little too much so I think I never found one for my total sweet spot in sizing." – (P2)		
Tracking	"I do something called Deepwater running. Um, so I use it for that heartrate end of it." – (P1) "Um, its they use it a lot in rehab. A friend of mine started a company called fluidrunning.com and you can actually look it up she's got a whole bunch of different work outs. She had been a marathon runner and had been injured and so she started doing her rehab in water. And years ago, I got hit by a car riding my bike to the gym and I no longer ride on the street and almost didn't walk for a year. And a lot of my rehab was done in the water. And as, so I have a firm appreciation for what hydrostatic pressure does for you and so she started this deep water running classes and then she turned it into an app and its basically a belt and waterproof earphones and you get the classes on your phone and she walks you through this whole thing and because I do so much cardio I don't, my heartrate seldom goes over 126 so for me and my resting is about 52" – (P1) (talking about making it a habit) "Actually, it was easier for me and the interesting thing is that I never really bothered to track my walking before because it was just something I did… So I think I just probably have a better idea of how much I actually move versus before where you had to be an activity that I either planned or okay your working out this is what you write down I wouldn't of bothered to	Heartrate Use it a lot for rehab Injured so she started rehab in water Never bothered to track walking before Better idea of how much I move versus before Wake up and check sleep How much tossed and turned and REM Tracked amount of movement Keeps me cautious about logging my food Be aware of how much food Pace around my house or take steps quite a bit I had to get the steps in even if they weren't quality steps Beats per minute Fat burning zone Similar experience	Heartrate Beats per minute Sleep/REM Rehab Walking Steps Calories Pace Swimming Awareness Amount Quality Fat Burning Resting Input and output Fazed out habit

	keep track of how far I was walking." – (P1) "Um I guess I just never thought of it in terms of how many miles I was actually walking." – (P1) "so I would wake up and check my sleep and see um how much I tossed and turned and how much it said that I actually was in REM, because I guess it can detect that" –(P2) "I would go to work and um it would let me know if I hadn't moved for like an hour or so, so I would try and just stand every hour-ish um and then it also and attachment to my fitness pal so it did keep me conscious about logging in my food which I think overall helps you, I don't know, eat less but maybe just watch what you're eating or be aware of the amount of Oreos you're eating um and so then I would, if I didn't reach my steps by the time work was over I would normally then either like pace around my house or take the stairs quite a bit um it almost became like a I had to get the steps in even if they weren't necessarily quality steps. If that makes sense." – (P2) "I payed attention to it most, not so much when I was resting, but more so when I was working out I would strive to hit different heart rates. Like with HIIT workouts, like hit workouts to try and get to a certain like beats per minute um so I knew I was in the fat burning zone or whatever that looked like. Um my resting one I didn't focus on as much because I never really had anything irregular or not normal its always been a pretty steady heart rate so, more so just when I was working out." – (P2) "Um, for me personally. So when I first started to decide to go off of it I did talk to some other people to see if anyone else had similar experiences to me both with the irritation but also to the almost obsessive over the app thing. Yeah so I think I learned for me personally that I naturally have really good balance in my life of like sitting standing walking running being active and inactive and so once I got to the	I paid attention to it most, not so much when I was resting, but more so when I was working out Naturally have a good balance Compare General idea of input and output Hours of nothing but tracking Kind of just fazed out Creatures of habit	

	point that I could visibly see what my day to day was I actually felt pretty happy with where I was at um I think that there is always room for improvement but I think more than anything it brought focus to like I doing okay. Um and other things I learned from it were. How, ohh, how a heart rate could change with stress. That was one thing so I could see, or when I was anxious, it would shoot up or something that was very interesting. Um although that didn't happen often I did check it maybe two or three times when I could feel myself really getting anxious or stressed out about something and then other than that just learning like for example walking at like a 4 mile per hour pace and jogging for a lessor time at a higher pace can end up being the same caloric burn so it was interesting to kind of compare like what I thought was a really high calorie burn but like maybe it was quite as much as I thought it would be." – (P2) "So I, for me that I guess is valuable information to have a general idea of my input versus my output for the day." – (P2) "then it became probably an hour of my day was nothing but tracking and I was like this is another job! (laughter) but definitely you, we are creatures of habit and if I make something for dinner one night I'm probably going to eat it for left over the next day so its like you know I already know what the caloric intake looks like, I made it, I know how much oil is in it I know what veggies are in it and so yeah um I kind of just like fazed out." – (P2)		
Apps used with smartwatch	"Um, I use MapMyRide for my biking and also Strava for a lot of other things. Um, so I've got Garmin, MapMyRide, and Starva all linked together along with MyFitnessPal for tracking eating." – (P1)	MapMyRide for biking Strava for a lot of other things MyFitnessPal for tracking eating	MapMyRide Strava MyFitnessPal
Mindset	"It was like oh I haven't moved for over an hour I need to like to add an extra mile to my gym time tomorrow or like I ate way too much this morning and feeling guilt. Um so that	I need to add an extra mile I ate way too much Feeling guilt	Need Guilt Balance

	was another reason that I didn't strive to find a watch that worked for me because I found that mindset was new for me and I did not care for that." – (P2) "Yup, um from that perspective it might modify my eating behavior but on the other hand maybe not. Um if I'm going to be a real pig then I might say okay well how many mile you gunna ride to get rid of this?" – (P1) "the only thing I would say is I have never been one to obsess over calorie intake like I'm very much a balance kind of person, 80-20 rule and I would find myself becoming slightly obsessive and that I did not like." – (P2). "like I ate way too much this morning and feeling guilt. Um so that was another reason that I didn't strive to find a watch that worked for me because I found that mindset was new for me and I did not care for that." – (P2) "the one thing that is really cool is letting me know like hey you have your fastest mile today or hey great job you walked 6 miles today. Um that kind of thing was almost like having a mini cheerleader about things that most people would have no idea happened to you like no one is tracking my steps but me um. so to have someone kind of pat you on the back is cool um, but then yeah definitely memorable of like I did not like the feeling of guilt I did not like the feeling of um being scared to login my food because I didn't want to see the calorie intake go over or um knowing that I didn't walk enough to meet what I ate for lunch or like being nervous to put things like that in because you knew that you failed for the day." – (P2) "Um, I do log a little bit of information and I do it sporadically so instead of doing it daily or I had even gotten to the point where I was logging one, each of my foods and weighing in the morning and weighing at night and that was so unhealthy. Like mentally made me so uneasy. So	The mindset was new for me and I didn't care for that Might modify my eating behavior but on the other hand it might not Miles to calories I'm balance kind of person 80-20 rule Obsessive Letting me know accomplishments/ cheerleader Have someone pat you on the back Scared to log food Didn't want to see calorie intake go over Failed for the day Weighing in too much/ unhealthy Mentally uneasy Woke up feeling great	Accomplishment Too much Unhealthy Uneasy

