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How Individual Traits Affect Type II Diabetics' Intentions to use Wearable Technologies

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HOW INDIVIDUAL TRAITS AFFECT TYPE II DIABETICS' INTENTIONS TO USE WEARABLE TECHNOLOGIES

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DEDICATION

I would like to dedicate this thesis to my paternal grandmother, who passed of diabetic complications and inspired me to continue my academic pursuits. She fought her disease and side effects with courage until the end of her fight. Thank you for never giving up on me.

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ABSTRACT

This research aims to uncover personality traits that affect type II diabetics' intentions to use wearable technologies. Survey data of 321 responses were used for data analysis to measure results. Data was analyzed using SPSS software to determine the effects of individual traits on current usage and purchase intentions of wearable technologies explored in the research. The individual traits studied were involvement, impulsivity, and self-consciousness. Smartwatches, smart socks, insulin pumps, and continuous glucose monitors were the wearables studied in this research. Results found that involvement has an impact on future purchase intentions of wearable technologies. However, impulsivity has partial statistical support to have an impact on current usage and future purchase intentions in regards to wearables. Finally, self-consciousness was found to have no significant impact on current usage and future purchase intentions of technologies.

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Chapter 1

INTRODUCTION

Introduction

Overall Purpose

Wearable technology is a rapidly growing industry that has paved its way to intersect with other fields, such as mining and oil refineries, manufacturing and production, and preventative health care measures. With each innovative wearable, the key is to eventually maneuver through multiple industrial sectors to achieve its maximum efficiency and optimization. The potential for wearables is accelerating for various purposes; however, the industry with the most potential is healthcare for remote patient monitoring, accessible health knowledge, and synchronal electronic medical records (Joszt). Remote patient monitoring can allow the users and physicians to effectively manage patients' health through manual or dynamic input of data and alerts or notifications of impending health risks. My research focuses on wearable technologies used by patients with type II diabetes, which is a relatively untapped research topic. Many previous studies discussed in the literature are based upon the technology acceptance model (TAM). Most of the existing literature has focused on financial access to wearables or personality traits, such as self-awareness, often using the TAM to predict these effects (Less 2003). My research will differ and add to this knowledge by measuring each individual's self-consciousness, involvement in healthcare, and impulsivity to determine one's likelihood to use various wearable technologies.

The technology acceptance model (TAM) bases its premise upon perceived usefulness and perceived ease of use, indicating prospective users of technology do not consider other factors (Davis 1986). However, analytical studies discussed in this research indicate that consumer adoption of wearables are impacted by personal thoughts and self-awareness of using such devices. Therefore, this paper, instead primarily focuses on the personality traits of individuals who may potentially affect their intentions to use wearable technologies to monitor their diabetes. The personality traits explored in this research project include involvement, impulsiveness, risk aversion, and self-consciousness.

What Is Wearable Technology

Wearable technology helps information harmoniously flow from the technology to the mobile application (Godfrey et. al 2018). With this feature, users' conditions are monitored at all times, and when necessary, the user receives a notification, showing the dynamic capabilities of wearable technologies in healthcare (Godfrey et. al 2018). These devices use sensors to gather information about body movement and current health conditions, such as total steps for the day or current heart rate (Lee and Lee 2018). Portable technology does not utilize any secondary support, rather sensors in the technology are essentially in some form attached to the human body, be it through direct touch such as smartwatches or clothing such as smart shirts (Gaff 2015).

Remote technology has the ability to go beyond its role as a mobile actor where the user wearing technology is the actor collecting solar energy or detecting the surrounding environment air quality (Mardonova and Choi 2018). Smart garments are a sector of this rising industry that are slowly progressing in comparison to other smart technologies, such as watches and glasses ("Smart Clothing and Body Sensors"). Smart clothing is currently being tested for possible use within professional sports leagues, such as Major League Baseball, in order to measure and maximize player performance (Leung). These wearables collect biomechanical and physiological data that is then monitored and analyzed by teams' research and development departments in order to optimize player potential while also maintaining a player's mental and physical health (Leung).

Industry Background

For the entire wearable revenue in 2018, diabetes provided 31.8%, the second largest revenue, with congestive heart failure being first at 34.2% (Curran 2018). In consideration of all types of wearable technologies, smartwatches are arguably the most popular as they account for 52% of the global wearable market share (Tilley 2016). Of all smartwatch users, 33% utilize this technology to track and monitor personal fitness levels to ensure they achieve specific goals (Fox, Duggan 2014). Perhaps the most popular smart technology is the Apple watch which provides haptic feedback -- vibrates to give alerts to wearers such as "stand up" or "take more steps" -- and holds the user accountable for his or her health (Chowdhry 2018). Wearable technologies can be utilized throughout the entire healthcare spectrum from clinical trials to remote monitoring. Also, the portable devices can help clinical trials slowly become affordable and more accurate as patients wear technology with accountability measures to ensure optimal success of the trial. Remote patient monitoring can reduce time and money because as patients monitor themselves more, the need for in-person visits decreases (Curran 2018). A recent Blue Cross Blue Shield study acknowledges that wearables are expected to decrease hospital costs by 16% in the next five years (Anthem 2017). Simply put, these devices provide many benefits and ought to be utilized to their full capacity.

Why Wearables Are Important

Wearables are important for use in health care because consumers can use these devices to help maintain their health as the physician recommends. Of all individuals diagnosed with diabetes, 90-95% have type II diabetes (Berry 2018). Because many diabetics often have other health issues that stem from diabetes, it's important to find new ways to help better one's health status. The intersection between diabetes and wearable technology is intriguing as the potential for technology to effectively monitor and prevent severe risks is growing rapidly. Wearable technologies strongly engage in the Internet of Things (IoT), which refers to storing data from wearables and mobile applications, as the growth of technology connects with previously existing servers and other sensors (P. Kumari et. al 2017). The alerts, notifications, and dynamic qualities of wearable technologies allow them to serve as security checkpoints while connecting doctors and patients in and outside the clinic. Extreme value lies in consistently bettering the network of devices that depend on personalizing services, detecting analytical patterns, processing information at remote locations, and motivating users to achieve specific goals. The IoT allows clinicians immense access into the habitual actions of their patients where they can remotely monitor patient health in an effective manner (P. Kumari et. al 2017). Most of the wearable devices connect to a user interface through an application that can be accessed by a smartphone, tablet, or desktop computer (Al-Ozairi 2018). These applications allow users to view and analyze their data and post updates on personal social media accounts to share information with their circles.

Other Health Issues Impacted

The most popular use of wearable technologies are through fitness trackers, but technologies can serve a variety of health purposes such as monitoring sleep cycles or optimizing one's physical health. Aside from the Fitbit Charge HR, other wearables such as Jawbone UP3 and Misfit Shine detect light and heavy sleep cycles, alert during light sleep cycles, and measure other health vitals ("New Wearable Sleep Trackers"). Also on the rise are mentally stabilizing applications that connect to wearable technology -- Muse headband for proper meditation, Gymwatch for effective exercising, and PIP for stress reduction.

The growth of technology in healthcare is rapid and innovative with new apps created by the second. The sensors in the wearable technologies have the power to revolutionize the field of healthcare fiscally, patient health physically, and overall better the healthcare industry.

Chapter 2

LITERATURE REVIEW

2.1 Health Involvement and Technology - Current Use and Purchase Intentions

Active participation in one's diagnosis can help an individual better understand and monitor his or her health conditions. Remaining actively involved as a patient helps doctors better understand the troubles one faces. Technology, in essence, serves to bridge that gap when patients are not in the clinical room for examination.

