IS THE USAGE OF WEARABLE DEVICES WORTH IT? A STUDY OF PERCEIVED RISKS AND FASHION ON INTENTION TO ADOPT WEARABLE DEVICES

by

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ABSTRACT

EDWARD M LEE. Is the Usage of Wearable Devices Worth it? A Study of Perceived Risks and Fashion on Intention to Adopt Wearable Devices. (Under the direction of DR. SUNGJUNE PARK)

Wearable technology became popular not only in the consumer market, but also in the field of academic research. Studies related to smart wearables have increased dramatically during recent years. However, personal safety perspectives of wearable devices have not been adequately addressed in the literature so far. There have been debates regarding the potential health risk of using wireless technology and batteries from wearable devices. Regardless of the actual health risks from wearable devices, these controversial debates could affect and form users' perceptions toward purchasing and using the technology. The uniqueness of wearable devices is that they are not only considered as technical devices, but also considered as fashion items. By adding perceived risk and fashnology (combination of fashion and technology) constructs to the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2), this study examines how perceived risks and fashion-related perceptions influence a consumer's intention to purchase and use wireless earbuds. Based on survey data from a sample group of 205 respondents, Perceived Health Risk, Perceived Fashionability, and Wearable Comfort have a significant impact on a consumer's intention to purchase wireless earbuds. These results fill in the gap of wearable technology literature and provide a reason why Perceived Health Risk should be studied more for future research. In addition, practitioners should make sure they produce wearable devices that are safe, fashionable, and comfortable to wear.

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LIST OF ABBREVIATIONS

5G	5th Generation
AMF	Alternating Magnetic Field
APHR	Awareness of Perceived Health Risk
AVE	Average Variance Extracted
BI	Behavioral Intention
BITP	Behavioral Intention to Purchase
BITU	Behavioral Intention to Use
C-TAM-TPB	Combined Technology Acceptance Model and Theory of Planned Behavior
COVID-19	Coronavirus Disease 2019
DBA	Doctorate of Business Administration
DTPB	Decomposed Theory of Planned Behavior
EMF	Electromagnetic Frequency
HCC	High-Current Electrical Wiring Configuration
ICR	Internal Consistency Reliability
IDC	International Data Corporation
IDT	Innovation Diffusion Theory
IS	Information Systems
IVE	Immersive Virtual Environments
MM	Motivational Model
MPCU	Model of Personal Computing Utilization
N/A	Not Applicable
PC	Personal Computing

PF	Perceived Fashionality
PHR	Perceived Health Risk
PLS	Partial Least Squares
PPR	Perceived Privacy Risk
SCT	Social Cognitive Theory
SLR	Systematic Literature Review
SMSS	Self-Management Support System
TAM	Technology Acceptance Model
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
UK	United Kingdom
UN	United Nations
UTAUT	Unified Theory of Acceptance and Use of Technology
VIF	Variance Inflation Factor
WC	Wearable Comfort
WHO	World Health Organization

Chapter 1. Introduction

Due to the advancement of technology, more wearable devices are being introduced to the market. Fitness-tracking bracelets can track an individual's heart rate, activity level, and sleeping pattern. Smart watches allow us to check emails and answer phone calls from our wrists. With wireless ear-buds, we no longer need to deal with tangled earphone cords. Wearable technology is no longer an unfamiliar area to consumers; furthermore, the number of users is increasing. According to International Data Corporation (IDC), the worldwide market for wearable devices grew 82.3% during the fourth quarter of 2019, reaching a new high of 118.9 million units (Framingham, 2020). For the entire year of 2019, vendors shipped a total of 336.5 million units worldwide, which is an 89.0% increase from the 178.0 million units shipped in 2018 (Framingham, 2020).

Wearable technology became popular not only in the consumer market, but also in the field of academic research. According to Niknejad et al., it was observed that studies related to smart wearables have increased dramatically during recent years: four studies released in 2010, five in 2011, three in 2012 to 41 in 2016, 63 in 2017, and 74 papers published in 2018 (Niknejad et al., 2020). Table 1 and Figure 1 show the count of wearable technology studies per year. These studies focused on wearable devices' technical issues, user behavior, design, security and privacy, or social acceptability (Niknejad et al., 2020). However, personal safety perspectives of wearable devices have not been adequately addressed in the literature so far (Niknejad et al., 2020).

There have been debates regarding the health risk of wearable devices. Researchers raised concerns of potential health risks from wireless ear-buds due to their high levels of radio-frequency radiation; however, others said there is no risk, and the arguments have no credibility

(Waugh, 2019). Researchers have also raised concerns of leukemia caused by powerful batteries being close to the human body for an extended period of time; however, other researches have negated these concerns (Bilton, 2015). A group of scientists filed a petition regarding health risks of electromagnetic frequency (EMF) radio waves generated from wireless devices and addressed to the World Health Organization (WHO) and United Nations (UN) (Waugh, 2019); however, WHO and other public health organizations have not found "any clear evidence for health hazards at exposure levels below international limits" (Heid, 2019).

Regardless of the actual health risks from wearable devices, these controversial debates could affect and form users' perceptions toward the technology as attitude is formed by an individual's belief regarding the consequences of using a certain technology, whether it is good or not (Ajzen & Fishbein, 1980). Some of the health risk perceptions may be valid; however, some could be exaggerated by hype, meaning perceptions regarding health risk affect consumer behaviors, regardless of the actual level of health risk (Cocosila et al., 2007). Due to the Coronavirus Disease 2019 (COVID-19) pandemic, health risk from a technology or product could be a more sensitive topic to consumers. It is now important to understand how Perceived Health Risk impacts consumers' perception toward new technology as these perceptions could affect how business performs.

The uniqueness of wearable devices is that they are not only considered as technical devices, but also considered as fashion items. Wireless earbuds are launched in different colors and smart watches have options to change their straps for consumer design preference. Fashion-related factors affect consumers when they evaluate wearable technologies (Herz & Rauschnabel, 2019). Then what are the factors that could influence a consumer's decision of purchasing and using wearable devices? Could it be the device's technical benefits or its design?

Could consumers not purchase wearable devices because of their potential health risks? This paper addresses and studies the following research question: *how do perceptions of technology, risks, and fashionability affect the user's intention of adopting wearable technology?* To understand consumers' acceptance of wearable devices, the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) from Venkatesh et al. (2012) is utilized and extended in this study. Perceived Health Risk, which is one of the eight facets of Perceived Risk from Luo et al. (2010), is added to UTAUT2 for understanding the relationship between Perceived Health Risk and acceptance of wearable technology. In addition, fashion-related factors identified by Herz and Rauschnabel (2019) are added to understand how they affect the consumer's decision of purchasing and using wearable devices. This study will not only fill in the gap of literature by providing insights of Perceived Health Risk on wearable devices, but also help practitioners have a better understanding of how consumers consider health risks and aid in the development of safe technology with minimal side effects. In addition, practitioners will understand how important it is to invest not only in their wearable device's technical features, but also in the product's design.

Table 1. Count of Wearable Technology Studies (Niknejad et al., 2020).

Year	Total
2010	4
2011	5
2012	3
2013	7
2014	8
2015	13
2016	41
2017	63
2018	74
2019 (Jan-Mar)	26
Count Total	**244**

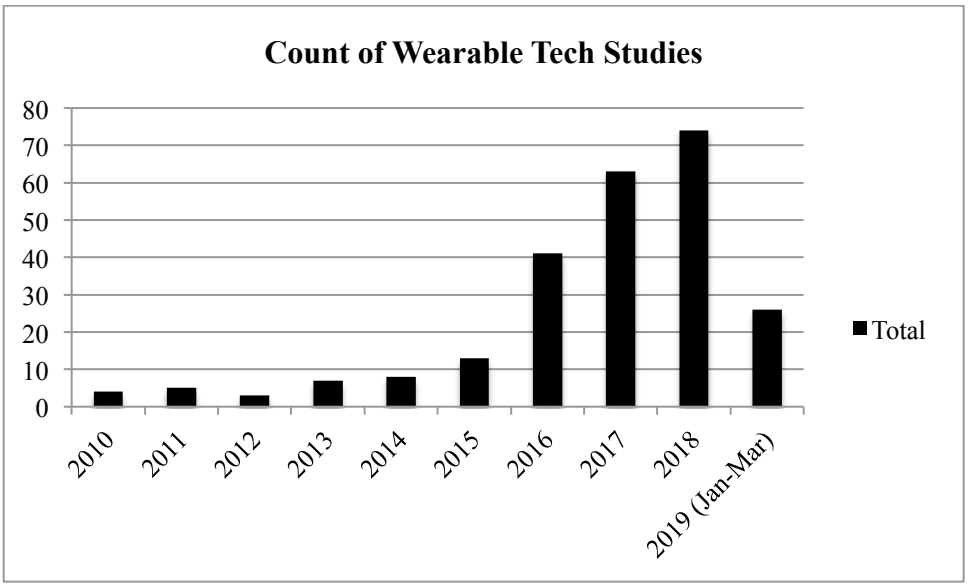

Figure 1. Count of Wearable Technology Studies (Niknejad et al., 2020).