	um after I stopped doing that I started instead tracking um just my food and weighing maybe once a weeks or so and I felt like that was a better pace even then I just could wake up in the morning and be like oh I'm definitely this amount of pounds under then be totally over I was the day before even though I woke up feeling great, because I saw the numbers I then felt horrible about myself. So, um I pretty much stopped tracking except for now I will do measurements and I do measurements maybe once a week like on, not on Mondays because that right after the weekend, but like Ill run." – (P2) "right now I have fitness goals, but I feel like I'm reaching them and accomplishing them without it and I don't need that reminder anymore. Because I did it for long enough for it to be like you have been sitting for a while so why don't you stand up and do some mountain climbers where its almost an internal thought." – (P2) "Yeah, like the Wii like the play system would like say you've been playing for a long time go outside. Or like Netflix, hey are you still there like are you sure you still want to be there um and so yeah I can appreciate the little reminders but it almost became like I got a reminder when I was in a meeting then I would be like okay there is nothing for me to do about it but I would get in my own head of like wow I've been sitting for a long time. I should stand up but I need to be focused in this meeting so especially with my job but also the way that can get anxious about working out and stuff it was just a marriage that was not working anymore." – (P2)		
Motivation	"Um I can't say that its done anything like life changing for me or behavior changing um it's just that dork that I am that it's interesting to me to see what it is that I do." – (P1) (discussing rehab from bike accident and tracking) "Maybe even more so, um because that was rehab work and that required for one thing for my mental health I needed to see progress		

	and when you had an extreme injury, so I broke my hip, my pelvis, and my lower back. Three months in a sling before I actually go to the point where I was upright again (Interviewer: okay) and made a mess of my legs as well and so every, so the beginning of rehab is when you see a lot of progress (interviewer: yeah) then as you move forward the progress becomes less noticeable and for me I needed to see "yes you are still moving forward" even though it didn't feel like it…for one thing there were very few steps. Um a lot of that was spent in a walker (interviewer: okay) um for me it was really more of a okay how long can you actually be physically up, how far can you go um can I make it across, how many times can I make it across the living room today. Um and then it was getting into the pool that was the first thing that they did with me um once I got past a lot of basic rehab stuff was to put me in the water where there was no um impact and then it was okay we are going to count laps. 25-yard pool first time I could get a third of the way down and then um it was really about counting that." – (P1) "It just made things easier and for somebody who is data and goal driven um it just kind of reinforces and it takes, it makes me lazy on one hand because I don't have to write it down but I also appreciate the fact that it is there its nice to have I suppose the integration between the food and the activity." – (P1). "yes! It's like this guy isn't doing anything anyways versus this trainer looks great so I'm going to listen to them and I also really liked that they send you an email with your results as opposed to right then and there it shows on your wrist or it shows up in an app or something like that so I can look at it and give it the attention when I'm ready to and on my schedule rather than feeling forced by vibration or note or something that comes through on an app." – (P2)		

Accuracy	"So this is not a time when you get in all your steps you get a couple thousand steps a day maybe but it's a little bit irritating to be told that you are a slug when you're not getting your septs in but you are riding anywhere between 70 to 100 miles a day and up to five thousand feet In elevation." – (P1) "when you are running in the water it doesn't compute your steps you get your heartrate but you're not going to get any steps for that." – (P1) "Um, its moderately annoying to me that it doesn't do a good job of tracking strengths training." – (P1) "because actually that was another thing I didn't like, when I was doing my make up even though I wore it on my non dominant hand it would still think I took a step because of my arm movements (interviewer: ohh) So um I did take it off when I would either be If I had to write with my left hand or if I were showering so that way when I was washing my hair it wasn't thinking like oh you're running um so I would take it off and charge it during those times so that would be as accurately as it could be." – (P2) "the only thing that didn't totally translate in the app was it could get my heart rate but it didn't necessarily know like it almost always tracks whatever the movement was it would just track walking or just steps versus when I'm doing jumping jacks my arms are moving but that's a lot of movement so I think that there's maybe some flaw in um Fitbit of how they are able to track your actually moving. But I think it's probably has updated since I've had one. With Garmin and stuff they do a really good job but I just haven't gotten back into it." – (P2)	Reminders to be active can be inaccurate and frustrating	Irritating
Activities	"Um so they would be anything from orange theory, the class, and then also I would do things like you sprint for one minute, or what's it called, Tabata, a sprint for one minute off for 10 seconds burpees for one minute off for 20 seconds um jump tucks for one minute off for thirty seconds so its like it keeps you interested and	Enjoying workouts that keep you interested and entertained Workouts that have variety	

	entertained." – (P2)		

Interview two coding

Theme	Quote	Open Coding	Axial Coding
Tracking	"Huh, well the very first Fitbit didn't actually do much of anything except track my steps and so you know that was more entertaining than anything else" – (P1) "when I moved up the ladder and as they changed, and I got the Garmin the heavy-duty one that was interesting from the perspective of being able to track pretty much everything" – (P1) "Yeah I definitely think that I imagined it would sky rocket my, what's the word I'm looking for, sky rocket not just my motivation but my awareness to be more physically active so I assumed it would make me aware that I had sat for two hours straight or that I had only done three thousand steps when I think that I was very much over assuming my activity. How many calories I was burning and that kind of thing before the fitness tracker. So, for example if I ran a mile, I got in my head that that was probably 200 to 300 calories burned realistically it is 100 or 110. So, that was something I ended up finding in a result but to start I definitely thought it would increase my activity and also make me more conscious of what I was eating." – (P2) "Yeah, and if there were a way of tracking my consumption of calories, I would love that because I think that would be eye opening." – (P2) "If it could track my body temperature, because I do a sauna um almost every day so to know that my temperature my body temperature was getting up to 101 where they say that your um not just burning fat but burning off toxins and heavy metals and stuff so if it could tell me my body temperate that would be cool too." – (P2) (Tracking without watch) ", I don't, its only to route runs and I don't use it when I'm on a treadmill so it's only my outdoor runs um or hikes just to know what my elevation gain was. Um but I don't track food I don't log gym time I don't log anything like that it's just to track my loop and how long I run." – (P2)	Fitbit didn't track enough It was entertaining to track steps Garmin was an upgrade from Fitbit because it could track everything Believed Fitbit would skyrocket motivation, awareness, and physical activity and it ended up making me aware that I wasn't doing as much work as I thought. I want a device that would automatically track my caloric intake. Eye opening I want my device to record body temperate to know if I was burning fat and burning off toxins. I now only use apps to track elevation gain and run loop.	Not enough Entertaining Garmin Upgrade from Fitbit Awareness Motivation Automatic
Accuracy	"so yesterday I was rowing I did the elliptical and I took a Pilates class and all of that kind of got lumped under the category of cardio well you know big whoo there's a little bit of difference between those three things." – (P1)	When I do different activities it only gets lumped under cardio which is irritating because	Irritating