An observation study was conducted to determine if wearables can improve the quality of life of those with Parkinson's disease. Parkinson's disease, a neurodegenerative disorder, may cause individuals to experience stiff muscles and limbs, muscle tremors, or bradykinesia ("What Is Parkinson's?" 2019). The simplest wearables that were first created featured the ability to measure physical activity, which was key in this study. During the course of the study, those with Parkinson's disease were more active in comparison to their typical sedentary lifestyle; for example, their walking time decreased (Van Uem 2016). Further analysis noted three factors that limit participation: negative experiences with social withdrawal due to feeling embarrassed or embarrassing someone else; the unpredictability of motor, as well as non-motor symptoms; loss of energy and strength, which is at least partly reflecting fatigue (Van Uem 2016). As noted in the study, further research might include how to determine how patients with Parkinson's disease can exercise full autonomy to improve quality of life (Van Uem 2016). Because it is difficult to explain the relation between autonomic irregularities and a poor health-related quality of life (HRQoL), wearables could serve to bridge the communication gap (Van Uem 2016).

Two particular individuals further note the possible positive implications wearables can have on an individual's Parkinson's Disease (PD) diagnosis. A male, who is forty-seven years old, has had PD for nineteen years. He mentions his quality of life could be improved if he had the ability to self-interpret his health through measurements, which could provide him the opportunity to adapt his lifestyle as needed. Another male of the same age has been diagnosed with PD for thirteen years. He notes that having an on-going diagnostic would be beneficial as well as receiving health condition updates, recommendations based on current status, and medication reminders to his mobile device (Van Uem 2016).

Participants in this study were actively involved in determining what impact, if any, technologies served in helping to effectively monitor his or her diagnosis. Typically, patient involvement allows for him or her to better constantly monitor personal health conditions. With serious illnesses, patients are likely to sometimes feel depressed and hence, uninvolved, in their personal health conditions.

Monitoring and treating a health issue is crucial; therefore, staying involved with personal health can help better the outcome. However, with diagnosis of chronic or serious illnesses, severe and strong emotions are attached to one's mind at the time of diagnosis, which may cause one to not strictly adhere to one's care routine of one's health.

Self-management education refers to the systematic intervention that includes active participation of patients in self-monitoring and/or decision-making and equipping diabetic patients with necessary knowledge and skills to maintain self-care, handle crises, and enable crucial lifestyle changes. Within a typical year, patients with type II diabetes who miss more than 30% of their scheduled appointments are likely to have a higher HbA1c level by 7%, in comparison to those who adhere to their proper health care regimen (Al-Ozairi 2018). A study that included 752 diabetic patients showed that proper physician-patient communication increased patient's physical activity, proper self-care adherence, and foot care (Kumah 2018). Of all studies examined in a secondary literature review, five measured the effect of self-management on mental health, and all reported better mental health levels with introduction and use of the self-management model for his or her diagnosis (Kumah 2018).

As discussed, wearables were used to help monitor patients with PD and type II diabetes. Through both critical analyses, we see that patient involvement in personal health can provide positive benefits. Because these revolutionary technologies can hold patients accountable and involved, it's important to consider other possible facets of use with wearables.

With this research, I hypothesize the following:

H1. As consumers' involvement with diabetes as a personal health issue increases, the likelihood that they use wearable technology increases.

H2. As consumers' involvement with diabetes as a personal health issue increases, their intentions to purchase wearable technology in the future increases.

2.2 Impulsivity and Technology - Current Use and Purchase Intentions

Impulsive decision-making refers to displaying behavior where the individual has not given forethought or consideration of possible implications of his or her decisions ("Meaning of Impulsive" 2019). Receiving and gathering information to confirm reasons to make a purchase leads to faster decision-making and impulse purchasing (Lurie 2017). As an individual's impulsivity increases in regards to decision-making, he or she is also likely to use mobile technology more often (Lurie 2017). Once an impulsive individual is online, he or she experiences unplanned purchase behavior, eventually creating psychological impulsivity (Huang 2012). A study found that internet addiction leads to impulsive buying online, which affects mental instability (Chen 2016). Further studies show that there are undeniable parallels between internet and gambling addicts in terms of their impulsive decision-making (Chen 2016). Consumers who constantly surf the internet are more likely to exhibit dysfunctional and uncontrollable impulsive behaviors (Chen 2016).

For an example, consider a study that was conducted to determine if influence or impulse was the main driver behind an individual's actions (Gilman 2014). The sample consisted of fifty-one "well-functioning college students from near-optimal environments" who were all medically healthy (Gilman et. al 2014). Researchers observed various environments to measure impulsive cues. The following situations were observed that eventually proved impulse was a stronger cue for their decisions rather than the influence of others: choosing healthier snacks even though he or she is not familiar with the products because of the reference group, physical activity, alcohol intake (Gilman et. al 2014). "Generally, peoples' perceptions of others' behavior have been found to be strong predictors of behavior, and this is especially true when the 'others' are thought of as a peer group" (Gilman et. al 2014).

Impulsivity also plays a role in childhood and adolescent obesity (Field 2013). Obese individuals are more impulsive in comparison to those of "healthy" weight according to their height and BMI (Fields 2013). The behavior behind online impulsive decision-making and purchasing, reference group cues, and eating habits are tied together on the premise of engaging in behaviors without forethought of possible consequences. With consumer behavior being unpredictable, they might be inclined to purchase items that are trendy amongst their reference groups and opinion leaders. The reference group cues are also strongly aligned with impulsive eating as discussed in the studies because one's behavior might be dictated by the other's habits.

With this research, I hypothesize the following:

H3. As consumers' impulsivity increases, the likelihood that they use wearable technology increases.

H4. As consumers' impulsivity increases, their intentions to purchase wearable technology in the future increases.

2.3 Self-Consciousness and Technology - Current Use and Purchase Intentions

Self-consciousness refers to "being aware of oneself as an individual; uncomfortably conscious of oneself as an object of the observation of others" ("Self-Consciousness" 2019). In efforts to raise self-esteem, we, as individuals, tend to seek artifacts or fashions items, such as personal digital technologies, to express our personalities (Shinohara 2016). A 2016 study to measure self-consciousness while wearing wearables was conducted with a sample of 147 participants. These participants had various disabilities (blind, hard of hearing, deaf, visually impaired), and each participant was asked to log if they felt self-conscious or self-confident while wearing the wearable technology (Shinohara 2016). When first given assistive technologies, many felt self-conscious at their inability to understand and properly utilize such technologies for their benefit (Shinohara 2016). However, as familiarity with the technology increased, self-consciousness decreased (Shinohara 2016). In contrast, when he or she directly interacts with a more tech savvy individual, he or she becomes self-conscious (Shinohara 2016).

Furthermore, results indicated that individuals who received unwanted attention wearing or utilizing personal technologies possessed negative feelings and mindsets (Shinohara 2016). These participants explained that they experienced heightened negative feelings due to social settings, regardless if the they were alone or within a group (Shinohara 2016). The results of the study support the notion that self-consciousness and self-confidence create a social feedback loop, which heavily impacts an individual's behavioristic decisions (Shinohara 2016).

Because self-consciousness can impact self-management habits, another study was examined to determine if self-awareness played a role in self-management of health. The study included 105 type II diabetic participants, and each of their blood sugar levels was measured over the course of a week, six months, and twelve months (Lane 2000). Those involved also took the NEO personality inventory, which asked for each participant's age, sex, race, length of diabetes diagnosis, current medications, and, if any, experimental treatment (Lane 2000). In this study, individuals who had poorer control of their glycemic levels also experienced low self-consciousness levels as well as increased anxiety and depression. (Lane 2000). "Stronger tendencies to worry and experience other negative emotions may provide increased motivation for a patient with diabetes to follow the necessary self-care regimen and achieve a better clinical outcome," (Lane 2000).