Chapter 2. Literature Review and Hypotheses Development

2.1 Definition of Wearable Technology

Table 2 lists the definition of "wearable devices" from various researchers. As a summary, this study defines wearable technology as wearable technologies that are integrated into clothing and accessories, which incorporate wireless connectivity for accessing, interacting, and exchanging information at anytime and anywhere. Wireless technology is utilized in various industries. For example, consumers wear wireless ear-buds to listen to music or answer phone calls and the healthcare industry uses wearable trackers for patient and disease management. This study will focus on the consumer market in order to understand what influences the consumer's behavioral intention to purchase and use a wearable device.

Table 2. Definition of "Wearable Devices".

Author(s)/Year	Definition
Barfield & Caudell (2001)	"Self-powered, fully functional and self-contained computer that provides access to information, and interaction with human body at anytime and anywhere."
Viseu (2003)	"A shift from digital simulation (separation and replication) to digital augmentation (responsiveness and connectivity)."
Mann (2013)	''Wearable computing is the study or practice of inventing, designing, building, or using miniature body-borne computational and sensory devices. Wearable computers may be worn under, over, or in clothing, or may also be themselves clothes.''
Fernandez (2014)	"Wearables include all forms of computational or sensory electronic devices that can be worn with clothing or on the body. In the broadest sense, any computer device that is carried with a person to assist them could conceivably be called a wearable."
Tehrani and Michael (2014)	"Electronic technologies or computers that are incorporated into items of clothing and accessories which can comfortably be worn on the body.''
Wright and Keith (2014)	''Electronics and computers that are integrated into clothing and other accessories that can be worn comfortably on the body."
Bower and Sturman (2015)	"Wearable digital devices that incorporate wireless connectivity for the purposes of seamlessly accessing, interacting with and exchanging contextually relevant information."

Author(s)/Year	Definition
Dimou et al. (2016)	"Every device which is worn for an extended period of time, processes and controls its user's inputs and enhances his experience."
Dehgani and Dangelico (2018)	"Embedded portable computers and advanced electronics that integrate seamlessly into people's daily lives and enable them to interact with a smart environment (i.e. home appliances) anytime and anywhere."

2.2 Literature of Wearable Technology

Niknejad et al. conducted a literature review of smart wearables to review the current state of smart wearables, recent advances, and future challenges (Niknejad et al., 2020). The research was conducted to fill in the gap of systematic reviews on the different aspects of smart wearables, especially from an Information Systems (IS) perspective (Niknejad et al., 2020). They wanted to understand the main studies on smart wearable technologies in the IS domain and which themes have been highlighted in these studies (Niknejad et al., 2020).

By conducting a Systematic Literature Review (SLR), Niknejad et al. obtained 244 papers to address issues and challenges with smart wearables (Niknejad et al., 2020). Five common themes were identified from these papers: technology-focused (131 papers, 54% of total), user behavior (65 papers, 27% of total), design (35 papers, 14% of total), security and privacy (11 papers, 4% of total), and social acceptability (2 papers, 1% of total) (Niknejad et al., 2020).

The technology-focused papers studied the technical issues related to smart wearables: such as feasibility/evaluation, technology affordance, pragmatic quality, remediation, and users' perception of smart wearables (Niknejad et al., 2020). For example, Grym et al. studied the feasibility of using smart wristband wearables to collect activity, heart rate, and sleep data among pregnant nulliparous women (Grym et al., 2019). Tonacci et al. assessed the feasibility of using

wearable sensors for examining the relationships between stress and emotions among healthy and non-addicted young volunteers to smartphones (Tonacci et al., 2019). Ricci et al. studied how a wearable device can render support to the diagnosis of motor disability in pupils (Ricci et al., 2019). Babaoglu et al. evaluated the feasibility of identifying familial Mediterranean fever attacks using activity trackers (Babaoglu et al., 2019).

The user behavior papers studied users' willingness to perform an action: such as actual system use, user experiences, intention to use, intention to adopt, intention to purchase, extended use, technology adoption and factors that influence the adoption (Niknejad et al., 2020). For example, Li et al. studied the significant factors of smart wearables adoption among older adults above 60 years old based on the technology acceptance model (Li et al., 2019). Nunes and Arruda Filho examined users' behavior toward Google Glass® through users' online comments on Reddit, a social network platform (Nunes & Arruda Filho, 2018). Dehghani and Kim proposed three key factors (screen size, uniqueness, and design) for aesthetic appeal of smart watches and investigated the effect of these factors on current and potential purchase intention and users behavior (Dehghani & Kim, 2019).

The design-themed papers studied new prototypes and systems for designing smart wearables based on user requirements and preferences (Niknejad et al., 2020). For instance, Muaremi et al. examined the stress experience of staffs applying features of smart phones and smart wearable chest belts and presented a solution for assessing stress (Muaremi et al., 2013). Hachisu et al. developed a new smart head-mounted wearable device to access the time of face-to-face mode with the partner's identity (Hachisu et al., 2018). Marín-Morales et al. developed a new emotion detection wearable system for automatic recognition of efficient situations evoked by Immersive Virtual Environments (IVE) (Marín-Morales et al., 2018).

The security and privacy themed papers examined the ethical, security, and privacy implications (Niknejad et al., 2020). For example, Anaya et al. studied users' ethical perceptions toward using wearables in the healthcare industry (Anaya et al., 2018). Becker studied factors affecting the users' health information privacy concerns by conducting interviews among seven focus groups of actual health wearable users (Becker, 2018). Lidynia et al. assessed sensitivity and privacy concerns regarding data collected with wearable devices among 82 smart wearables users (Lidynia et al., 2017). Kwee-Meier et al. studied the relationship between demographic data and privacy and security perceptions among 2085 cruise ship passengers regarding using smart wearables (Kwee-Meier et al., 2016).

Social acceptability-themed papers investigated the social acceptability of smart wearables (Niknejad et al., 2020). For instance, Profita et al. studied how information regarding the consumers' disability influenced judgments of the social acceptability of using Google Glasses® in a public environment (Profita et al., 2016). Ouverson et al. investigated the relationship between aesthetics considerations and social acceptability of wearables that are mostly identified as fashionable devices (Ouverson et al., 2017).

After conducting a literature review of smart wearables, Niknejad et al. identified that entertainment and personal safety perspectives of wearable devices have not been adequately addressed in the literature so far (Niknejad et al., 2020). These two themes are future research opportunities that could provide more insights of perceptions toward wearable technology.

2.3 Health Risk of Wearable Technology

The health risk of wearable devices is a highly controversial topic. Jerry Phillips, a professor of biochemistry at the University of Colorado, raised concerns of wireless earbuds that their placement in the ear canal exposes tissues in the head to relatively high levels of radio-

frequency radiation, eventually increasing the chance of cancer (Waugh, 2019). However, Kenneth Foster, a professor of bioengineering who has studied the effects of wireless radiation on human health at the University of Pennsylvania, said there is no risk, and the arguments have no credibility (Waugh, 2019). According to Foster, "these arguments have no credibility" because "there are many thousands of papers of varying quality and relevance to health that point in all sorts of directions" (Heid, 2019).

Researchers have also raised concerns about having powerful batteries close to the human body for an extended period, as being too close to power lines could cause leukemia (Bilton, 2015). An excess of electrical wiring configurations suggestive of high current-flow was noted near the homes of children who developed cancer, comparing to the homes of control children (Wertheimer & Leeper, 1979). Not only childhood cancer, but also adult cancer was found to be associated with high-current electrical wiring configurations (HCCs) near the patient's residence (Wertheimer & Leeper, 1982). According to Wertheimer and Leeper, "such wiring can expose occupants of the residence to alternating magnetic fields (AMFs) at a level which, though very low, may produce physiological effects" and "several patterns in the data suggest that HCCs and cancer may be causally linked" (Wertheimer & Leeper, 1982). However, other researches have negated these concerns related to wearable devices (Bilton, 2015).

In 2015, a group of 250 scientists filed a petition regarding health risks of electromagnetic frequency (EMF) radio waves generated from wireless devices and addressed to the World Health Organization (WHO) and United Nations (UN) (Waugh, 2019). According to the petition, "numerous recent scientific publications have shown that EMF affects living organisms at levels well below most international and national guidelines. Effects include increased cancer risk, cellular stress, increase in harmful free radicals, genetic damages,

structural and functional changes of the reproductive system, learning and memory deficits, neurological disorders, and negative impacts on general well-being in humans" (Waigh, 2019). However, Foster pointed out that WHO and other public health organizations have not found "any clear evidence for health hazards at exposure levels below international limits" after analyzing the literature on Bluetooth and wireless technology (Heid, 2019).