	"also, I would add in all of those different activities, so you know the closest thing I kind of have to pick and choose between. Do I want to call Pilates weights since a lot of it is bodyweight training or do I want to call it yoga it kind of depends on which instructor I go to that. So I think I would probably differentiate the different kinds of activity the other thing is that so if I do biking on that watch it is perfectly happy to keep track of all of my mileage from a GPS standpoint but when the polar vortex hit Chicago I have one option and that's the bike to nowhere. So, it doesn't exactly track that that's another thing where I have to throw in cardio that I think more than anything else is just being able to accurately track my different activities. I walk a lot differently when I go out for a walk by myself rather than when I walk the dog." – (P1) "the idea that you're getting realistic tracking as opposed to just kind of a generic I could if I weren't so stinking lazy accomplish a lot of this type of tracking myself what I do find interesting is that I will periodically throw on my polar heart rate monitor because I have a free motion bike and the polar gets picked up by the computer and it also gets picked up by most of the gym equipment whereas the Garmin does not so typically when I go out and I use computerized equipment I almost always wear the polar and they're different which they shouldn't be." – (P1) "well the calories on the app are pretty useless um for example my 30-minute the 19 miles an hour bike ride is usually about a hundred and forty calories for me as per heart rate monitor which is where I figure that's probably the most accurate. If I just went by the app where I have got nothing more than my age size and sex in there they have me burning off 400 and something that's like the machines if you look at the numbers on the machines they're just stupid." – (P1) "the data is presented well I as I said with Strava I find it irritating that I can't edit it yeah what data off my watch that's what I've got so I have to pull it out and then go in and edit it by hand and then there's stuff that gets lost in that because then I lose all the heart rate data and everything else so I'm just tracking miles again." – (P1) "So Nike would just say like you walked a 2.0 mile versus Strava would be like hey you hiked a 2.0 mile you know like 800 ft elevation gain or whatever is high I don't know. An uh yeah so it could definitely tell the difference in what you are doing when you're running the app itself can either show you a fake path so you could run to an artificial like trail that they show or you could run to a um race track it will show you how many times you go around the track or it will show you your stats so how fast you're running how long you've gone at your current pace how fast your mile would be what your 5k time would be um and then the elevation calories burned and just like a chart of all the things that are in it and its continuing to go with you. I found it to be very accurate because I test those apps when I'm running on a treadmill to see if it actually matches what my pace is and that kind of thing before using them and that one was very accurate to what a treadmill says." – (P2)	these activities are very different. I want my device to differentiate between different activities for accuracy and to still track mileage when using machine/ indoor bike trainer I want accurate tracking opposed to generic tracking. If I weren't lazy I would track all of this on my own. I have to wear another device, polar heartrate monitor, to track my activities when using machines because my device does not connect with my equipment. My Garmin and polar heartrate monitor never give the same results which should not be the case. The app does not give accurate caloric information because it is not specific to me. The app overestimates caloric burn. Data is presented well on Strava but its irritating that I cannot edit the data manually. I lose data when I change data by hand. Strava gives better information than the Nike App.	Accuracy Convenience Generic Tracking

		Strava gives various virtual paths for exercise along with accurate and comprehensive data that is presented well.	
Wear-ability	"I would do away with having to charge it because that's pain in the butt." – (P1) "If I could make my own it would be a ring (interviewer: oh!) Yes, because I think wrist bands are so, I don't like them for me I think part of the reason why I got out of it so it would be something super easy and flexible like a ring that could catch your heartbeat, how fast you were walking because that's something the other ones cant track it will tell me my heartrate or how many calories I have burned but it doesn't tell me like hey during this part of your run you were running at a 7.5 versus a 6 or something like that um and then it would be able to track things like, and I don't know if this is like super technology, but it would be able to track when I was cleaning the house vigorously or when I was um when I'm swimming it can track that I'm going that or HIIT workouts or weightlifting because it's hard to track your calories burned when you are weight training opposed to when you're running." – (P2) "I think the biggest thing would, that I would share about its features one that comfort and wearing it so opposed to the wristband. And I know I'm the only person that I know of that has had the allergy to the metal (interviewer: right) I've never heard that for anyone else but that fact that its water proof so upper water proof maybe it's made of a rubber a neoprene or something um and all the features that it can do in terms of thing like the calories your consuming all also burning um your body temperature your heartrate and stuff like that. And it's very minimal it's not something you can't wear with both outfits like your workout outfits and your fashionable ones. And I think it would also be something that because it's so small that maybe it could be cheaper so it could be something that anyone could purchase opposed to just having to spent 350 on an apple watch and the Garmin watch and things like that." – (P2) "I think to like I wouldn't get too big into the different skins that you could put on it to make it look different I would make it super simple like a black, a nude, a white, and maybe like one weird color but I wouldn't do all the like get the gold band and watch, get the leather facing one watch, like that part to me is just a waste of money." – (P2) "And I had an iPod so when I would have to run with my cell phone so it was like all this equipment I didn't want so now I just want one ring (interviewer: yup) that's all I want maybe my phone probably not and just run." – (P2)	Charging my smartwatch is annoying. I want a device that is discreate and comfortable like a ring that would track heartrate, calories, pace and differentiate between many different activities. I want comfort and waterproof that is hypoallergenic and fashionable I want it to be less expensive so anyone could have access to it. Fashionable and affordable I want something small that does not require me to have multiple items while exercising.	Charging Discreate Comfort Affordable Fashionable
Apps And app incentives	(talking about Strava) "what I don't like is the way that you record things and what you can record it does get along with my Garmin watch so that picks up all of my heartrate information but one of the things that Strava doesn't track is stationary equipment so my fight to nowhere has to be put in manually now it will it will take in my cardio information from my watch and call it cardio but I can't go in then and edit it and put in how many miserable miles to nowhere I road." – (P1)	Strava doesn't track my stationary equipment. I don't think the physical incentives are particularly novel and discounts for the promoted brand is	Incentives Personal