Depression is increasing with the growing number of diabetes cases. Those who are depressed are less likely to care for themselves, manage their blood sugar properly, and live for a shorter amount of time (Al-Ozairi 2018). Type II diabetes is a burden on patients that is growing, nationally, at a fast rate, with over 100 million diabetic cases ("CDC Newsroom" 2017). Therefore, there comes a time to explore new ways to monitor patients that is easier for both the clinician and patient; hence, the idea of e-monitoring comes to mind. E-health refers to the use of electronic information with the internet in efforts to better one's personal health care. With this platform, patients have the opportunity to receive and access an abundance of health information maintaining confidentiality, leaving their home for the clinic, or feeling the public stigma associated with diabetes. Due to the immense information and access available to electronic information processing, patients can now utilize mobile devices to improve and monitor their health issues. As noted by Al-Ozairi in 2018, m-health refers to "the use of mobile devices such as phone, for health processes." The communication exchange has shown to be successful in motivating patients to improve their personal health care. As electronic commerce has grown into the healthcare sector, more opportunities have risen where patients can receive virtual care from clinicians in the luxury of their own home. With this innovative method, patients can establish self-care changes that are cheap and adaptable.

To further display the effects of depression in diabetics, another study was analyzed with 864 type II diabetics, all of whom completed a MINI diagnostic interview that measured psychological distress and depression (Dooren 2016). The traits were measured by the DS14 and Big Five personality questionnaires (Dooren 2016). The DS14 consists of 14 items that might create negative states, and the Big Five measures measures five main personality domains-- extraversion, agreeableness, conscientiousness, emotional stability and openness to experience (Dooren 2016). Within the study, it was found that type II diabetics were less extraverted, conscientious, agreeable and emotionally stable (Dooren 2016). Because these individuals displayed emotions in relation to depression and anxiety, they are said to be self-conscious (Dooren 2016). As mentioned previously, individuals who are self-conscious are likely to experience depression and anxiety, consequently suffering lower quality of mental health.

In efforts to suppress self-consciousness and feel confident, some individuals seek branded goods and services to increase their self-esteem, making them feel less self-conscious (Machin 2018). Those who share higher self-esteem levels are more likely to take better care of their mental and physical health (Machin 2018).

In short, as individuals wear these devices, others are naturally inclined to look towards other individuals. Hence, they become self-consciousness and are wary of using such devices, which only grows directly with suffering from depression.

With this research, I hypothesize the following:

H5. As consumers' self-consciousness increases, the likelihood that they use wearable technology decreases.

H6. As consumers' self-consciousness increases, their intentions to purchase wearable technology in the future decreases.

Chapter 3

SURVEY DESIGN

3.1 Data Collection and Sample

To test my hypotheses described in Chapter 2, I developed a survey in Qualtrics, administered the survey to a sample of men and women with type II diabetes, all 18 years of age or older. The survey vendor that I used was RN/SSI (Research Now), a premier survey sampling and data collection company. Boas and Hidalgo (2013) assert that Qualtrics is a crowdsourcing software that is recognized as a successful online surveying engine founded for academic research and available on the websites of many universities.

The first step in collecting my data was the creation of the questionnaire in Qualtrics. The complete survey is available in *Appendix A*. Next, I administered the online survey to residents in the United States through RN/SSI. From the participants, I collected 321 survey responses with 48% from women, 51.1% responses from men, and .9% who selected prefer not to answer, all of whom are type II diabetics. The age range of these participants varied from 20 to 85 years old. Exactly 24% of the respondents are ethnic minorities, consisting of Hispanic or Latino, African-American/Black, and Asian/Pacific Islander; however, whites/caucasians formed 74.1% of the overall respondents. More than half of the participants received degrees beyond a high school education at 55.8% while only .3% of the individuals did not complete their high school education/receive their GED. Less than a quarter of the participants are within the

$100,000 and above income level, precisely 23.7%. However, 32.7% of participants' income levels are less than $50,000 per year.

Further analysis of the United States sample showed over half of the participants are married and 63.9% have children. A quarter of the survey respondents fall into the 55-64 age range. Often those who fall within the 45 to 64 years old age range are the most diagnosed group for type II diabetes (Cherney 2015)**.** These demographic factors are the most common amongst the surveys across various research projects. They allowed me to draw further conclusions and analyze what influence, if any, their age, gender, or ethnicity had on their usage rates and future purchase intentions. A complete demographic summary of the sample is shown in Table 1.

Demographic Factor	***% of sample***
Age: 18-24	2.5%
Age: 25-34	17.8%
Age: 35-44	17.1%
Age: 45-54	22%
Age: 55-64	25.9%
Age: 65-74	12.4%
Age: 75 or older	2.4%
Age: Prefer not to say	.3%
Gender: Male	51.1%
Gender: Female	48%
Gender: Prefer not to answer	.9%
Ethnicity: White/Caucasian	74.1%
Ethnicity: Hispanic or Latino	8.4%
Ethnicity: Asian/Pacific Islander	4.1%
Ethnicity: African-American/Black	11.5%
Ethnicity: Other	1.9%
Education: Some high school	.3%
Education: High school graduate, or the equivalent (GED)	11.5%
Education: Some college	22.1%

Education: Trade/technical/vocational training	8.4%
Education: College graduate	37.7%
Education: Some postgraduate work	1.9%
Education: Post graduate degree	18.1%
Income: less than 29,999	12.8%
Income: 30,000-39,999	11.5%
Income: 40,000-49,999	8.4%
Income: 50,000-59,999	14.0%
Income: 60,000-69,999	9.3%
Income: 70,000-79,999	7.8%
Income: 80,000-89,999	5.9%
Income: 90,000-99,999	6.5%
Income: 100,000 and above	23.7%
Marital Status: Yes	54.8%
Marital Status: No	45.2%
Kids: Yes	63.9%
Kids: No	36.1%

Table 1: Demographics of Survey Respondents

RN/SSI was used to collect responses from types II diabetics throughout the nation because they recruit a representative sample and utilize quality controls, providing quality data results for the researcher. Research Now also ensures that participants are easily compensated for their time and effort once they have successfully completed the survey. Each participant was paid approximately $3.73 for their time and effort on the survey. Midway through the survey, participants completed an attention check and were prompted to select a specific answer. If the specified answer was not selected, the respondent was automatically rerouted to the end of the survey. The attention check served as a quality control to ensure survey data integrity.

Prior to sending the survey to participants, an IRB application was submitted to the University of Mississippi IRB for approval to begin data collection. The University of MIssissippi IRB approved the application as exempt under 45 CFR 46.101(b)(#2). The link to complete the survey was sent to the sample described above in an email that explained both the survey and the purpose of the study. The body of the email may be found in *Appendix B.*

The survey began by ensuring the participant was 18 years of age. If the participant was not 18 years of age, the survey automatically rerouted him or her to the end and did not allow the participant to continue further. After consent, the respondent was given an overview of wearable technology and asked if he or she currently used wearable technologies to monitor his or her diabetes, and if so, which technologies were used.