Regardless of the actual health risks from wearable devices, these controversial debates could affect and form users' perceptions towards wearable technology. Attitude is formed by an individual's belief regarding the consequences of using a certain technology, whether it is good or not (Ajzen & Fishbein, 1980). The general evaluation affects the individual's intention to use or not use the technology; thus, attitude leads the individual's behaviors by forming perception towards the technology (Ajzen & Fishbein, 1980). Some of the health risk perceptions may be valid; however, some could be exaggerated by hype (Cocosila et al., 2007). This means perceptions regarding health risk affect consumer behaviors, regardless of the actual level of health risk (Cocosila et al., 2007). From a health risk perspective, consumers would accept wearable technology either because they are not aware of its following health risks or because they think the benefits exceed the health risks.

Due to the Coronavirus Disease 2019 (COVID-19) pandemic, consumers could be more sensitive to heath risks regardless of the actual health risks from products or technology. For instance, a rumor spread on social media that 5th generation (5G) wireless network technology caused the COVID-19 pandemic (Duffy, 2020). However, the United States Federal Emergency Management Agency responded that 5G technology does not cause the virus and the United Kingdom government officials called the rumor a "crackpot conspiracy" (Duffy, 2020). As consumers are becoming more sensitive to health risks that could build perceptions toward

products or technology, it is important that Perceived Health Risk is studied in the wearable technology field.

2.4 Literature of Perceived Health Risk and Technology Acceptance

2.4.1 Scope of Review

Perception of personal safety is one of the lacking studies in the literature of wearable technology (Niknejad et al., 2020). A literature review was conducted in order to understand the relationship between Perceived Health Risk and acceptance of technology (not limited to wearable technology). Articles were searched through Google Scholar (https://scholar.google.com) and the actual articles were obtained from either Google Scholar or the J. Murrey Atkins Library website (https://library.uncc.edu) at University of North Carolina at Charlotte. The initial article search was conducted on 1 February 2020 by searching every article that contained the terms "Perceived Health Risk" and "Technology Acceptance". The following search command was used for searching articles: "Perceived Health Risk" AND "Technology Acceptance". The initial search retrieved 90 outputs. Since then, five more articles were published by 23 April 2020, part of the same search criteria. As a result, there were a total of 95 search outputs. Out of the total outcomes, 20 articles were duplicates, articles written in foreign languages, or not obtainable. After excluding all of these invalid outcomes, a total of 75 articles were obtained. The list of articles is included in Appendix A.

To discover any pattern between the articles, the articles were categorized by year and technology type. Table 1 lists the count of articles by each year. As seen in Table 2 and Figure 2, there was a significant increase of articles between 2016 and 2018: 22 articles in 2018, following 11 articles in 2017 and 10 articles in 2016. Even though the number of studies decreased in 2019, an increase of studies in Perceived Health Risk is anticipated due to the COVID-19 pandemic.

As seen in Table 4 and Figure 3, mobile health was studied the most (17 articles and 23% out of total articles), following smart wearable devices (11 articles and 15% out of total articles) and health information seeking on Internet (11 articles and 15% out of total articles). Comparing the list of articles between the literature review of wearable technology from Niknejad et al. (2020), there were only two mutual studies (Table 4): studies from Adapa et al. (2018) and Weiz et al. (2016). Even out of these two studies, the study from Weiz et al. (2016) does not include Perceived Health Risk in the research model. This reconfirms the result from the literature review from Niknejad et al. (2020) that health risk is a gap in literature of wearable technology; thus, being an opportunity for future research and contribution to the field.

Table 3. Count of Articles per Year.

Year	Total
2004	1
2006	1
2007	1
2009	2
2010	3
2011	2
2012	3
2013	1
2014	1
2015	5
2016	10
2017	11
2018	22
2019	8
2020 (Jan – Apr)	4
Count Total	**75**

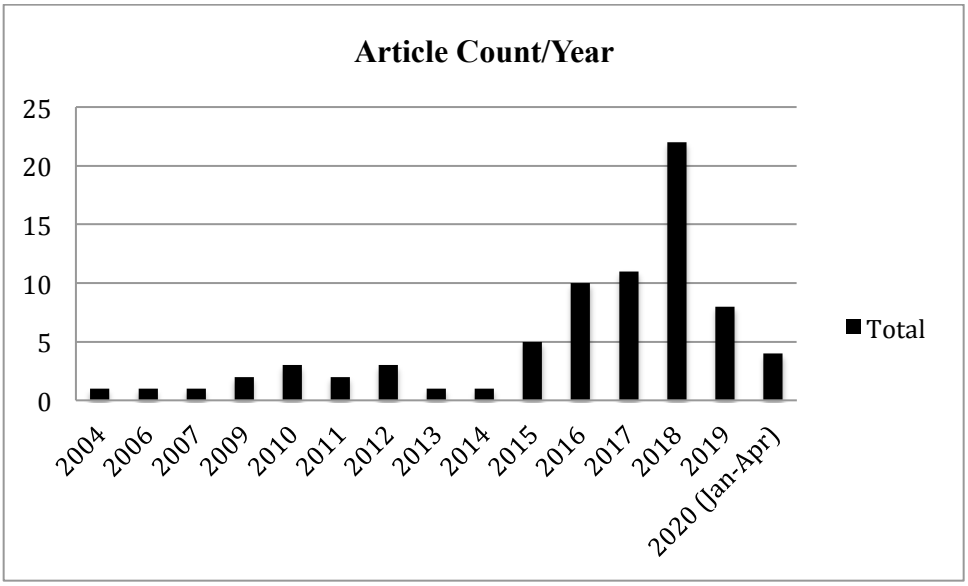

Figure 2. Count of Articles per Year.

Table 4. Count of Mutual Studies between Wearable Technology and Perceived Health Risk.

Wearable Technology (Niknejad et al., 2020)	**Wearable Tech from Perceived Health Risk & Technology Acceptance**	**Mutual Studies**
244	11	2

Table 5. Count of Studied Technology Type.

Technology Type	Total
Mobile Health	17
Smart Wearable	11
Internet (Health Information)	11
N/A	10
Patient Portal	6
Online Purchase	5
Internet of Things	3
Health Monitor Device	3
Cell Phone	2
Virtual Reality	1
Ventilated Tools	1
Information Security Risk Assessment Methods	1
Hybrid Electric Vehicle	1

Technology Type	Total
Handheld Powered Equipment	1
Electronic Logistics System	1
eBenefits Portal	1
Count Total	**75**

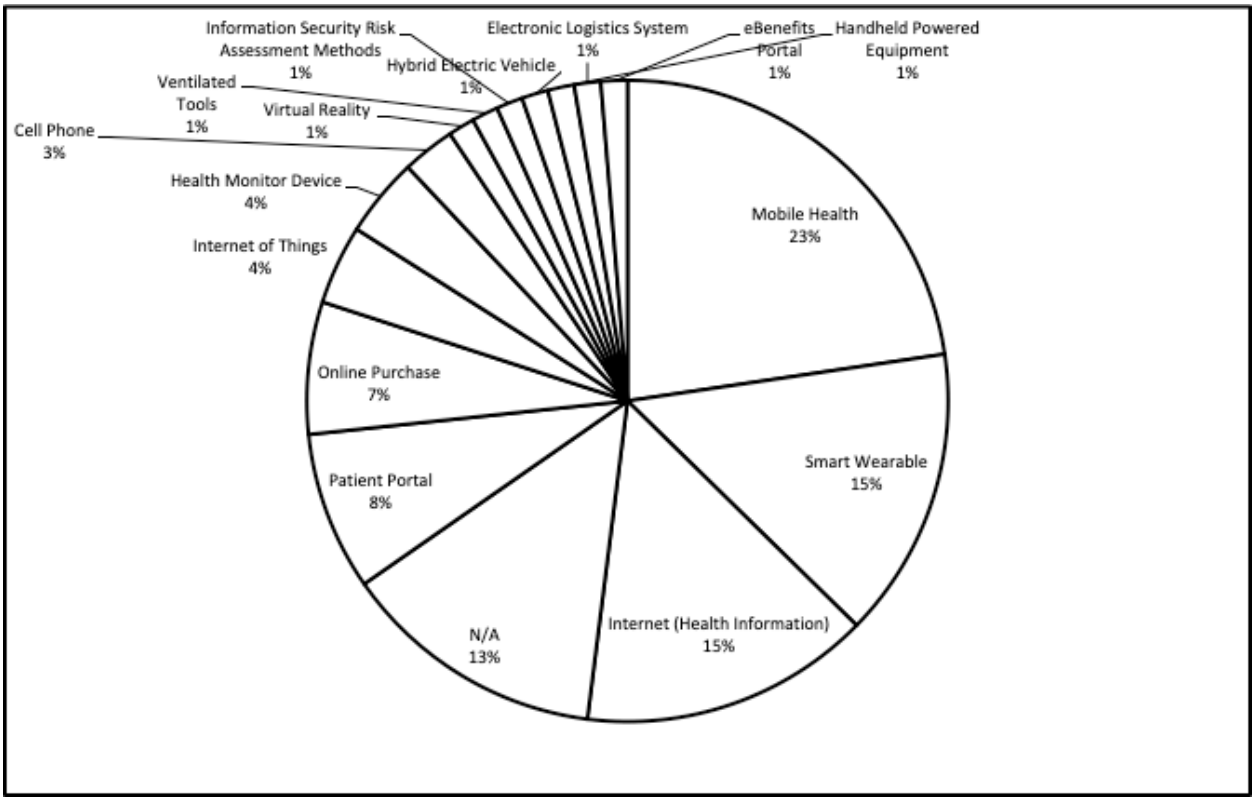

Figure 3. Ratio of Studied Technology Type.