	"They have them I've never used that MyFitnessPal also does that and MapMyRide does that I don't think that that's anything particularly novel um most of them frankly I'm a gear snob and about the only place I shop is REI and let's see MapMyRide is tied to Under Armour I don't like their clothes at all so I don't buy any of their stuff so the discounts are meaningless to me and I haven't seen anything on Strava where I thought oh I have to have that on the other hand when I get my REI garage sale notice I'd probably find something I have to have." – (P1) (Strava) "then it ranks you compared to what your behavior was the last time you took the walk" – (P1) "okay so MapMyRide isn't quite as exciting I get little badges for when I perform better than however then whatever group of peers, they put me in and then I compete with myself too." – (P1) "um so with MapMyRide your choices are actually it's a fairly it's a longer list than I thought but it's all things that are really more about being mobile so they do have class workouts never noticed that but those are things like there's bar CrossFit Orangetheory TRX yoga everybody seems to hate Pilates which I live in they have machine workout post recovery video workouts but that's all really kind of things that are commercial - yeah so I never even noticed any of those." – (P1) "I've got so many Garmin badges that I haven't been through them all in years um it doesn't matter to me some I don't need a trophy for showing up." – (P1) "I mean the data is presented well I as I said with Strava I find it irritating that I can't edit it yeah what data off my watch that's what I've got so I have to pull it out and then go in and edit it by hand and then there's stuff that gets lost in that because then I lose all the heart rate data and everything else so I'm just tracking miles again" – (P1) "I don't think I ever looked at my Fitbit while I was using it I always used the app." – (P2) "Um I wouldn't I would continue to do it like 50 miles a month but I did try to continue running at least a mile a day um and then the apps that I used like Strava and a couple of the other ones when I had a phone issue like where my phone was totally geeking out if I couldn't get the app to work instantaneously before I was working out I would just delete the app. (interviewer: oh okay) so if it caused any hindrance to the motivation I had at the gym I did not mess with it so it was just kind of like turn it off shut it down and I wouldn't go back to it because I just wanted to start working out so kind of the same thing with the Fitbit fitness tracker it wasn't working so I just got rid of it." – (P2) "So, it tracks your mileage and tracks who is around you using the same app and so actually what you can do it's called ghost marathoning which is how I first, the first lululemon give away really started to get into it. So, for instance like my friend in	meaningless to me. It ranks you against yourself I compete with myself MapMyRide isn't as exciting, it gives you badges when competing against others and yourself. MapMyRide has more choices than I thought but they all seem to have things that are commercial It's annoying that I lose data when I enter things in manually If the app or fitness tracker wasn't working and caused any hinderance to my motivation I would turn it off and not go back to it. The lululemon giveaway was an incentive for me to do a ghost marathon which allowed the stronger runner to run more and I would do what I was capable of. The world Wide Ghost run was motivating through Strava and made it fun to get out and do something active. Strava had more comprehensive and dynamic data to calculate output opposed to Nike's older app. I liked verbal updates from Strava to keep me on track during my workouts	Records Competition Hinderance Malfunction Motivation Keep on Track Gamification

	college was a really big runner so she would like run 15 miles and if we were trying to get a marathon which is how many miles? So like if she ran 15 miles um and I ran, I'm definitely not as strong of a runner as she is, but I would run like 6 then it bounces back to her so then she has to run three and then I run three until we complete a marathon together." – (P2) "Totally, totally quick funnels sales funnels. The other thing that they launched was a world-wide ghost run so on one. One day I think it was back in October. Um they pretty much said like okay everyone go out and run your own 5k your favorite 5k go to your favorite spot and they showed a map of how diverse everyone's 5k was and stuff and the average times so then you were in this like really cool virtual run with other people so it was kind of like a virtual reality situation but like the difference of that was really cool so I think that Strava is the most modern running tracker app and the most influential with big name fitness companies um as well as the most motivating because it provides the most information and fun ideas that make you want to get out and do stuff." – (P2) "Yeah so that was the other thing like the Nike run club which was something you could connect to your shoes um like three or four years ago they couldn't check your altitude increase like so if I were hiking the Nike app would say like hey you walked for 30 minutes at this pace versus Strava would be like you hiked and you hiked this high and you pace might have been slow but you burned a lot because you were hiking at such a steep, you get what I'm saying?" – (P2) "It can also talk to you so like I'll put my headphones in, and it will be in my, and I'll still use those apps even though I don't use the fitness tracker. I'll still use Strava so I'll put it in my pocket when I'm running and it'll tell me like my music will be going and stuff but when I reach a mile it will stop my music and say you reached one mile it took you 8 minutes and 20 seconds if you continue this pace you will finish 2 miles in 16 minutes and 52 seconds or whatever it is um so it will stop you just to give you updates while you are running." – (P2) "Um kind of competition but kind of team building. There is another app called Strava that Fitbit introduced me to its S. T. R. A. V. A. (interviewer: okay) and actually the main reason I got into that is because lululemon did a giveaway if you ran 50 miles in a month um and used the Strava app to track it with your fitness tracker you got a free pair of shorts so but that was, they say you are competing against yourself or the couch and wasn't so much of completing against other people. (interviewer: okay) um my tracker did end up being the motivation for me to sign up for me to do some 5ks and so then you could go on Fitbit see who else was running in that race and see how you ranked in the Fitbit side of things um so that was the only time I would say it led to competition with other people mostly it was just additional workouts because it motivated me to do something and not so much competing." – (P2) "Oh definitely, yeah like when it was like hey. One my motivation was like a free pair of shorts that I really like that are like quality shorts um I think if it had been any other article like	Incentives have to match my interest to be motivating or worth the work	

	if it were a water bottle from target or something that wouldn't have been enough of a motivation but um the motivational point was there for me to really want to press for it and then if you did the 50 miles within half of a month you also got a shirt like a lululemon shirt witch I think was cool but yeah it definitely, I would say it gets you up and off the couch." – (P2)		
Social	"I have a couple of friends who we follow each other around Strava and we all live at different ends of the earth so one is in Australia another is in Toronto I'm clearly here one is in Denver one's in Colorado or in California so we follow each other because we're given to going on rides together we do RAGBRAI and this year we're helping to do the ice roads in Canada but I can't say that it's influenced me socially otherwise." – (P1) (virtual competition) "I suppose that we could given that one of us is a professional cyclist and that one of us isn't, me, I don't really want to see what it is next to me there. I know he's gonna leave me behind." – (P1) "Yeah so because it got me really sticking on my fitness pal um I started working out with my sister we ended up both getting the Fitbit and we ended up both deciding to join the same gym and so because of that we were tracking like okay you're going to try walking at an incline and I'm going to ry running and let's see whose outputting more (interviewer: oh so it was like an experiment) yeah, kind of so trying to measure things like that or like in a cycle class how much was that actually doing and we would do the cycle class together and see um you know if I'm exerting more but she weighs more whose actually burning more because your body weight has to do with what you are doing and stuff. And then it also got me on to the my fitness pal which got me and the Fitbit app had me connecting with people from like college that I didn't talk to in a while and like you see what they are doing and then it lead me to taking my first orange theory class I went to college with because I saw she posted about it on the Fitbit app." – (P2) "it definitely at least at the beginning really did get me looking at other people's diaries like food diaries or what they weighed in on for their exercise for the day and that kind of stuff. I watched that." – (P2) "More reading their stuff um like my food diary and exercise diary was always private so what they would see was XX completed her workout today but they wouldn't see like and she burned this many calories she ate this many and this is what she ate but for those who could do that I defiantly, if it was someone that I thought was in really great shape and theirs was public I would read it and see if my body would adapt to what they were eating um and then I would take meal ideas from their diaries and stuff um but I didn't see someone post something about their food diary and comment on it and suddenly get into any in-depth conversation." – (P2)	Strava keeps me connected with friends who are around the world and training for events we do together I would prefer not to have virtual competition as I know my friend who is a professional cyclist would leave me behind. My sister and I both got a Fitbit and joined the same gym together and compared activities and output of data based on body type and level of activity. The MyFitnessPal app lead me to do my first Orangetheory class with a friend from college because I saw her post about it. I monitored other's food diaries for dietary ideas	Connected Virtual Competition Together Activity Level Monitor
Motive / Goals	"I have two one which is to keep my head clear and the other is to keep me from being and old lady who can't do anything." – (P1)	I stay active for mental health and physical health (longevity)	Mental health