The survey examined four types of wearable technologies -- smartwatches, smart socks, continuous glucose monitors (CGM), and insulin pumps. These specific technologies were chosen because they allow patients to directly access their health, provide preventative care, and help management of chronic illnesses (Piwek et. al 2016). Generally, diabetic smartwatches measure total distance walked, heart rate, and glucose levels of the individual (Draper 2018). Smart socks, a relatively new type of wearable technology, can detect foot ulcers, which is often a complication of diabetes ("Diabetic Foot Monitoring"). Continuous glucose monitors tracks one's blood glucose levels at all times, so patients are able to take their levels into consideration when making decisions about their meals ("Continuous Glucose Monitoring" 2017). The CGM allows for the individual to access their health information immediately as well as sync the information to a computer or smart device mobile application to gather more insights ("Continuous Glucose Monitoring" 2017). Insulin pumps, which are small, computerized technical devices, constantly deliver small dosages of short-acting insulin; the rates are typically set with the physician first (Tamboli 2019).

Before answering questions specific to each technology, the survey displayed an overview of the technology and its prospective uses for a diabetes diagnosis. Participants also answered several behavioristic and demographic questions for each technology. These are discussed in section 4.2.

3.2 Measuring Independent Variables

The hypotheses primarily focus on the social aspects of an individual's personality, in terms of how it affects their current usage and purchase intentions of wearable technologies. The independent variables for the study were the measured personality aspects, including general involvement, impulsivity, and self-consciousness. These three variables were measured using a seven-point Likert scale where 1 = strongly disagree and 7 = strongly agree. Two statements were included for each personality trait. Each independent variable was interpreted by computing the average value of both statements. The statements used for involvement ($r = .47$, $p < .001$), impulsivity ($r = .60$, $p < .001$), and self-consciousness ($r = .37$, $p < .001$) displayed data that proved the statements were not properly correlated to provide significant data results.

Involvement

- Diabetes is a health issue that is personally relevant to me.
- I am very involved with diabetes as a health issue.

Impulsivity

- I buy things without thinking.
- I consider myself an impulse purchaser.

Self-consciousness

- I'm self-conscious about the way I look.
- I'm concerned about what other people think of me.

3.3 Measuring Dependent Variables

3.3.1 Purchase Intentions

As previously mentioned, three hypotheses measure each personality trait with current usage and the other three hypotheses measure each personality trait with purchase intentions. Two dependent variables were measured in the survey: current usage and purchase intentions. However, only for purchase intentions, were there multiple statements used to measure respondents' likeliness to purchase a specified wearable technology. The value of purchase intentions, per technology, was measured and interpreted by computing the average value of both statements for each type of wearable technology discussed in the study. The questions that were asked showed strong correlation (smartwatch: $r = .72$; $p < .001$; smart socks: $r = .78$; $p < .001$; CGM: $r = .71$, $p < .001$; insulin pump: $r = .78$, $p < .001$). These three variables were measured using a seven-point Likert scale where 1 = very unlikely or not probable, respective to their questions, and 7 = very likely or very probable, also depending on the question asked.

Smartwatch

- How likely would you be to use smartwatches in the future?
- How probable would you be to use smartwatches in the future?

Smart socks

- How likely would you be to use smart socks in the future?
- How probable would you be to use smart sock in the future?

Continuous glucose monitors (CGM)

- How likely would you be to use continuous glucose monitors in the future?
- How probable would you be to use continuous glucose monitors in the future?

Insulin pumps

- How likely would you be to use insulin pumps in the future?
- How probable would you be to use insulin pumps in the future?

3.3.2 Current Usage

The question in the survey used to measure current usage is, "Do you currently use [wearable technology] to monitor your diabetes?" Because this was a dichotomous question, a response as "yes" was equal to 1 whereas a "no" response was coded to 2. The most currently used technology amongst type II diabetics are smartwatches at 18.7% whereas the least popular are smart socks at 92.5%. A complete table showing current usage of the four wearables explored in the survey can be found in Table 2.

	Currently **DO** use	Currently **DO NOT** use
Smartwatches	18.7%	81.3%
Smart socks	7.5%	92.5%
Continuous Glucose Monitors (CGM)	15.3%	84.7%
Insulin Pumps	14.3%	85.7%

Table 2: Current Usage Rates by Wearable Type

3.3 Analytical Procedure Description

To analyze results, I used the statistical software SPSS to conduct descriptive tests, frequencies tests, and regressions - binary and logistic. The current version of SPSS available to students, faculty, and staff at the University of Mississippi is version 25; therefore, SPSS 25 was used. In order to measure the effect on the dependent variables, current usage and purchasing intentions, I conducted linear regressions within SPSS to find relationships with various personality traits. Linear regression tests allow me to look at the dependent variable as continuous and dichotomous. The regressions showed the relationship between the independent and dependent variables, which were either positive or negative and showed varying relationship strengths. The results of the linear regressions are presented in **Chapter 4**, and these results provide a more thorough examination of the relationships between the independent variables (involvement, impulsivity, risk aversion, and self-consciousness) and the dependent variables (current usage and purchase intentions).

Chapter 4

RESULTS

In this section, the results from binary and linear regressions are given and interpreted for social and external variables.

4.1 Analysis of Social Variables

Binary regression results revealed that involvement did not have a significant effect on whether respondents currently use a smartwatch (B = -.063, S.E. = .066, p = .341), smart socks (B = -.051, S.E. = .098, p = .599), continuous glucose monitors (B = -.021, S.E. = .071, p = .763), or insulin pumps (B = -.026, S.E. = .073, p = .719). Thus, H1 is not supported.

	B	SE	significance
Smartwatch	-.063	.066	.341
Smart Socks	-.051	.098	.599
Continuous Glucose Monitors	-.021	.071	.763
Insulin Pumps	-.026	.073	.719

Table 3: Effects of Involvement on Likelihood of Current Usage

Linear regression results revealed that there was a significant positive effect of involvement on respondents' purchase intentions for smartwatches (B = .246, t = 4.218, S.E. = .058, and p < .001), continuous glucose monitors (B = .245, t = 4.716, S.E. = .052, and p < .001), and insulin pumps (B = .220, t = 4.491, S.E. = .049, and p < .001), such that intentions increased as involvement increased. Involvement also proved to be somewhat significant on participants' intentions to purchase smart socks (B = .110, t = 2.169, S.E. = .051, and p = .031). Therefore, H2 is fully supported.

	unstandardized B	t	Coefficient std. error	significance
Smartwatches	.246	4.218	.058	.000
Smart socks	.110	2.169	.051	.031
Continuous glucose monitors (CGM)	.245	4.716	.052	.000
Insulin Pumps	.220	4.491	.049	.000

Table 4: Effects of Involvement on Purchase Intentions

Binary regression results revealed that impulsivity had a significant effect on whether respondents currently use a smartwatch (B = -.305, S.E. = .105, p = .004) and smart socks (B = -.339, S.E. = .151, p = .025), such that their usage likelihood increases as their impulsivity increases. However, regression results showed that impulsivity did not have an effect on whether respondents currently use continuous glucose monitors (B = -.130, S.E. = .109, p = .235) and insulin pumps (B = -.154, S.E. = .112, p = .170), which shows that H3 is partially supported - only by smartwatches and smart socks.