2.4.2 Gaps

During the literature review, common gaps were identified. The studies were specific to health technology, specific to a certain technology type, specific to a certain demographic type, not related to technology, or/and not related to Perceived Health Risk. Gaps are listed and marked for each article in Appendix A. Research specific to health technology focuses on healthcare employees, patients, or individuals seeking health information online. For example, Tavares studies adoption of electronic health record portals by healthcare consumers (Tavares,

2018). Van Lint studies factors influencing renal transplant patients' acceptance of self-management support systems (SMSS) (Van Lint, 2019). Nölke et al. study socio-demographic and health-related characteristics of online health information seekers in Germany (Nölke et al., 2015). These types of studies focus on the actual health issue, health data, or health information that are different from the impact of Perceived Health Risk on technology acceptance. Users would not consider or beware of any health risk caused from using an electronic health record portal or seeking health information on the Internet.

Studies specific to a certain technology type or product are difficult to extend or generalize. Tanwir and Hamzah studied the determinants that influence individual's intention to purchase hybrid vehicles (Tanwir & Hamzah, 2020). Mani and Chouk researched the psychological, functional, and individual barriers that impact consumer resistance to Internet of Things (IoT) (Mani & Chouk, 2018). Weiz et al. studied the influence of Subjective Norm on the usage of smart glasses (Google Glass®) (Weiz et al., 2016). However, Google Glass® as a consumer product was discontinued in 2015 (Garcia, 2019). It is difficult to say that the results from these studies can be extendable or applicable to the acceptance of other technology.

There are also articles that focus on specific demographics, conducting research in specific countries, cities, ages, gender, or/and occupations. Cocosila studied the acceptance of cell phone support for smoking cessation in the United Kingdom (UK) and Canada (Cocosila, 2011). Mwencha researched customers' perceptions and usage of online retailing services in Nairobi County, Kenya (Mwencha, 2015). Norfadzila and Aderus investigated predictive factors of online health information use by urbanized Malaysian women (Norfadzila & Aderus, 2017). Shakir et al. conducted an observational study of factors associated with online sexually transmissible infection information seeking among young, aged 18-25 years, people in Malaysia

(Shakir et al., 2019). Shuford III studied perceptions of telehealth services by Veterans. Results from these studies would be difficult to apply to a broader scope of users (Shuford III, 2018).

There are articles that study user behavior and perceptions but not related to technology or Perceived Health Risk. Joel studied consumer willingness to pay for chicken meat derived from chicken fed on insect-based feed in Kenya (Joel, 2018). Even though the study focused on consumer willingness, it is difficult to apply the findings of chicken meat acceptance to technology acceptance. Gonzalez et al. studied motivational impacts on intent to use health-related social media (Gonzalez et al., 2018). They studied how the individual's health condition itself impacts the interest in health-related social media sites. As discussed previously, individuals would not consider or not be aware of any health risks from using social media. Even though the findings of these 75 articles are difficult to generalize, most of them are based on theories of technology acceptance. The following section introduces theories that ground the current study.

2.5 Theoretical Models

2.5.1 Theory of Reasoned Action and Theory of Planned Behavior

Assuming individuals are rational and make systematic use of available information, Theory of Reasoned Action (TRA) was developed to understand and predict behavior and attitude (I Ajzen & Fishbein, 1980). TRA views behavioral intention as the main predictor of behavior, while the influence of the attitude on the behavior is mediated through intention (I Ajzen & Fishbein, 1980). In other words, Martins et al. explained TRA as a theory proposing "belief influence attitudes that in turn lead to intentions and then consequently generate behaviors" (Martins et al., 2014). The independent variables of TRA are attitude toward using technology and subjective norm (I Ajzen & Fishbein, 1980).

Theory of Planned Behavior (TPB) is an extension of TRA as TPB adds perceived behavioral control as an additional variable to TRA (Icek Ajzen, 1985). Siraye described perceived behavioral control as “a situation in which the resources and opportunities available to a person must to some extent dictate the likelihood of behavioral achievement” (Siraye, 2014). In order to study users’ intention to trust the cloud technology adoption, Ho et al. utilized TPB since it takes into account the influence of attitude, subjective norms, and perceived behavioral control on intention and behavioral outcome (Ho et al., 2017).

2.5.2 Technology Acceptance Model

The Technology Acceptance Model (TAM) is another extension from TRA and is one of the popular theories when technology acceptance is studied. TAM starts from the conceptual framework describing the motivational process that mediate between system characteristics and user behavior as shown in Figure 4 (Davis, 1985). Davis explained that the characteristics (features and capabilities) of the system affect how motivated users are to use the system, which in turn affects their own actual system use or non-use (Davis, 1985).

The conceptual framework was developed and became TAM. TAM explains attitude toward new technology with influences by two major beliefs: perceived usefulness and perceived ease of use (Davis, 1985). Davis defined perceived usefulness as “the degree to which an individual believes that using a particular system would enhance his or her job performance" and defines perceived ease of use as “the degree to which an individual believes that using a particular system would be free of physical and mental effort” (Davis, 1985). As shown in Figure 5, design features directly influence perceived usefulness and perceived ease of use then perceived usefulness and perceived ease of use influence the attitude toward using new

technology (while perceived ease of use has a causal effect on perceived usefulness) (Davis, 1985).

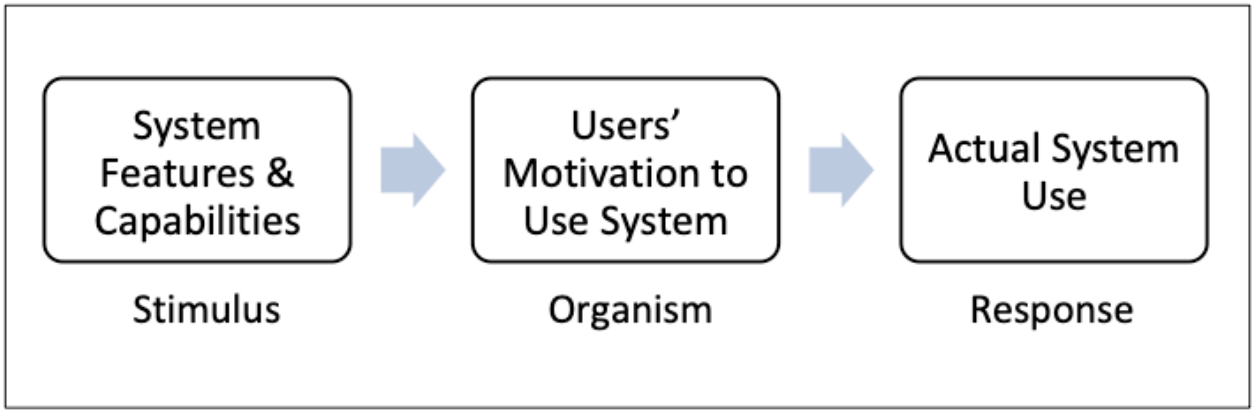

Figure 4. Conceptual Framework (Davis, 1985).