	"It's mental health for me that's how I clear out my head and I'm just one of those people who needs to move I don't sit still well but on the other hand when I look, well I guess im more aware of this, Kate and I we're talking about this hmm when you take care of older parents and you watch your friend's parents age and everything you just be very you're very conscious of where what their lives are like now especially knowing how they lived and the choices that they made and trying to make better ones my husband I were talking about this recently when our grandparents were our age it wasn't that they seemed old to us because we were little kids but in a lot of ways they were old right um and they died younger their quality of life wasn't as good -- I know a lot of bad ass old ladies and I intend to be one. One of my aunt's was riding well into her 90s and I would prefer to be one of those as opposed to somebody who's sitting around a wheelchair whining." – (P1) "oh yeah after my accident and the three months that I had to be stationary I learned a lot about myself." – (P1) "Yeah, I started to , so they set goals for you like I used my fitness pal attached to my Fitbit (interviewer: okay) So they set goals for you or you should eat 1200 calories if you're trying to lose weight 1500 if you are maintaining 1800 if you are gaining, I think. And um so I started with the goals that they set for me based on what my goals were but then I found that they were slightly unrealistic um for me so like to eat 1200 calories but then to try and burn 4-5 hundred calories working out that balance there was very difficult I found myself so hungry. So then I set my own goals of eating 1500 but only allowing 2-3 hundred of them to be carb based so like grains or if I was a snacker because I'm a snacker or dessert because I can't totally cut out one hundred percent dessert um so I used theirs as a guideline and created my own." – (P2) "You can earn badges and stuff which sometimes can translate to certain stores for like 15 percent off. I never cashed those in uh it was more so just like me and her were on a team and our other two friends were on a team and so just trying to log in as many miles as we can to become a stronger runner was all." – (P2)	Looking at parents' and other's lifestyles to see how they age Fitbit set behavioral goals based on your physical goals but they didn't end up being sustainable, so I modified them to fit my lifestyle.	Physical health Goals Sustainable
Mind Set	"Um and even the people that have the text messages to their watch and stuff I put my phone in do not disturb so much because I don't want to know what is on my screen so for me it's actually like when I'm working out it is too much of a distraction to watch while I'm doing it um so if there is a natural break between my cardio sessions and my weight session I will check did I do enough in cardio do I need to go back on it but I don't want to be focused on it the whole time because one it makes my workout feel so much longer while I'm watching the minutes but two I just find it to be a waste of my time and I get out of the mental state of like push push push and look at the reward that kind of a thing after." – (P2) "I think that would be really cool I find that when I'm on a treadmill I cover the screen of the treadmill I don't want to know how far I have gone or how long I've gone because I'm a	Phone and, smartwatch, and equipment screens can be distracting during workout, making it feel like time or output is taking a longer time.	Distracting

	watcher if I do so if I'm aware of the time at any point in my run I know how long the songs on my playlist are so I will then track the entire, how long I have gone and estimate how far I've gone. That drives me insane and it makes it so much longer. So when they just tell me, like I get in my zone, and it's a really quick voice that says he you've reached a mile in 8 and a half minutes and it pops right away I can hop right back in my mental state of like just running versus this continuing to watch a screen that's just not for me."		

Interview Three coding

Interview Topic	Quote	Open Coding	Axial Coding
Motive/Meaning	"I think a lot of it has to do with seeing people who weren't an aren't active so and where they wind up versus we're people who fight the gravity, so to speak, wind up the other night on the news there was a 77 year old lady who's a local she had ridden her bike across the northern part of the United States and she is about to start the southern half of the United States that's kinda where I'm gonna be (that's awesome) yeah and RAGBRAI which is the annual riding across Iowa there are two sisters who ride and they have a custom-made tricycle and they're in their 80s and what I figure okay I'm haulin my butt up those hills on a fairly tricked-out really light bike and they're riding a converted trike to go with no gears but one it's it looks at their seat looks almost like a church Batch and they don't go very fast but they get there." – (P1) "you get a limited amount of time on this earth and I don't really want to spend I've already spent a year not walking that I wanna keep, I don't want to do that again uh." – (P1) "um I think for those of us who really want to understand what we're doing every day and it's a combination of a motivator and a curse to be honest because part of it's okay I can't, well you know I can't have incomplete circles or I can't have anything on the calendar that's incomplete so there's a little bit of obsession there but it also from my hand it pushes me okay I got X many miles in this amount of time yesterday what can I do better today oh gee you've really been driving yourself a little bit hard no wonder you hurt why don't you back off a little bit I think I do think that there are some people to become so obsessed with the data that it impairs how they function in the same way that too much screen time for anything probably isn't good for you." – (P1)	I see the relationship between lifestyle and longevity, and I want to be like those who work hard to live long and healthy. I want to use the time I have on this earth doing everything that I want and not to be held back by physical limitations. I can become obsessive with the data and push myself too hard at times. Tracking too much can become obsessive and for some and likely not good for anyone to do.	Longevity No limitations Push too hard Obsessive

Personal traits	"It's an awful lot of determination and it's just that they've never in their life been quitters and aren't going to start now so there's just a certain amount of determination and a certain amount of fighting spirit that they're gonna get things before they get them anything I think that's really what kind of what it's all about." – (P1) "yeah I wouldn't say that it has to be in your nature but I think that it helps and it's a difficult thing you acquire." – (P1) "yeah that intrigues me too there's some sort of catalyst but I still think it has to be a certain kind of person mm-hmm and that goes not just for exercise but pretty much anything in life that's adverse I one of my best friends have quite possibly the single worst up bringing that any child could have could ever have it was just from day one she was sort of cursed with less than advantage circumstances and she still managed to put herself through college she put herself through law school and did the things that were really meaningful her as opposed to sitting down and saying well wahh for me yeah my life sucked and from early years and I mean her is truly did she had an abusive father her mother committed suicide when she was three and she was in the apartment with the body for two days (oh wow) all the things that could happen to warp someone in early childhood and make them not push forward she did it anyway so I that's one of those big nature-nurture questions and III don't know what switches have to be flipped because some people can have all of the chances in the world and they don't take advantage of any." – (P1) "Pretty much everybody has their preferred toys and their preferred apps everybody pretty much likes seems to like strava but I think that for those of us who are distance and also those of us who are just stupidly competitive race yourself to the bathroom types that's its definitely good thing for us or a bad thing but we definitely use them." – (P1) "It's interesting because in my head at the very like the first thought of a SmartWatch where to me would be someone who's already incredibly active very motivated very driven but I would actually say the majority of people that I know still wear and use them are ones that struggle with motivation struggle with gym time. I also find that the Fitbit's are more for people who are not doing high-intensity cardio and are just trying to get steps in versus um things like Phoenix watches by Garmin so the more expensive watches I find actually go to the more motivated and driven people and the less tracking maybe less expensive are the ones who are just trying to kind of step into the out of smartwatches and get their exercise first started." – (P2) "Yeah, kind of like maybe like the Fitbit are gateways to my interest is there I have some goals, but I'm not sure	People who continue to stay active have never been quitters and have a lot of determination. There's a catalyst that pushes someone to keep going in life. A certain level of adversity may act as that catalyst It's inspirational to see someone who has endured much adversity and has thrived in life. Its complex to try to understand what biological or environmental factors can elicit a drive for life. It sometimes doesn't make sense why people who are given ideal environments don't have the same drive for life. I was surprised to find that individuals who I know that continue to use a smartwatch have difficulty staying motivated. Certain levels of watches tend to correlate with an individuals level of motivation. It has to be worth it to the individual to invest more into their smartwatch. Fitbit, having less tracking abilities, is a gateway to becoming active and Garmin, having more abilities, is for individuals who are well versed in their level of activity and are looking to set personal records.	Never been quitters Determination Catalyst Adversity Inspirational Thrived Nature-nurture Drive Motivation Invest Gateway