	B	SE	significance
Smartwatches	-.305	.105	.004
Smart Socks	-.339	.151	.025
Continuous Glucose Monitors	-.130	.109	.235
Insulin Pumps	-.154	.112	.170

Table 5: Effects of Impulsivity on Likelihood of Current Usage

Linear regression results revealed that there was a significant positive effect of impulsivity on respondents' purchase intentions for continuous glucose monitors (B = .242, t = 3.118, S.E. = .078, and *p* = .002) and insulin pumps (B = .201, t = 2.747, S.E. = .073, and *p* = .006), such that intentions increased as impulsivity increased. However, impulsivity proved to not have a significant impact on survey participants' intentions to purchase smartwatches (B = .078, t = .922, S.E. = .085, *p* = .357) and smart socks (B = .059, t = .800, S.E. = .078, *p* =.424. Hence, H4 is partially supported by continuous glucose monitors and insulin pumps.

	unstandardized B	t	Coefficients std. error	significance
Smartwatches	.078	.922	.085	.357
Smart socks	.059	.800	.074	.424
Continuous glucose monitors (CGM)	.242	3.118	.078	.002
Insulin Pumps	.201	2.747	.073	.006

Table 6: Effects of Impulsivity on Purchase Intentions

Binary regression results revealed that self-consciousness did not have a significant effect on whether respondents currently use a smartwatch (B = -.116, S.E. = .100, *p* = .245), smart socks (B = -.042, S.E. = .131, *p* = .748), continuous glucose monitors (B = -.034, S.E. = .101, *p* = .738), or insulin pumps (B = .078, S.E. = .101, *p* = .439). Thus, H5 is not supported.

	B	SE	significance
Smartwatches	-.116	.100	.245
Smart Socks	-.042	.131	.748
Continuous Glucose Monitors	-.034	.101	.738
Insulin Pumps	.078	.101	.439

Table 7: Effects of Self-Consciousness on Likelihood of Current Usage

Linear regression results revealed that there was a significant positive effect of self-consciousness on respondents' purchase intentions for continuous glucose monitors (B = 2.91, t = 4.191, S.E. = .069, and $p < .001$) and insulin pumps (B = .424, t = 6.777, S.E. = .063, and $p < .001$), such that intentions increased as self-consciousness increased. Self-consciousness also proved to be significant on participants' intentions to purchase smartwatches (B = .170, t = 2.165, S.E. = .079, and $p = .031$) and smart socks smartwatches (B = .203, t = 2.964, S.E. = .068, and $p = .003$). However, as the data indicates as self-consciousness increased, self-consciousness also increase; this is the opposite of the hypothesis. Therefore, H6 is not supported.

	unstandardized B	t	Coefficients std. error	significance
Smartwatches	.170	2.165	.079	.031
Smart socks	.203	2.964	.068	.003
Continuous glucose monitors (CGM)	2.91	4.191	.069	.000
Insulin Pumps	.424	6.777	.063	.000

Table 8: Effects of Self-Consciousness on Purchase Intentions

Chapter 5

GENERAL DISCUSSION

In the first section of this chapter, I will summarize and further analyze the results mentioned in Chapter 4. I will also interpret these results and discuss their correlation with the hypothetical frameworks mentioned in the introduction and literature review. Then, I will discuss the limitations and obstacles experienced throughout the process of conducting research for and writing this work. Finally in the last section, I explain the future implications of this thesis for future research on wearable technologies for type II diabetics.

The prevalence of diabetes is ever growing due to the massive increase in cases since 1980 (Chatterjee, Khunti, Davies 2017). On a global scale, the number of type II diabetes cases have increased by 60% in women whereas they have doubled for men (Hackethal 2016). Diabetics must not only be wary of their glucose levels but also they must be wary of their bone health because type II diabetics are at higher risk for bone fractures (Leslie 2012). In addition to bone fractures, diabetics are more prone to cardiovascular and kidney disease, neuropathy, and blindness (Deshpande, Harris-Haynes, Schootman 2008). Moreover, type II diabetics' mortality rate, in comparison to non-diabetics, is 15% higher, further proving the massive effect this chronic illness can cause upon individuals (Chatterjee, Khunti, Davies 2017). Diabetes was the sixth leading cause of death in 2002, with more than 70,000 cases stating diabetes as the underlying reason for death (Deshpande, Harris-Haynes, Schootman 2008).

Type II diabetes can be prevented if individuals manage their physical health as well as glucose levels (Chatterjee, Khunti, Davies 2017). Both primary concerns can be alleviated with use of wearable technologies such as smartwatches, which was mentioned previously in this article. The most basic diabetic smartwatches have the ability to track how far an individual walks, progression of heart rates, and measurement of glucose levels (Hosseini and Tabasi 2015). Smartwatches have been introduced within the wearable industry for years; however, a newer type of wearable technology studied in this research are smart socks. Smart socks detect pressure changes in the foot and foot ulcers, which are both likely for diabetics (Perrier et. al 2014). Insulin pumps and continuous glucose monitors are both wearable technologies used to monitor and essentially better manage one's type II diabetes diagnosis. Because type II diabetics require larger amounts of insulin, individuals may not be able to gain long term control of their insulin levels, an issue the insulin pump alleviates with the bolus dosage of insulin (Bode 2010). In a study of type II diabetics who have been diagnosed from two to nineteen years, 90% of the individuals were compliant in using their CGM device and had reduced HbA1c levels (Taylor, Thompson, Brinkworth 2018).

This research aims to uncover type II diabetics' possible intentions to adopt wearable technologies in efforts to better monitor and manage their diagnoses. According to data results, H1 and H5 were not supported, which shows that involvement and self-consciousness had no impact on likelihood of current usage. However, involvement and self-consciousness heavily impact future purchase intentions of wearable technologies, which prove that H2 and H6 are fully supported. Lastly, impulsivity had partial a effect on likelihood of current usage as well as future purchase intentions; therefore, H3 and H4 are partially supported.

The hypotheses for purchase intentions are fully supported when considering involvement and self-consciousness. The larger t value was shown along self-consciousness, and a greater t value indicates a stronger response for that specified variable. Following, consumers' involvement with diabetes as a health issue was a stronger hypothesis, according to data results, than consumers' impulsivity. Simply put, the order of importance of personality traits to the average type II diabetic individual is self-consciousness, involvement, and impulsivity.

5.1 Theoretical Implications

Previous academic literature primarily considers access and perceived use of wearable technologies. In contrast, my research takes a deeper look into the personality and mindset of the type II diabetic. While perceived use may account for some adoption of technologies, some studies do not take into account why some find technologies harder or easier to use, and numerous traits such as involvement can impact that decision. Impulsive consumers are often the first that come to a marketer's mind; however, involvement and self-consciousness may be the first traits that a health scientist will immediately think of.

5.2 Public Health Implications

In the realm of public health, epidemiology is a premise into understanding how diseases affect different groups of individuals and how they can impact the population overall. Type II diabetes impacts millions of individuals, and their disease is a precursor to other illnesses as mentioned previously. Therefore, the importance in determining better methods to manage a type II diabetes diagnosis is vital. While continuous glucose monitors and insulin pumps are popular technologies used in monitoring diagnoses, individuals and health professionals should promote and acknowledge the positive implications in using smartwatches and smart socks. With the results of this research, practitioners ought to consider the purchase intention differences amongst different ethnic groups. For example, because African-Americans are more prone to being diagnosed with type II diabetes than Caucasians, African-Americans might have higher purchase intentions than other groups. In the study, participants were asked to acknowledge other health issues they have such as neuropathy or hypertension. Public health practitioners ought to elaborate on these results by using a graphic ratings scale. Specifically, it would be beneficial for the researcher to provide a graphic ratings scale for each of the five most common illnesses caused as a results of diabetes. In doing such, a public health practitioner might have more insight to determine the full impact of diabetes on an individual's health, giving a clearer picture of their diagnosis progression.