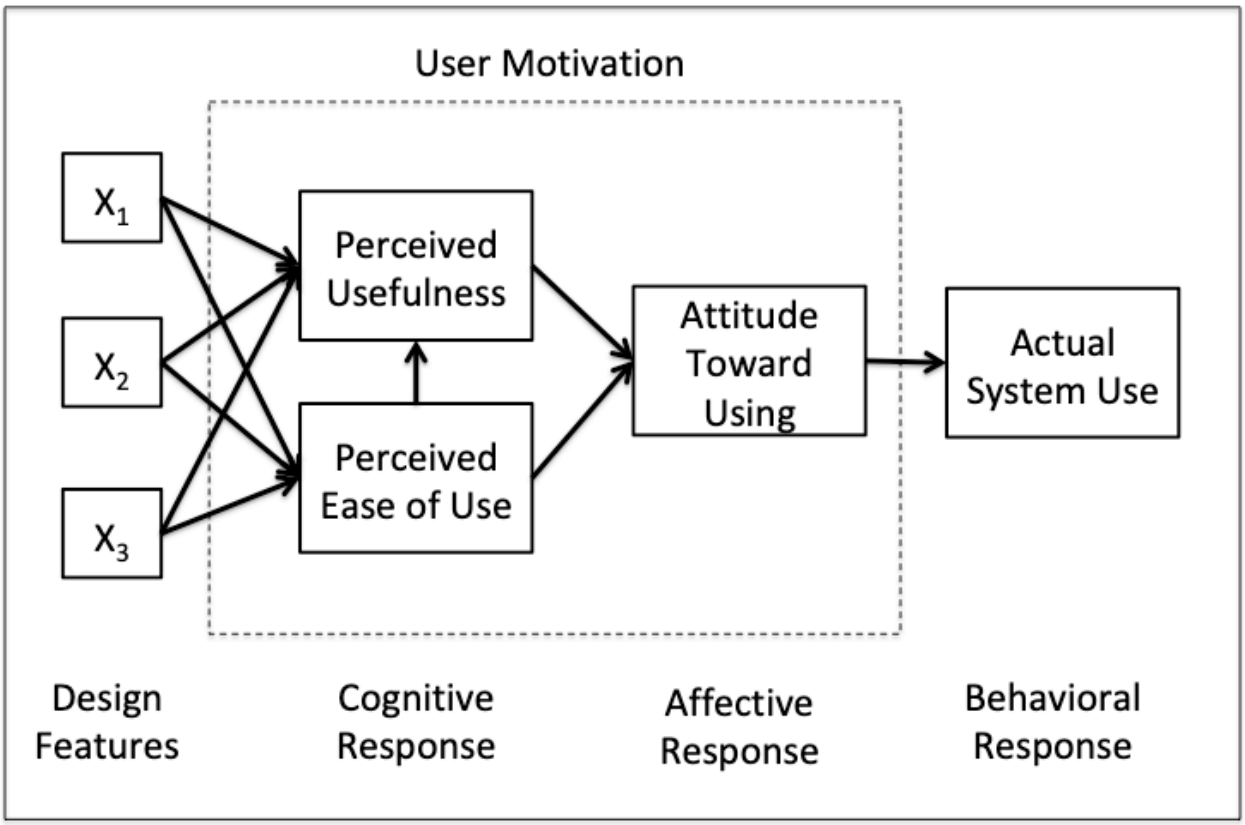

Figure 5. Technology Acceptance Model (TAM) (Davis, 1985).

2.5.3 Technology Acceptance Model 2

Venkatesh and Davis later extended TAM to TAM2 for identifying the variables that influence perceived usefulness (Venkatesh & Davis, 2000). The variables added are subjective norm, image, job relevance, output quality, and result demonstrability. Experience and voluntariness are also added as moderating factors of subjective norm.

Venkatesh and Davis (2000) retrieved the definition of subjective norm from Fishbein and Ajzen (1975) as a "person's perception that most people who are important to him think he should or should not perform the behavior in question". Image was defined from Moore and Benbasat as "the degree to which use of an innovation is perceived to enhance one's image or status in one's social system (Moore and Benbasat, 1991)". Venkatesh and Davis defined job relevance as "an individual's perception regarding the degree to which the target system is applicable to his or her job (Venkatesh & Davis, 2000)". Venkatesh and Davis described output quality as how well the system performs tasks that match the job goals (job relevance) (Venkatesh & Davis, 2000). Result demonstrability was defined from Moore and Benbasat as the "tangibility of the results of using the innovation (Moore & Benbasat, 1991)". Venkatesh and Davis referred experience as the experience of using a target system (Venkatesh & Davis, 2000). Voluntariness was defined by Agarwal and Prasad (1997), Hartwick and Barki (1994), and Moore and Benbasat (1991) as "the extent to which potential adopters perceive the adoption decision to be non-mandatory".

Venkatesh and Davis tested TAM2 by using longitudinal data collected regarding four different systems at four organizations, two involving voluntary usage and two involving mandatory usage (Venkatesh & Davis, 2000). TAM2 was strongly supported by all four organizations. In addition, both Social Influence processes (subjective norm, voluntariness, and

image) and cognitive instrumental processes (job relevance, output quality, result demonstrability, and perceived ease of use) influenced user acceptance significantly (Venkatesh & Davis, 2000). TAM2 is shown in Figure 6.

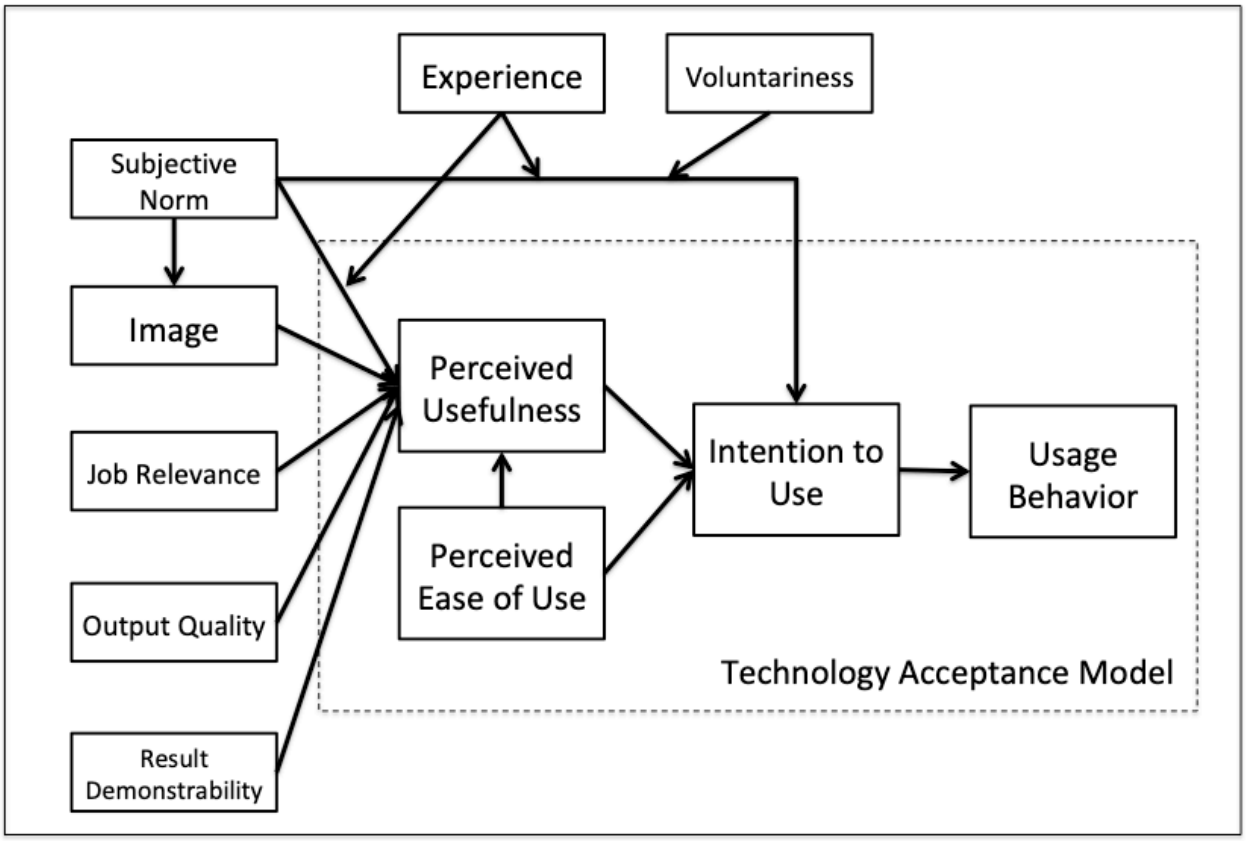

Figure 6. Technology Acceptance Model 2 (TAM2) (Venkatesh & Davis, 2000).

2.5.4 Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT) is an extension of TAM as it unifies eight theories related to technology acceptance and usage: TRA, TAM/TAM2, Motivational Model (MM), TPB/Decomposed Theory of Planned Behavior (DTPB), Combined TAM and TPB (C-TAM-TPB), Model of PC Utilization (MPCU), Innovation Diffusion Theory (IDT), and Social Cognitive Theory (SCT) (Venkatesh et al., 2003). The model of UTAUT is shown in Figure 7.

MM applies extrinsic motivation and intrinsic motivation to understand the motivation of adopting and using computers in the workplace (Davis et al., 1992). Extrinsic motivation is defined as "the performance of an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as improved job performance, pay, or promotions (Davis et al., 1992)". Intrinsic motivation is defined as "the performance of an activity for no apparent reinforcement other than the process of performing the activity per se (Davis et al., 1992)".