	what they are versus you know the Garmin's and maybe the more expensive smartwatches are kind of like I'm looking to set personal records. I'm looking to beat my previous times. I'm looking to reach this many miles in a week. So, I would say personality type that's kind of how I would separate the two. That's just my own observation and experience of who I know uses which brands. So now after using a Fitbit, after wearing for a couple runs someone else's Apple watch as well as Garmin. I would say if I were to hop back into Smartwatches I would go for a Garmin there were things that were more comfortable about the bracelet in terms of actual wearing that I liked better. Also, it gives you a little bit more option to only wear it when you're working out versus Fitbit has kind of a you should wear it all the time to get your wholeness of tracking versus Garmin is like hey, that was a really great run. This is what you did. This was your altitude change. More situational I guess." – (P2)	I would like to use a Garmin if I were to begin using smartwatches again for comfort, versatility, specificity.	
Wear ability	"Yes, I do. So my sister has one and then I've been interested in Apple watches, but I've been afraid of the same issue happening where I'm like allergic to it and then I have friends that have them and a lot of the community that I'm surrounded by they have them for their work purposes to get on their personal training making sure that they're meeting the requirements for their job. So I hear the use of them quite frequently, which makes me feel like I'm kind of missing out on something but after all the attempts I've had with them it's just never ultimately been positive enough and not to continue." – (P2)	I'm afraid that I will have allergies to other brands of smartwatches so I hesitate to get another one. I hear people talk about smartwatches for many things like work and I feel like I'm missing out on something.	Allergies Missing out
Social	"I think part of it was the community and motivation I was expecting it to host. So I got it, resulting part of it part the reason it was on my radar was because my sister had had one and what I noticed was she would come over to my parent's house for dinner and then she'd be like, okay well I'm gonna go get on the treadmill for 15 minutes for a post dinner walk because I need to get my steps in and. So, it became an awareness thing and then she would say something like oh man Whitney beat me on my steps today. So, there was a sense of meaning I guess you could say that came from the idea of the community. That would have come around because at the time I wasn't a member of a gym because I was in a lot of transit, so it was kind of maybe fueling what I felt I was missing from a gym relationship and membership if that makes sense." – (P2) "Yeah, I think that's a really good question because when I attend something like an orange Theory class, which orange theory is a very extreme version of a group workout class that the people that tend to go are not beginner it's very demanding. It's just really intense so when the people there have all the gear when they have their own heart rate monitor that goes with their watch and when they have the shoes that go with the watch there's an immediate level of like either I'm not going to be able to compete with them or I want to see	I was interested in getting a smartwatch at first because my sister had one and I saw that she was being active with it and becoming aware of her steps. I noticed my sister was being competitive with her friends using the smartwatch. The meaning of having a smartwatch meant a sense of community to me. When I see people using tracking devices in high intensity workouts, I feel somewhat intimidated, but I also become curious as to how I would compare to them.	Others had one Competitive Sense of Community

	how I can track to them. So I think when I see something like someone who's really fit wearing it, I think of wow I would love to see how I rank up to that person and flip side of that is if I'm at target and I see someone who maybe is a little bit more overweight who's wearing a Fitbit who I see is actively looking at it, you know, I immediately think in my head good for them they're getting their selves together and maybe that's a too far of a judgement to cast on someone else without knowing anything except for the fact that they're wearing a watch, but I do find myself positively judging I guess you could kind of say it that way that they are maybe attempting to make strides in their life and in their health but I do think that it's something that's visible to other people and you can quickly make an assessment that they are either interested in health or attempting to get interested in their health and so it either makes me want to cheer them on or compete against them in a fitness class." – (P2) "Yeah. Yeah, I think it was like the first or second conversation we had, but we talked about if they could put it into a ring and for me, it's like I don't I wouldn't if someone came up to me and said something about me wearing a fitness watch and it was supportive of like oh good job I hope you hit your goal that Isn't a motivator for me so that wouldn't push me further. So, I would be fine with it being very hidden and no one recognizing it but I do think too if you are someone who feeds off of intense affirmation in a community setting that I have seen previously at the gym to people who recognize they're wearing the same watch and immediately pull out their phones to sync up on the virtual community Hmm, which is cool. That's a motivator for you." – (P2) "So I don't it's like I don't know if it's condescending and just I don't know how to word it properly I like communication in a sense that I feel physical bodies around me working out it's like I can feed off the energy of we're all going at it, but I don't want to be talked to in the community, I don't want you to put like, oh you saw that I ran three miles. I don't want you to comment on it and be like hey good job. That makes me uncomfortable but if I'm running on the treadmill and I see someone who's running faster than me I feed off of that and then I think to myself why can't I push a little harder? so I like being at it, I like working out by myself, but I like working out by myself in a productive active clean gym." – (P2) "Yes, so there's something like I take my workouts, Not privately, I think that for some people it's super cool. Like I love seeing when other people are working out. I love seeing what they're doing, and I get inspired and motivated by that but it's not my makeup to then present it back. Um, but like if I see someone post something online that they just did a hike like Koko Head on Island or something know myself saying what did I do to get sweaty today? What did I do to get a workout today?	I wonder how my abilities would rank up to someone who looks really fit. How am I doing? I often find myself making judgments about someone's level of activity based on smartwatches. I would like my smartwatch or tracking device to be discreate because I would prefer not to be judged or recognized for it. Some people enjoy being recognized for it and engage in more social engagement. I feed off of the energy around me rather than social or verbal appraisal I observe those around me to gage my level of activity. I am motivated by the	Intimidation Compare Rank Up Judgement Discreate Recognized Social Engagement Energy Observe others Activity Level