5.3 Overall Implications

As aforementioned, the technology acceptance model (TAM) states that perceived usefulness and ease of use are two strong determinants in the adoption of technology by consumers (Davis 1986). However, the respondents for this survey were given options from perceived usefulness to personality traits to effectively determine the role they played in technology adoption. Because the data does not show that perceived usefulness and ease of use affect current usage and purchase intentions, it is assumed the premises of the TAM are not as pertinent to today's modernized society. However, the self-management model discusses that active monitoring of one's personal health conditions. As mentioned in the literature review studies, the SME was found to be beneficial in improving the health conditions and quality of life for Type II diabetics. Further, H2, which measures involvement and purchase intentions, is the second strongest hypothesis in the data analysis. This proves the shift that is occuring from considering use of technology to personality traits affecting use of technologies.

Moreover, much discussion of technology adoption is based upon the practicality or cost of such devices. However, as shown in this survey data analysis, it is clearly seen, through extremely strong data support, that personality traits are the biggest drivers behind adoption of technology.

5.3 Limitations and Future Research

My research was not without flaws, which I will explain to help future researchers within any realm of this topic. For the questions in regard to age, height, and weight, one respondent said "prefer not to say" in the text box provided. A better method of asking such questions should be utilized to avoid this situation. Furthermore, only one survey vendor and data source was used in analysis, whereas more sources would provide a better picture and analyses. Lastly, 24% of the respondents are of ethnic minorities, so a rather large portion of the sample are of one ethnicity. Hence, the results might possibly be skewed as such.

Future research should measure various types of a technology as each independent survey of their own. For example, it would be beneficial to describe various types of smartwatches for type II diabetics to determine which features are most sought after in monitoring and managing a patient's diagnosis, and the same could be done for smart socks, insulin pumps, and continuous glucose monitors. Furthermore, social pressure as a personality trait should be measured in the future. Because many who are diagnosed with the same illness tend to confide in one another, they might make decisions because others are doing as such. With a type II diabetes diagnosis, a patient has a delicate state of mind and can be swayed based on his or her reference group.

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Appendix A
SURVEY

Q1 Are you at least 18 years old?

- ❍ Yes (1)
- ❍ No (2)

Skip To: End of Survey If Are you at least 18 years old? = No

Q2 Do you have Type 2 Diabetes?

- ❍ Yes (1)
- ❍ No (2)

Skip To: End of Survey If Do you have Type 2 Diabetes? = No

Q3

Consent to Participate in Research

Title: Individual Perceptions of Wearable Technology

Investigator	**Faculty Sponsor**
Ashna Sethi	Christopher Newman, Ph.D.
Department of Marketing	Department of Marketing
238 Holman Hall	238 Holman Hall
University of Mississippi	University of Mississippi
University, MS 38677	University, MS 38677
(601) 622-5053	(662) 915-5820

The purpose of this study The purpose of this research is to determine how diabetics use, if they do, technology. We want to know how diabetics use wearable technology to assist their diabetic diagnosis in enhancing their quality of life. You will take a survey that asks about your current and future intentions to use technology to improve your quality of life as a diabetic. The latter part of the survey are demographics--age, education, and income. You will not be asked for your name or any other identifying information.

Costs and Payments

This survey will take a total of 15 minutes or less.

Risks and Benefits
There are no associated risks with taking this survey. In addition to contributing to our knowledge about consumer behavior, you will be given approximately 4 dollars' worth of points towards your account for successful completion of the survey.

Confidentiality
Your name will be in no way associated with your responses. The only information that will be on your survey will be some general demographic information and the unique yet anonymous identifier you choose to give yourself for the sole purpose of payment. Therefore, we do not believe that you can be identified from any of your responses.

Right to Withdraw
You do not have to take part in this study. Whether or not you choose to participate or to withdraw will not cause you to lose any benefits to which you are entitled. Inducements, if any, will be prorated based on the amount of time you spent taking the survey. The researchers may terminate your participation in the study without regard to your consent and for any reason, such as protecting your safety and protecting the integrity of the research data. If the researcher terminates your participation, any inducements to participate will be prorated based on the amount of time you spent on the study.

IRB Approval
This study has been reviewed by The University of Mississippi's Institutional Review Board (IRB). If you have any questions, concerns, or reports regarding your rights as a participant of research, please contact the IRB at (662) 915-7482 or irb@olemiss.edu.

Statement of Consent
I have read and understand the above information. By completing the survey I consent to participate in this study. I have read the above information. I have been given a copy of this form. I have had an opportunity to ask questions, and I have received answers. I consent to participate in the study. Furthermore, I also affirm that the experimenter explained the study to me and told me about the study's risks as well as my right to refuse to participate and to withdraw.

Page Break

Q4

Please make sure you carefully read and understand the definition below before proceeding with the survey.

Wearable technologies are directly worn as clothing or accessories that track health data and/or vital signs and location that allow the user to control bodily functions consciously. Wearables contain sensors that give the user access to a wide range of information from heart rate to number of steps completed in a day.

Different types of wearables support different activities from maintaining a healthy fitness plan to preventing a negative event. Information consistently flows from the device to the user, allowing the user to constantly monitor his or her health on the device. This has helped wearables gain popularity worldwide.

Q5 Have you ever used wearable technologies for diabetes?

❍ Yes (1)

❍ No (2)

Display This Question:

If Have you ever used wearable technologies for diabetes? = Yes

Q5.1 Which wearable technologies have you used to monitor and/or control your condition?

____

Page Break

Q6

DIRECTIONS:

You are going to be given a brief description of 4 different wearable technologies. You'll then be asked a series of questions about each. While the questions for each technology are the same, it is important that you answer them based only on the specific technology that is being asked about.

Page Break

Q7

DIABETIC SMARTWATCHES

Diabetic smartwatches measure glucose levels painlessly through a sensor and do not require a blood sample. The watch measures steps taken and calories burned in addition to offering unlimited glucose measures in a 30-day period. It even sends

you reminders when you haven't measured your glucose levels in a certain amount of time.

Page Break

Q8
DIRECTIONS:
Please consider the following questions about <u>diabetic smartwatches</u> and answer accordingly.

Q9 Are you **<u>aware</u>** that **<u>diabetic smartwatches</u>** are currently available?

- ❍ Yes (1)
- ❍ No (2)

Q10 Have you **<u>ever</u>** used a **<u>diabetic smartwatch</u>**?

- ❍ Yes (1)
- ❍ No (2)

Q11 Do you **<u>currently</u>** use a **<u>diabetic smartwatch</u>** to monitor your diabetes?

- ❍ Yes (1)
- ❍ No (2)

Page Break

Q12 Please describe the extent to which the following factors influenced your decision to use or not use **<u>diabetic smartwatches</u>** to monitor your diabetes.

	Not Important (1)	2	3	4	5	6	Very Important (7)
Initial acquisition cost of technology	○	○	○	○	○	○	○
Recurring cost of technology	○	○	○	○	○	○	○

Usefulness	○	○	○	○	○	○	○
Ease of use	○	○	○	○	○	○	○
Knowledge of how to use technology	○	○	○	○	○	○	○

Q13 Please describe the extent to which the following factors influenced your decision to use or not use **diabetic smartwatches** to monitor your diabetes.

	Not Important (1)	2	3	4	5	6	Very Important (7)
How others would perceive me when I'm wearing the technology	○	○	○	○	○	○	○
Knowledge of where to purchase technology	○	○	○	○	○	○	○
Financial support from insurance	○	○	○	○	○	○	○

Financial support from government programs	○	○	○	○	○	○	○

Q14 How effective do you believe diabetic smartwatches are at monitoring your diabetes?

- ❍ Not at all effective (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very Effective (7)

Q15 How much do you trust diabetic smartwatches to monitor your diabetes?