DTPB is identical to TPB in terms of predicting intention; however, in contrast to TPB but similar to TAM, DTPB decomposes attitude, subjective norm, and perceived behavioral control into the underlying belief structure within technology adoption contexts (Taylor & Todd, 1995b). C-TAM-TPB combines attitude toward behavior, subjective norm, and perceived behavioral control from TPB and perceived usefulness from TAM (Taylor & Todd, 1995a).

MPCU was created to predict Personal Computing (PC) utilization and examine the effect of job-fit, complexity, long-term consequences, affect towards use, social factors, and Facilitating Conditions on intention (Thompson et al., 1991). IDT adapts the characteristics of innovations and refines a set of constructs (relative advantage, ease of use, image, visibility, compatibility, results demonstrability, and voluntariness of use) to study individual technology acceptance (Moore & Benbasat, 1991). SCT was created to study computer usage but the model can be extended to study acceptance and usage of information technology in general by examining outcome expectations (performance or personal), self-efficacy, affect, and anxiety (Compeau & Higgins, 1995).

UTAUT is formulated with four core determinants (Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions) of intention and usage, and up to four

moderators (gender, age, experience, and voluntariness of use) of key relationships (Venkatesh et al., 2003). Performance Expectancy is defined as "the degree to which an individual believes that using the system will help him or her to attain gains in job performance (Venkatesh et al., 2003)". Effort Expectancy is defined as "the degree of ease associated with the use of the system (Venkatesh et al., 2003)". Social Influence is defined as "the degree to which an individual perceives that important others believe he or she should use the new system (Venkatesh et al., 2003)". Facilitating Conditions are defined as "the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system (Venkatesh et al., 2003)". UTAUT was tested with real world data from four organizations over a six-month period with three points of measurement. It turned out that UTAUT outperformed the eight individual models (Venkatesh et al., 2003).

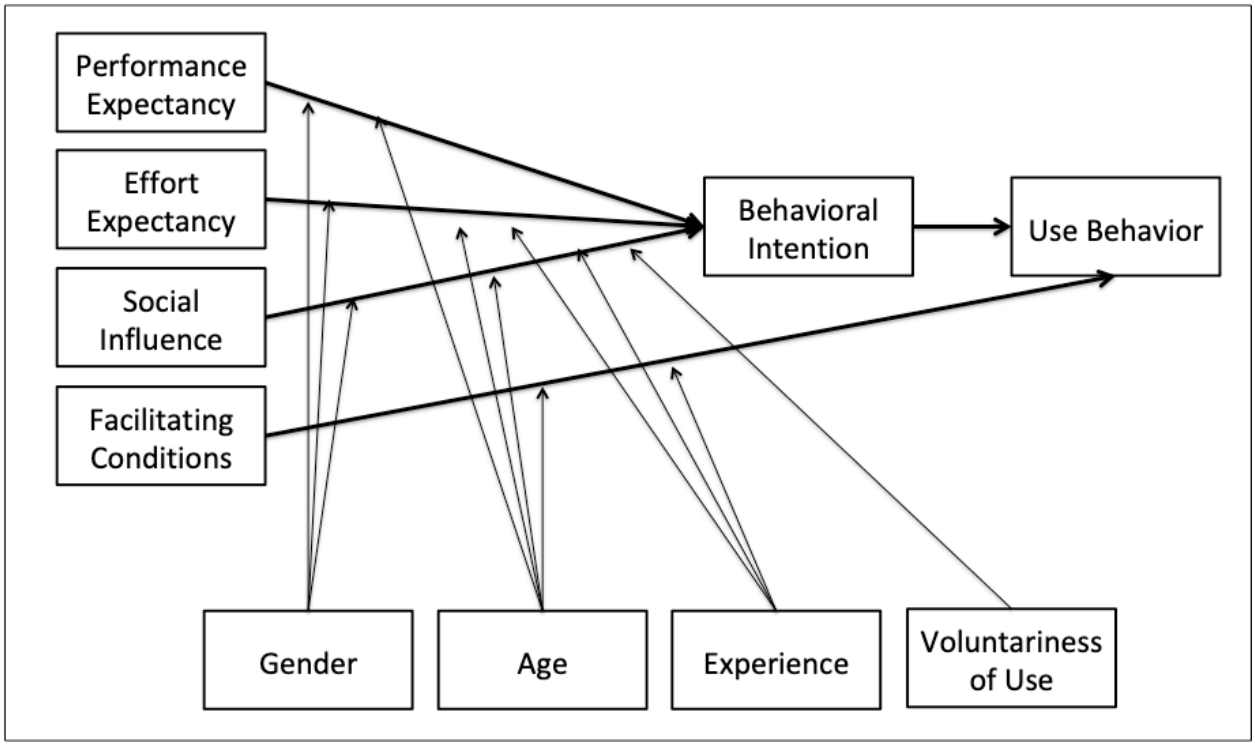

Figure 7. UTAUT (Venkatesh et al., 2003).

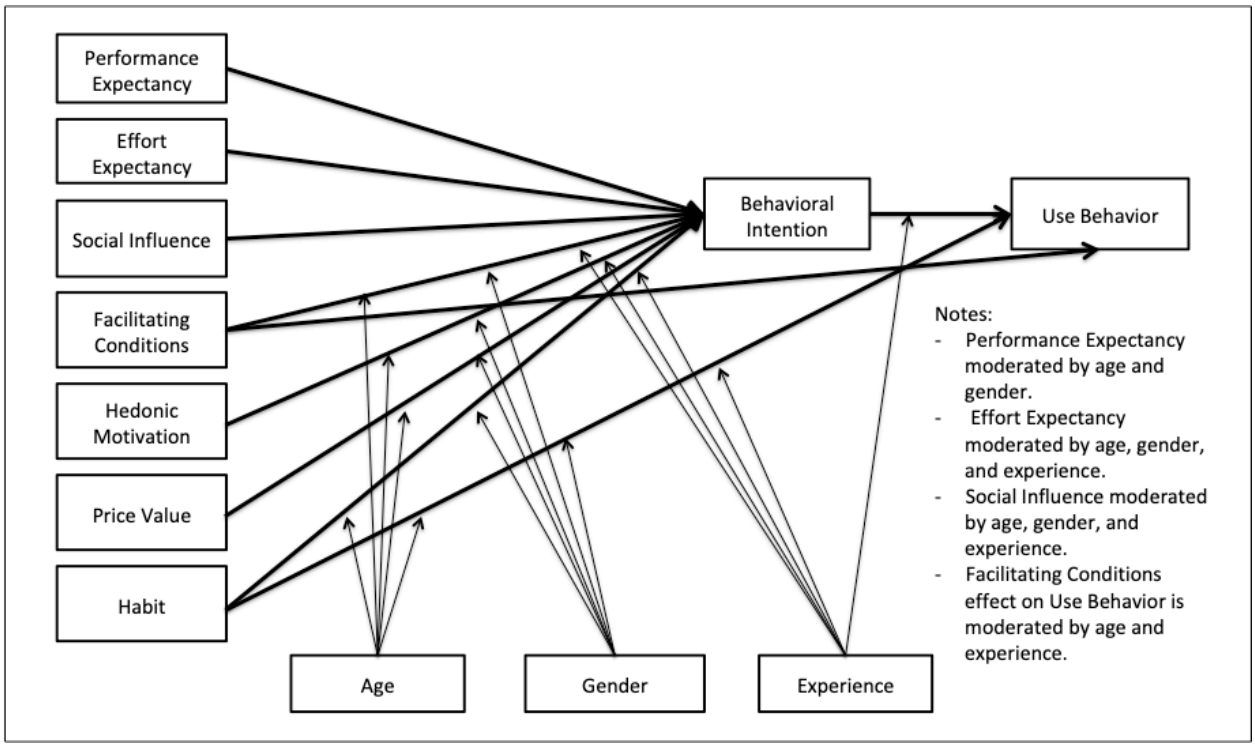

Figure 8. UTAUT2 (Venkatesh et al., 2012).

2.5.5 Unified Theory of Acceptance and Use of Technology 2

The theoretical models related to technology acceptance, from TAM to UTAUT, studied the critical factors that influence the behavioral intention to use a technology and technology use primarily in organizational contexts. UTAUT2 was built to study these relationships in a consumer use context (Venkatesh et al., 2012). UTAUT2 incorporates three constructs into UTAUT: Hedonic Motivation, Price Value, and habit (Venkatesh et al., 2012). Hedonic Motivation is defined as "the fun or pleasure derived from using a technology (Brown and Venkatesh, 2005)", and it has been shown to play a critical role in determining technology acceptance and use (Brown and Venkatesh, 2005). Price Value is defined as "consumers' cognitive tradeoff between the perceived benefits of the applications and the monetary cost for using them (Dodds et al., 1991)". Habit has been defined as "the extent to which people tend to perform behaviors automatically because of learning (Limayem et al., 2007)". The model of UTAUT2 is shown in Figure 8. The extensions proposed in UTAUT2 provided a substantial

improvement from UTAUT in the variance explained in behavioral intention to use a technology (from 56 percent to 74 percent) and technology use (from 40 percent to 52 percent) (Venkatesh et al., 2012).