	And then whether they know it or not, I'm taking motivation from them to go do it. I just then don't want to be necessarily talked to about it by the community that I'm involved in." – (P2) "it's like when you're at, you know a group coffee shop or something and you're there to work and everyone around you or like finals week when everyone's really hustle-bustle and they have that mentality. You can feel that energy and put yourself in the same zone. But I don't necessarily what to talk to you about it yeah, that's a perfect comparison, that's how I deal. like this unspoken" – (P2)	hustle and bustle around me it's an unspoken understanding.	Motivated
Mind Set	"you know I will admit to that there are times when I have been an absolute pig where I have not recorded it because I don't want to look at it." – (P1) "I'm sure I'd be distracted by them." (if smartwatch tracked more) – (P1) "Exactly. Yeah, exactly. It's like, you know it's I don't want to be wearing my Fitbit while I'm eating a fry on my cheat day. Like there's something very guilt driven about that versus the Garmin is kind of almost I think of it as you put it on like you're putting on your workout shoes. I don't tend to wear my running shoes anytime but when I'm running (yeah) kind of like it's an item that I'm putting on for the workout as opposed to for my day." – (P2)	Not tracking to prevent guilt Too many tracking abilities can be distracting. I don't feel it necessary to wear a smartwatch all of the time because it is for working out I don't want to feel guilty	Guilt Distracting Guilty
Tracking	"part of what annoys me with Garmin and some of these others is the fact that there are a limited number of exercises that you can track so on starva it's ride, run, swim, walk, hike, alpine ski, backcountry ski, canoe, CrossFit, bike ride, elliptical, hand cycle, ice skate, in-line skating, kayak, kite, surf Nordic ski, rock climb, roller ski, row, snowboard, snowshoe, stair stepper, stand-up, paddle, surf vilo 'mobile ride, virtual ride, virtual run, weight training, wind surf, wheelchair workout whatever that means that's pretty arbitrary and yoga so that's all you can track with Strava and that doesn't do any calories MyFitnessPal is a food tracker only but it'll pick up the exercise stuff from Garmin." – (P1) "it's not really you know it's fine to have skiing or kayaking listed if that's place where you live all the time I mean I can do that almost three seasons but on the other hand that's not really in my daily exercise either Strava is straight-up competition so that's for people who are training races and it's really good for that ok the timing and yeah and you've also got competition against	There are a limited number of exercises that you can track that are not specific to my regimen. Strava is good for competition Tracking data is very time consuming because I have to manually make sure all the apps and tracking communicate accurately and if I change things manually I lose data. My smartwatch is	Limited Tracking Competition Time Consuming Convenience

	other people too so you can participate in virtual races. You want to train as a team then you can work together around that." – (P1) "that's yeah for me that could grab as much as half an hour of one of my days and by the time your finished monkeying around with all of your data making sure that it integrated the same way across all of your apps because MyFitnessPal does pick up motion and does screwy things with calories that aren't even related to what you might have burned so making sure that everything is accurate across the board and I use Garmin as my baseline mostly because that's what I'm using is a heartrate tracker so even I would really love two and a half hours where I kicked ass on my bike and got in 38 miles that I really would be nice to think I burned off thousand calories but I know that the six hundred and something is more accurate (um) so from that perspective I don't know how much more I want." – (P1) "Mm-hmm, Yeah I travel quite a bit and I actually tended not to wear it when I was flying because I do feel like I swell a little bit and it would get kind of uncomfortable because it was like that silicone or rubber material does pinch but I did wear it. Um, like during the day if I was doing an event to see how many steps I was getting and how active was natural that day and that kind of thing." – (P2) "I was thinking about in terms of watches I don't know if this has a space or not a space in it out there anyway is with watches it was interesting to be able to like if I went on a run with my dog yeah, you were able to see like if she was pulling me my heart rate would drop even if my speed increased so you were kind of able to see when the motivation and movement wasn't coming from yourself and it was like kind of you were being dragged in a way. So, which was interesting and then on the Garmin you were able to actually subtract anytime that you stopped, and it almost had a smartness so it could pause. So, like when I would run my friend's dog, they have a big Australian Shepherd, and I would take it on runs and he would like to want to stop and smell a stop sign. So, my running time when I'm really pushing might have been seven and a half minutes, but we actually took nine minutes. So, the Garmin had the intelligence to pull those brakes out or to stop the watch so I think that that is something that Was a cool feature that the nicer the watch is that you were able to do something like that." – (P2) Yeah, I just recently bought a watch for someone and we've since returned it which was interesting because he decided he wasn't a watch wearer and that the fad of it was cool, but that he didn't want it but right before he would get up to do an activity the watch would pop up and say what activity are you doing? And they had something like a hundred plus to choose from and it was like I'm walking at regular pace I'm walking an incline.	uncomfortable to travel with Aware of how active I was during a typical or busy work day. I would like my smartwatch to differentiate between activities including when I'm walking my dog or jogging alone. Smartwatch wearing is a fad I was impressed that the smartwatch had so many activities to choose from.	Accurate Comfort Activity Level Tracking variety Fad Tracking variety

	I'm walking with a dog. I'm walking with a stroller. I'm walking like so build like yoga hot yoga Bikram yoga So you could get very specific that they would be able to gauge better about how you're exerting yourself, which is cool. But anyway, other than that, I think we covered most things watches." – (P2)		
Future Smart Watch	"well if you go to the AI conferences and things which I do then I'm supposed the sky's the limit it's really a matter of how intrusive do you want to let something be? From my own perspective I'd say I don't really need much more than what I've got I'd like improved accuracy on things whether its calories count and burned and everything else maybe respiration would be nice to have tracked and body temperature simply because those are parts of performance but you know I think that at a certain point it becomes intrusive and almost you get too obsessed with the data. Particularly for those of us who aren't professional athletes." – (P1) "Its not that far off because people are putting our RI ID chips in their hands part of what I do with working with entrepreneurs and helping people find funding as I do a lot of work with tech and just the night before last I was at a dinner that was all tech and artificial intelligence and there's a whole lot of there are several studies going on in the university and Sweden of people embedding chips in their hands so that when they do things like let me go to work instead of holding up your badge to open the door you to hand and you can use your hand to make payments and things like that and that's a little little too much for me. (yeah yeah) but that's getting to be to the point where people are saying yeah so that's gonna be the future okay enough." – (P1) "and it's could and should so that's the whole thing with stuff like you know 3d printers are fascinating and I had been to an event last year where they had the next generation of 3d printer there and it was kind of cool because I don't know if you saw the terminator movies but there's a point at which the terminator won't die it keeps coming back in different forms of molten metal so no matter what you do to it comes back but the formation of it was what was interesting and this 3d printer basically and showed it to us in a steel case the furniture people who were using it and they put in a prototype for a new desk chair and by the time we left they basically just kind of rock up in the vault and there was a chair and I know that they have the capacity to do things like 3d print screen are cars and houses and everything else but at the end of the day does it make sense to do that no. Does that create some kind of just-in-time manufacturing that's really important? No. Some of the health check that I've seen has to do with diagnostics and everything and I've heard that that's kind of the future of where they're going to go with smartwatches but there are also a lot of data questions too so it's big question as to what does Garmin and Fitbit do what did they do with that data that they're collecting	The sky is the limit which could become intrusive and people can become obsessive. I don't want more I just want more accurate How far is too far with technology and when will people say that's far enough Does it make sense to make things so complex? Smartwatches are moving toward diagnostics and but its not okay for these smartwatches to have our personal data or to share it. There could be many benefits to having this information shared but only at my discretion and for beneficence.	Sky is the limit No limitations Obsessive Accuracy Too Far So Complex Diagnostic