- ❍ Not at all (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very Much (7)

Q16 What is your overall attitude toward diabetic smartwatches?

- ❍ Very Negative (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very Positive (7)

Q17 How likely would you be to use **diabetic smartwatches** in the future?

- ❍ Very Unlikely (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very Likely (7)

Q18 How probable would you be to use **diabetic smartwatches** in the future?

- ❍ Not Probable (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very Probable (7)

Page Break

Q19

SMART SOCKS

Smart socks utilize sensors that detect changes in temperature to determine whether there is inflammation in your feet, a problem that people with diabetes can experience. Users can connect to a mobile app to receive accurate information and alerts about possible injuries such as foot ulcers.

Page Break

Q20

DIRECTIONS:

Please consider the following questions about smart socks and answer accordingly.

Q21 Are you **aware** that **smart socks** are currently available?

- ❍ Yes (1)
- ❍ No (2)

Q22 Have you **ever** used **smart socks**?

❍ Yes (1)
❍ No (2)

Q23 Do you **currently** use **smart socks** to monitor your diabetes?
❍ Yes (1)
❍ No (2)

Page Break

Q24 Please describe the extent to which the following factors influenced your decision to use or not use **smart socks** to monitor your diabetes.

	Not Important (1)	2	3	4	5	6	Very Important (7)
Initial acquisition cost of technology	○	○	○	○	○	○	○
Recurring cost of technology	○	○	○	○	○	○	○
Usefulness	○	○	○	○	○	○	○
Ease of use	○	○	○	○	○	○	○
Knowledge of how to use technology	○	○	○	○	○	○	○

Q25 Please describe the extent to which the following factors influenced your decision to use or not use **smart socks** to monitor your diabetes.

	Not Important (1)	2	3	4	5	6	Very Important (7)
How others would perceive me when I'm wearing the technology	○	○	○	○	○	○	○
Knowledge of where to purchase technology	○	○	○	○	○	○	○
Financial support from insurance	○	○	○	○	○	○	○
Financial support from government programs	○	○	○	○	○	○	○

Page Break

Q26 How <u>effective</u> do you believe **<u>smart socks</u>** are at monitoring your diabetes?

- ❍ Not at all effective (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very Effective (7)

Q27 How much do you trust **<u>smart socks</u>** to monitor your diabetes?

- ❍ Not at all (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very much (7)

Q28 What is your overall attitude toward **<u>smart socks</u>**?

- ❍ Very Negative (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very Positive (7)

Q29 How likely would you be to use **<u>smart socks</u>** in the future?

- ❍ Very Unlikely (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very Likely (7)

Q30 How probable would you be to use **smart socks** in the future?

- ❍ Not Probable (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very Probable (7)

Page Break

Q31

CONTINUOUS GLUCOSE MONITORS

A continuous glucose monitor (CGM) works through a tiny sensor inserted under your skin, usually on your belly or arm. The sensor measures the glucose found in the fluid between your cells. The sensor tests glucose every few minutes and a transmitter wirelessly sends the information to a monitor.

Page Break

Q32

DIRECTIONS:

Please consider the following questions about continuous glucose monitors (CGM) and answer accordingly.

Q33 Are you **aware** that **continuous glucose monitors** are currently available?

- ❍ Yes (1)
- ❍ No (2)

Q34 Have you **ever** used a **continuous glucose monitor**?

- ❍ Yes (1)
- ❍ No (2)

Q35 Do you **currently** use a **continuous glucose monitor** to monitor your diabetes?

❍ Yes (1)
❍ No (2)

Page Break

Q36 Please describe the extent to which the following factors influenced your decision to use or not use **continuous glucose monitor** to monitor your diabetes.

	Not Important (1)	2	3	4	5	6	Very Important (7)
Initial acquisition cost of technology	○	○	○	○	○	○	○
Recurring cost of technology	○	○	○	○	○	○	○
Usefulness	○	○	○	○	○	○	○
Ease of use	○	○	○	○	○	○	○
Knowledge of how to use technology	○	○	○	○	○	○	○

Q37 Please describe the extent to which the following factors influenced your decision to use or not use **continuous glucose monitor** to monitor your diabetes.

	Not Important (1)	2	3	4	5	6	Very Important (7)
How others would perceive me when I'm wearing the technology	○	○	○	○	○	○	○
Knowledge of where to purchase technology	○	○	○	○	○	○	○
Financial support from insurance	○	○	○	○	○	○	○
Financial support from government programs	○	○	○	○	○	○	○

Page Break

Q38 How effective do you believe **continuous glucose monitors** are at monitoring your diabetes?

- ❍ Not at all effective (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very effective (7)

Q39 How much do you trust **continuous glucose monitors** to monitor your diabetes?

- ❍ Not at all (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very much (7)

Q40 What is your overall attitude toward **continuous glucose monitors**?

- ❍ Very Negative (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very Positive (7)

Q41 How likely would you be to use **continuous glucose monitors** in the future?

- ❍ Very Unlikely (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very Likely (7)

Q42 How probable would you be to use **continuous glucose monitors** in the future?

- ❍ Not Probable (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very Probable (7)

Page Break

Q43

INSULIN PUMPS

Insulin pumps easily distribute insulin dosages in two ways: continuous or rapid. The dosages are separated into basal (delivered throughout 24 hours to maintain normal glucose levels between meals and overnight) and bolus (to assist with levels after consuming carbohydrates). Doses are delivered through a flexible plastic tube. With the aid of a small needle, this tube is inserted through the skin into the fatty tissue and is taped in place. The device mimics the body's normal release of insulin.

Page Break

Q44

DIRECTIONS:

Please consider the following questions about insulin pumps and answer accordingly.

Q45 Are you **aware** that **insulin pumps** are currently available?

❍ Yes (1)
❍ No (2)

Q46 Have you **ever** used **insulin pumps**?
❍ Yes (1)
❍ No (2)

Q47 Do you **currently** use **insulin pumps** to control your diabetes?
❍ Yes (1)
❍ No (2)

Page Break

Q48 Please describe the extent to which the following factors influenced your decision to use or not use **insulin pumps** to control your diabetes.

	Not Important (1)	2	3	4	5	6	Very Important (7)
Initial acquisition cost of technology	○	○	○	○	○	○	○
Recurring cost of technology	○	○	○	○	○	○	○
Usefulness	○	○	○	○	○	○	○
Ease of use	○	○	○	○	○	○	○

Knowledge of how to use technology	○	○	○	○	○	○	○

Q49 Please describe the extent to which the following factors influenced your decision to use or not use **insulin pumps** to control your diabetes.

	Not Important (1)	2	3	4	5	6	Very Important (7)
How others would perceive me when I'm wearing the technology	○	○	○	○	○	○	○
Knowledge of where to purchase technology	○	○	○	○	○	○	○
Financial support from insurance	○	○	○	○	○	○	○

Financial support from government programs	○	○	○	○	○	○	○

Page Break

Q500 How **effective** do you believe **insulin pumps** are at controlling your diabetes?

- ❍ Not at all effective (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very effective (7)

Q51 How much do you trust **insulin pumps** to control your diabetes?

- ❍ Not all all (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very much (7)

Q52 What is your overall attitude toward **insulin pumps**?

- ❍ Very Negative (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very Much (7)

Q53 How likely would you be to use **insulin pumps** in the future?

- ❍ Very Unlikely (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very Likely (7)

Q54 How probable would you be to use **insulin pumps** in the future?

- ❍ Not Probable (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Very Probable (7)

Page Break

Q55 Now please honestly answer the following questions about yourself, in general.