2.5.6 Perceived Risks

The concept of Perceived Risk was introduced by Bauer and defined as "a combination of uncertainty plus seriousness of outcome involved (Bauer, 1960)". Featherman and Pavlou later researched the effects of seven facets of Perceived Risk: Performance Risk, Financial Risk, Time Risk, Psychological Risk, Social Risk, Privacy Risk, and overall Risk (Featherman & Pavlou, 2003).

Performance Risk is defined as "the possibility of the product malfunctioning and not performing as it was designed and advertised and therefore failing to deliver the desired benefits (Grewal et al., 1994)". Financial Risk is defined as "the potential monetary outlay associated with the initial purchase price as well as the subsequent maintenance cost of the product (Grewal et al., 1994)". Time Risk is described as the possibility of consumers losing time "when making a bad purchasing decision by wasting time researching and making the purchase, learning how to use a product or service only to have to replace it if it does not perform to expectations (Featherman & Pavlou, 2003)". Psychological Risk is defined as "the risk that the selection or performance of the producer will have a negative effect on the consumer's peace of mind or self-perception (Mitchell, 1992)". Social Risk is defined as the "potential loss of status in one's social group as a result of adopting a product or service, looking foolish or untrendy (Featherman & Pavlou, 2003)". Privacy Risk is defined as the "potential loss of control over personal information, such as when information about you is used without your knowledge or permission

(Featherman & Pavlou, 2003)". Overall Risk is "a general measure of perceived risk when all criteria are evaluated together (Featherman & Pavlou, 2003)".

In addition to these seven facets of Perceived Risk, Luo et al. added Perceived Physical Risk for researching the factors affecting acceptance of emerging technologies (Luo et al., 2010). Perceived Physical Risk is defined as "the risk to the buyer's or other's safety in using products (Jacoby & Kaplan, 1972)". The research from Luo et al. indicated that risk perception, derived from these eight facets, is a salient antecedent to acceptance of innovative technology (Luo et al., 2010).

2.5.7 Fashnology

People also consider fashion-related factors when evaluating wearable technologies (Herz & Rauschnabel, 2019). Fashnology represents "consumer perceptions of wearable technologies as a combination of 'fashion' and 'technology' (Rauschnabel et al., 2016)". Herz and Rauschnabel identified three broad categories of factors that explain why people chose particular apparel: Perceived Fashionability, Wearable Comfort, and functional quality (Herz & Rauschnabel, 2019).

Perceived Fashionability, the perception of the design component, of a product has been known to affect consumer behavior (Homburg et al., 2015). The ownership of wearable accessories strongly impacts one's physical appearance (Herz & Rauschnabel, 2019). Therefore, how consumers view the design of the wearable technology device could impact their intention of using the device. When Apple announced their first wireless headphones called AirPods®, people disliked their design and shared jokes on social media, comparing their design to a toothbrush head (Newcomb, 2016). Wearable Comfort is defined as "consumers' overall subjective assessment of the physical feeling from wearing" a wearable device (Herz &

Rauschnabel, 2019). Wearable devices that are comfortable to wear would increase usage enjoyment (Herz & Rauschnabel, 2019). Functional quality is measured by the apparel's overall quality, durability, and appropriateness for particular occasions, or price cues (Herz & Rauschnabel, 2019). People have expectations on functionalities for certain apparels, such as raincoats (Herz & Rauschnabel, 2019). As wearable devices are used for their functionalities, functional quality could affect an individual's decision on using a wearable device.

2.6 Technology Type – Wireless Earbuds

Even though jokes floated around the Internet regarding the design of Apple's AirPods®, Apple was the leader in the global true wireless earphones market with AirPods® shipments exceeding every alternative at the end of August 2019, according to Counterpoint Research (Wu, 2019). According to Toni Sacconaghi of Bernstain, sales of AirPods® nearly doubled to $6 billion in 2019 and expected to generate $15 billion in revenue in 2020 (Pound, 2019; Eadicicco, 2019). If sales of AirPods® grow at the same rate again in 2021, AirPods® could become Apple's third largest product division (Pound, 2019). With the success of AirPods®, competitors launched or are preparing to launch their own wireless earbuds. Wireless earbuds are becoming a popular wearable device in the consumer market. Therefore, studying wireless earbuds as the wearable device of the research model would provide insights of why consumers tend to or not tend to purchase and use wearable technology.

2.7 Conceptual Model and Hypotheses Development

As this study examines consumers' perception toward wearable technology, the conceptual model is based on and extended from UTAUT2. UTAUT2 focuses on technology acceptance from a consumer's point of view, while previous technology acceptance models focus on technology acceptance from an employee's point of view at a workplace (Venkatesh et

al., 2012). Perceived Health Risk and Privacy Risk, two of the eight facets of Perceived Risk from Luo et al. (2010), are added to understand the impact of Perceived Risk on consumers' attitude toward wearable technology. In addition, fashionability and Wearable Comfort from Herz and Rauschnabel (2019) are added to understand consumers' acceptance of wearable technology from an aesthetic view. Gender is a moderator from UTAUT2 that will help understand how it affects the relationships between variables. Figure 9 is the conceptual model of this study. The definitions of the perception constructs are listed under Table 6.

Consumers have expectations of a technology's performance or functionality. For example, a consumer could expect a wireless earbud to provide stable and high quality music while jogging. Depending on how this consumer evaluates the earbud's performance and stability, she/he would have either a positive or negative perception toward wireless earbuds. Regardless of the wearable's actual performance, there is a higher chance of a consumer adopting the wearable device if the consumer thinks the device's performance meets or exceeds her/his expectations. Consumers will most likely purchase and use wearable devices if they think the device is useful and helpful for achieving goals in a quickly manner by increasing productivity. In contrast, there is a lower chance of a consumer adopting the wearable device if the consumer thinks the device's performance does not meet her/his expectations. Performance Expectancy is similar to functional quality, which is one of the three broad categories of factors that explain why people chose particular apparel (Herz and Rauschnabel, 2019). Therefore, the study hypothesizes that:

H1: Performance Expectancy has a positive influence on behavioral intention of purchasing wearable devices.

Difficulty of using a wearable device could impact a consumer's intention to adopt it. For instance, some consumers would prefer wired headsets than wireless earbuds since it is easier to use by just plugging the headphone jack into the music player while wireless earbuds require an initial Bluetooth sync-up with the music player. In addition, some consumers could think that recharging batteries of the wireless earbuds is inconvenient while wired headsets do not require batteries. Certain consumers could think wireless earbuds are difficult to use due to their initial setup, which requires a certain level of technical knowledge, and inconvenient due to frequent battery recharges. In contrast, others could think that wireless earbuds are easy to use as they automatically connect to the music player after the initial sync-up. There is a higher chance of consumers purchasing and using wireless earbuds if they think wireless earbuds are understandable, easy to use, and easy to become skillful at using them. Depending on how difficult a consumer thinks using a wearable device is, the consumer will have either a positive or negative attitude toward using the wearable technology. Thus, the study hypothesizes that:

H2: Effort Expectancy has a positive influence on behavioral intention of purchasing wearable devices.

A consumer's perception toward wearable devices could be affected by how others view the technology. When the image of Apple's first wireless headphones called AirPods® was revealed, many people made fun of their design and spread jokes on social media, comparing their design to a toothbrush head (Newcomb, 2016). These jokes could have caused consumers to be hesitant purchasing and using AirPods®, especially for consumers who care about others' opinions. If an individual is surrounded by family, friends, or coworkers who are wearable device users, the individual could have a positive perception toward wearable devices or be encouraged to try a wearable device. The impact will be stronger if the people surrounding the

individual are important to the individual, influence the individual's behavior, or whose opinions that the individual values. In contrast, if an individual is surrounded by people who are against, complain, or make fun of wearable devices, the individual may have a negative perception toward wearable devices or be discouraged to give them a try. Therefore, the study hypothesizes that:

H3: Social Influence has a positive influence on behavioral intention of purchasing wearable devices.

The existence and quality of organizational and technical support could impact consumers' intention of purchasing and using wearable devices. Since wearable technology is relatively new, consumers may think that there is not enough resources or knowledge to verify the durability of wearable products. The existence of organizational and technical support, such as customer service or warranty programs, may diminish these concerns. If a consumer thinks the quality of customer service and warranty programs is reliable, she/he could have a positive attitude toward wearable devices and be encouraged to use them. In addition, there is a higher chance of a consumer purchasing and using wireless earbuds if the earbuds are compatible with other technologies the consumer has been using. Thus, the study hypothesizes that:

H4: Facilitating Conditions have a positive influence on behavioral intention of purchasing wearable devices.