	and you know by the time your insurance company gets your hands on it how do they treat that? A friend of mine as a personal injury lawyer and it's sort of interesting because he said that now they're able to use fitbit's and Garmin's and things in court they say look this person is no longer active at the level they were at before and frankly I would have really appreciated that when I had my accident easily that I spent a whole year being a vegetable after being a kick-ass so for the band it's interesting but it's also intrusive (yeah) I want my health insurance company do I want my employer I don't have but others do knowing that much about how active I am or I am not that kind of use of data I find a little bit disturbing an intrusive that's one for me too afraid or my time away I think oh I hate this I guess I better fess up to those M&Ms I show up in my face but that's from my use not for somebody else's." – (P1) "Um, I think I think I see them sticking around for quite some time and evolving. I kind of see them going the way I feel like a lot of technology goes is it goes from the first one comes out and then a new series of it comes out that make it a lot smaller and then all of a sudden the popular thing is to grow bigger again. It's kind of like the first iPod was so chunky and then it was the iPod mini and then it was like the iPod Square and then all of a sudden it's like no let's just make an iPad and it goes back to big so I could see it kind of going in the way. Where now, You know, they started off with these regular Fitbit's and then they made the really skinny bands and now they're going back up to Garmin how much Information can we fit in it? And I think what I see happening not necessarily in the near future, but right now to go on a run if I were SmartWatch, I would then, technology-wise, have my smart my SmartWatch my Apple pod headphones and my cell phone. So that's three pieces of equipment I'm required to take with me to get the information from my run and get through it the way I want it to. So, to me, it would make more sense to conjoin at least two of those. So, I could see them becoming whether it's like your air pods become a tracker and they're able to feel pulse at the base of your ears and they're able to see what your heart rate gets up to, umm wow I'm gonna go work at Apple! (Yeah) You know They don't then require their phone, but Garmin can only use music that you download to the Apple watch. So, I think that then you're missing out if you know the playlist that you have downloaded isn't what your mood is. Maybe you don't run as long so you don't have the music you want. So I could see it well being in the sense that it collaborates with something that we're already wearing. Maybe it's tracking in your shoes. There's a chip in your shoe that you run with or maybe it is just something like I think they used to have those braces that went around to your arms that you could put your phone in. So, I could see it going back to something like that where the band itself	smartwatches will continue to evolve. It would be beneficial to have one device that could do everything rather than having to bring multiple things to go workout. I want to be able to relate to their advertisement or see a device that would likely fit my lifestyle.	Personal Data Information Shared Evol Conjoin devices

	tracks your blood pressure your heart rate your altitude and things like that but I don't see them going anywhere. I think that they're great pieces of equipment to have in the world because it does motivate people that maybe wouldn't normally be motivated Um, I am NOT one who is motivated by their commercials or advertising that they've used for them. Mm-hmm, like when I see that I'm like seeing someone who's already incredibly fit like an athlete. I can't relate to them I have never been you know, a pro swimmer what winning gold medals and I've never been a top gymnast. So, I think advertising wise I would like to see more real-life stories. More so than an athlete who already has it together who has the top training equipment using it other than that. I think more apps are gonna come out that are also maybe gonna make it easier that you don't need such a big piece. I'm excited for what is to come because the sooner it moves out from bracelets the sooner, I'd be more inclined to trying it again." – (P2)		Advertisement
Privacy	"For example we get discounts if we fill out a certain quiz that gives you data that we do and everything else do we belong to a gym etc but I think the use of Fitbit and Smart Watch came up last year I don't remember so that sounds to me that the insurance companies are starting to think about how to dig into this data on a wholesale way yeah that makes wholesale for trends that's fine if they want my individual data the F word to you yeah really throw it with that." – (P1) "yeah not even like I have anything to hide I don't I just don't like that idea of somebody knowing that much about me." – (p1) "I don't want somebody knowing what time I went to bed and one time I got up and never mind what I did in between." - (P1) "I disabled my Garmin's connection to the health app my iPhone the one that comes with it. I decided you know what there's a limited amount I'm letting my data out and that doesn't get to go anywhere." – (P1) "I haven't read them. I saying that they retain the rights from what I read in that article to anonymize the data, but I haven't read any of them but as I understand it from the article I read they basically reserved the right Garmin, and they and they referenced Garmin in LA and Fitbit in particular that they can use the data in an anonymous way. I'm guessing that they reserve that right and there's not much you can do about that except safety I'm not going to use that yeah really bugs you but it's I don't think they can use the individual data without your flat-out consent." – (P1) "And I think that would be really cool because typically right now I have two apps going then I have three apps going when I run I have the MyFitnessPal if I'm using that that week and Under Armor app that tracks the pace	Im okay with smartwatches and companies use data as a whole but not for individual purposes. I limit my connection to apps to protect my information	Personal Data Protect information Sharing

	of my run and then my Spotify and then my phone counts my steps. I don't feel that it's very accurate, but it does count them. So, it would be really nice if it was more inclusive into one app. That was really, I mean, that would be something I would pay for it I would pay you know a small amount monthly for an app that tracked all the things that all of these separate apps track (Mm-hmm. Yeah) But as a single, you know female running in public paths mostly at night in the summer. I wouldn't be comfortable just running with my watch and not with my phone. So right now it's kind of like I do require all of these pieces all of these apps because nothing Involves safety security as well as the tracking that I'm looking for." – (P2) "Yeah, I think when I had my Fitbit there was a security breach and at the time the only thing I had in there was like my weight my height and probably like my billing zip code or something. So, for me, it wasn't too big of an issue, but the idea of having a piece of equipment that can track, you know If you I have a normal running path and if that got out into a public world where they knew every single day between 5:00 and 5:30 they could find me in the woods at this running path. You don't know what someone's willing to do with that kind of information. So, I think the more information they take from you there isn't much that someone can do knowing your blood pressure but there's a lot someone could do knowing that you're in the exact same trail inside a battlefield every day at night you know, that's kind of information I think is just as important to hide it as a credit card number because that's really easy to be picked up and Um have safety issues that way." – (P2) "Yeah, yeah like they tell parents. Um there was something on like The Today Show recently it was like parents were posting photos of their kids to show the progress of them every day and like second grade or something and I didn't know this but if you download the photo and upload it to a website you can pull exactly where that photo was taken. So which is super crazy. So, it's like you know, there was this one kid I think in Washington or something who has been kidnapped while his mom was taking these photos daily because he was able to know exactly where he would be at what time. So, you know, I think that in the world that we have today your location is just as huge of information as your health reports as your credit card number as your social security number because It seems to me a little bit that physical violence and security and safety is Becoming just as big of an issue as virtual safety. Yeah so now I'm scared to run.. no, laughter." – (P2)	Convenience and accuracy in one	Convenience Accuracy