Q56 I'm self conscious about the way I look.

- ❍ Strongly Disagree (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Strongly Agree (7)

Q57 I'm concerned about what other people think of me.

- ❍ Strongly Disagree (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Strongly Agree (7)

Q58 I care a lot about what my friends think of me. Select 4 to show you're paying attention.

- ❍ Strongly Disagree (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Strongly Agree (7)

Q59 If you want something done right, you've got to do it yourself.

- ❍ Strongly Disagree (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Strongly Agree (7)

Q60 In the long run the only person you can count on is yourself.

- ❍ Strongly Disagree (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Strongly Agree (7)

Q61 Diabetes is a health issue that is personally relevant to me.

- ❍ Strongly Disagree (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Strongly Agree (7)

Q62 I am very involved with diabetes as a health issue.

- ❍ Strongly Disagree (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Strongly Agree (7)

Page Break

Q63 I buy things without thinking.

- ❍ Strongly Disagree (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Strongly Agree (7)

Q64 I consider myself an impulse purchaser.

- ❍ Strongly Disagree (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Strongly Agree (7)

Q65 I'd rather take risks than be overly cautious.

- ❍ Strongly Disagree (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Strongly Agree (7)

Q66 I love to take risks even when there is a small chance I could get hurt.

- ❍ Strongly Disagree (1)
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5
- ❍ 6
- ❍ Strongly Agree (7)

Page Break

Q67 These last sets of questions are for classification purposes only. Your responses will be completely anonymous.

Q68 In general, would you say your health is:

- ❍ Excellent
- ❍ Very Good
- ❍ Good
- ❍ Fair
- ❍ Poor

Q69 When thinking about all of the diabetes-related symptoms that you may have experienced during the past 4 weeks, please indicate the option that best describes how your symptoms overall have been:

- ❍ No symptoms
- ❍ Mild symptoms
- ❍ Moderate symptoms
- ❍ Severe symptoms

Q70 Have you had your hemoglobin A1c (HbA1c) checked in the last six months?

- ❍ Yes (1)
- ❍ No (2)

Q71 Do you know what your hemoglobin A1c (HbA1c) level was the last time it was checked?

- ❍ Yes (1)
- ❍ No (2)

Display This Question:

If Do you know what your hemoglobin A1c (HbA1c) level was the last time it was checked? = Yes

Q71.1 What was the measured level? (for example: 7.0)

____

Q72 How many times a day on average do you prick your finger to monitor your blood glucose?

- ❍ 0 times a day (1)
- ❍ 1-2 times a day (2)
- ❍ 3-4 times a day (3)
- ❍ 5-6 times a day (4)
- ❍ 7 or more times a day (5)

Q73 Do you use any type of <u>non-wearable</u> technology to help you with your diabetes?

- ❍ Yes (1)
- ❍ No (2)

Display This Question:
If Do you use any type of non-wearable technology to help you with your diabetes? = Yes

Q73.3 Please list all types of *non-wearable* technologies you use to help with your diabetes.

____

Q74 Do you use any type of *wearable technology* to monitor any aspect of your health other than diabetes?

- ❍ Yes (1)
- ❍ No (2)

Display This Question:
If Do you use any type of wearable technology to monitor any aspect of your health other than diabetes? = Yes

Q74.1 Please list all types of wearable technologies you use to monitor any aspect of your health other than diabetes.

____

Page Break

Q75 How many years ago were you **first** diagnosed with diabetes? (for example: 5)

____

Q76 Does your family have a history of diabetes?

❍ Yes (1)
❍ No (2)

Q77 What medications do you regularly take for your diabetes diagnosis? Select **all** that apply.

▢ oral medication (1)

▢ insulin injection once a day (2)

▢ insulin injections multiple times a day (3)

▢ continuous delivery system for insulin (4)

▢ other injectables (5)

▢ none of the above (6)

Q78 Do you have any of the following health issues in addition to diabetes? Select **all** that apply.

▢ heart disease (1)

▢ hypertension (2)

▢ neuropathy (3)

▢ diabetic foot (4)

▢ none of the above (5)

Page Break

Q79 What is the highest level of education you have completed?

- ❍ Some high school (1)
- ❍ High school graduate or the equivalent (GED) (2)
- ❍ Some college (3)
- ❍ Trade/technical/vocational training (4)
- ❍ College graduate (5)
- ❍ Some postgraduate work (6)
- ❍ Post graduate degree (7)

Q80 What is your biological sex?

- ❍ Male (1)
- ❍ Female (2)
- ❍ Prefer not to answer (3)

Q81 How old are you? (for example: 23)

____

Q82 What is your ethnicity?

- ❍ White/Caucasian (1)
- ❍ Hispanic or Latino (2)
- ❍ Native American or American Indian (3)
- ❍ Asian/Pacific Islander (4)
- ❍ African-American/Black (5)
- ❍ Other (6)

Q83 My annual income from all sources is:

- ❍ Less than 29,999 (1)
- ❍ 30,000-39,999 (2)
- ❍ 40,000-49,999 (3)
- ❍ 50,000-59,999 (4)
- ❍ 60,000-69,999 (5)
- ❍ 70,000-79,999 (6)
- ❍ 80,000-89,999 (7)
- ❍ 90,000-99,999 (8)
- ❍ 100,000 and above (9)

Q84 Are you married?
- ❍ Yes (1)
- ❍ No (2)

Q85 Do you have children?
- ❍ Yes (1)
- ❍ No (2)

Q86 What is your height? (in feet and inches, for example: 5'7")

____

Q87 What is your weight? (for example: 162 pounds)

____

Appendix B
RECRUITMENT EMAIL

Hello.

My name is Ashna Sethi and I am undergraduate student working with Dr. Christopher Newman at University of Mississippi. We are conducting a research study about diabetics' quality of life with or without current use of technology along with future intentions. I am emailing to ask if you would like to take about 15 minutes or less to complete a survey for this research project. Participation is completely voluntary and your answers will be anonymous.

The purpose of this research is to determine how diabetics use, if they do, technology. We want to know how diabetics use wearable technology to assist their diabetic diagnosis in enhancing their quality of life. You will take a survey that asks about your current and future intentions to use technology to improve your quality of life as a diabetic. The latter part of the survey are demographics –age, education, and income. You will not be asked for your name or any other identifying information.

There are no associated risks with taking this survey. In addition to contributing to our knowledge about consumer behavior, you will be paid $3 for your successful completion of the survey.

You do not have to take part in this study. Whether or not you choose to participate or to withdraw will not cause you to lose any benefits to which you are entitled. Inducements, if any, will be prorated based on the amount of time you spent taking the survey. The researchers may terminate your participation in the study without regard to your consent and for any reason, such protecting your safety and protecting the integrity of the research data. If the researcher terminates your participation, any inducements to participate will be prorated based on the amount of time your spent on the study.

This study has been reviewed by The University of Mississippi's Institutional Review Board (IRB). If you have any questions, concerns, or reports regarding your rights as a participant of research, please contact the IRB at (662) 915-7482 or irb@olemiss.edu.

If you are interested, please click on the link for the survey.

DISCLAIMER: I have read and understand the above information. By completing the survey, I consent to participate in this study. I have been given a copy of this form. I have had an opportunity to ask questions, and I have received answers. I consent to participate in this study. Furthermore, I also affirm that the experimenter explained the study to me and told me about the study's risks as well as my right to refuse to participate and to withdraw.

If you have any questions, comments, or concerns, please feel free to reach out to me at asethi@go.olemiss.edu.

Thank you in advance.

Ashna Sethi
Undergraduate Student
University of Mississippi