Prior IS research, in the consumer technology use context, has found that Hedonic Motivation is an important determinant of technology acceptance and use (Brown & Venkatesh, 2005). Consumers may consider using wearable devices not only for their functionalities, but also for entertainment. Entertainment perspective is one of the gaps that Niknejad et al. identified from their literature review of wearable technology (Niknejad et al., 2020). Researching how

Hedonic Motivation affects consumers' perception toward wireless earbuds will fill in this gap in the literature and provide more insights about wearable technology acceptance. There is a higher chance of a consumer purchasing wireless earbuds if she or he thinks activities, such as listening to music or making phone calls, of wireless earbuds are fun, enjoyable, and entertaining. Therefore, the study hypothesizes that:

H5: Hedonic Motivation has a positive influence on behavioral intention of purchasing wearable devices.

Pervious technology acceptance research was conducted in an organizational environment, meaning employees did not need to consider monetary cost when accepting new technology as the cost was covered by the organization (Venkatesh et al., 2012). However, this research studies technology acceptance from a consumer's perspective with UTAUT2; thus, Price Value could affect the consumer's perception toward wearable technology as consumers usually bear the monetary cost (Venkatesh et al., 2012). The price of AirPods Pro®, the latest and most advanced wireless earbud product from Apple, is $249.00 while EarPods®, the basic wired headset from Apple, are priced at $29.00 ("iPhone Accessories", 2020). This makes the wireless earbuds approximately nine times more expensive than the wired ones. Some consumers may think $249.00 for wireless earbuds is reasonable and affordable while others may think it is too expensive when compared to the wired earbuds at $29.00. If a consumer thinks wearable devices are overpriced, she/he may have a negative perception toward using wearable devices. Consumers will most likely purchase wireless earbuds if they think wireless earbuds are reasonably priced, good value for the money, or provide good value at the price. Thus, this study hypothesizes that:

H6: Price Value has a positive influence on behavioral intention of purchasing wearable devices.

Based on previous findings from literature, Venkatesh et al. stated that habit is a perceptual construct reflecting the results of prior experiences (Venkatesh et al., 2012). Prior experience includes prior use (Limayem et al., 2007) and feedback from pervious experiences (Ajzen and Fishbein, 2005). However, habit and experience are different. According to Venkatesh et al., experience is a necessary but not sufficient condition for the formation of habit (Venkatesh et al., 2012). In addition, experience can result in the formation of different levels of habit (Venkatesh et al., 2012). Prior experience of using wired headsets that built a habit of listening to music privately could affect the acceptance of wireless earbuds. If a consumer thinks that using wireless earbuds would become a habit and a must to use, she or he will most likely purchase wireless earbuds. Therefore, this study hypothesizes that:

H7: Habit has a positive influence on behavioral intention of purchasing wearable devices.

As mentioned earlier, there have been debates on the health risk of wearable devices. There are concerns of wearable devices raised by researchers because people wear these electronics, that use wireless technology and rechargeable batteries, for a long period of time (Waugh, 2019; Bilton, 2015; Waugh, 2019). However, there are other researchers who claim that there is no evidence of these health risks and wearable devices are safe to use (Waugh, 2019; Bilton, 2015; Heid, 2019). There is a possibility that there is not enough data yet to study these potential health risks because wearable technology is relatively new to the consumer market. Regardless of the truth, these debates of health risks could affect how consumers view wearable technology. There is a higher chance of consumers purchasing wireless earbuds if they think

using wireless earbuds is completely safe. In contrast, there is a lower chance of consumers purchasing wireless earbuds if they think long-term usage of wireless earbuds could be harmful due to wireless radiation. Perceived Health Risk is the other gap identified by Niknejad et al. from their literature review of wearable technology (Niknejad et al., 2020). Studying the influence of Perceived Health Risk on consumers' behavior toward wireless earbuds will provide more insights of consumer behavior, especially because consumers could be more sensitive to health concerns due to the COVID-19 pandemic. Thus, this study hypothesizes that:

H8: Perceived Health Risk has a negative influence on behavioral intention of purchasing wearable devices.

How a consumer perceives privacy risk of wearable devices could affect her/his behavior toward wearable technology. Even though wireless earbuds only play music, they are connected to the main source, such as a smart phone, through bluetooth wireless technology. This means hackers might be able to access other's smart phones by hacking wireless earbuds. Regardless of the actual possibility of hacking, how sensitive a consumer is regarding privacy protection could affect how she/he views wearable devices. If a consumer is concerned of personal information being collected by companies or exposed to hackers, she/he may select using wired headsets instead of wirless earbuds. In contrast, if a consumer think wireless earbuds are secured enough, there is a higher chance of the consumer purchasing wireless earbuds. Therefore, this study hypothesizes that:

H9: Perceived Privacy Risk has a negative influence on behavioral intention of purchasing wearable devices.

Since wearable devices are wearables and exposed with other outfits, the design of wearable devices could affect a consumer's intention of using wearable devices. Consumers,

who use wireless earbuds to answer phone calls at work, would consider the design or color of their wireless earbuds to make sure they look professional at work. Even though jokes of Apple's AirPods® design spread around social media, there could be consumers who think the design is acceptable while others think the design is a joke. There is a higher chance of consumers purchasing wireless earbuds if they think wireless earbuds are fashionable and look good at them; while others who think wearing wireless earbuds is funny will most likely not purchase them. Wearable devices could be considered as fashion items; thus, the study hypothesize that:

H10: Perceived Fashionability has a positive influence on behavioral intention of purchasing wearable devices.

How comfortable a consumer thinks a wearable device is could influence the consumer's intention of purchasing and using wearable devices. Wearable Comfort could be a critical factor of evaluating a wearable device, especially since wearable devices are worn for a long period of time. For example, a consumer would most likely not wear wireless earbuds all day if they are uncomfortable or bother normal activities. A consumer would not wear wireless earbuds if they make her or his ears uncomfortable physically while jogging or exercising. The weight of wireless earbuds or how well they fit into ears could also affect the consumers' decision of purchasing wireless earbuds. Therefore, the study hypothesizes that:

H11: Wearable Comfort has a positive influence on behavioral intention of purchasing wearable devices.

Venkatesh et al. also studied the moderating effects of gender on the constructs in UTAUT2 (Venkatesh et al., 2012). UTAUT2 theorizes that gender moderates the effect of Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Hedonic Motivation, Price Value, and habit on behavioral intention (Venkatesh et al., 2012). Instead of

re-testing the moderating effect of gender on UTAUT2 constructs, this study will focus on the moderating effect of gender on the perceived risk constructs (Perceived Health Risk and Perceived Privacy Risk) and fashnology constructs (Perceived Fashionability and Wearable Comfort) added to UTAUT2. According to the study from Finucane et al., women manifest more insecurity than men, as women perceive more threats from potential hazards (Finucane et al., 2000). This could apply to both Perceived Health Risk and Perceived Privacy Risk. A study from O'Cass and Julian found that consumer involvement in fashion clothing is significantly affected by gender with females being more involved (O'Cass & Julian, 2001). This could apply to both Perceived Fashionability and Wearable Comfort. However, both studies from Finucane et al. (2000) and O'Cass and Julian (2001) were conducted in the early 2000s. It will be interesting to see if the moderating effects of gender have changed after two decades, especially for a product that is not only considered as a tech product, but also a fashion product. Thus, the study hypothesizes that:

H12a: Gender moderates the influence of Perceived Health Risk on behavioral intention to purchase wearable devices, such that the effect will be stronger among women.

H12b: Gender moderates the influence of Perceived Privacy Risk on behavioral intention to purchase wearable devices, such that the effect will be stronger among women.

H12c: Gender moderates the influence of Perceived Fashionability on behavioral intention to purchase wearable devices, such that the effect will be stronger among women.

H12d: Gender moderates the influence of Wearable Comfort on behavioral intention to purchase wearable devices, such that the effect will be stronger among women.

According to Ajzen, intentions are presumed to be an indicator of to what extent people are willing to approach a certain behavior (Ajzen, 1991). Consumers who intend to adopt

wireless earbuds will consider purchasing them. Consumers who already own wireless earbuds may consider repurchasing more for different purposes. For example, a consumer may consider ordering a second pair of wireless earbuds so one set could be used at work and the other being used while exercising. There could also be cases of consumers, who already own wireless earbuds, considering buying the next generation wireless earbuds as an upgrade. Following intention to purchase, consumers will consider how frequently they would use wireless earbuds. Therefore, it is hypothesized that behavioral intention to purchase wireless earbuds drives use intentions.

H13a: Behavioral intention to purchase wearable devices has a significant influence on behavioral intention to use wearable devices.

H13b: Behavioral intention to purchase wearable devices serves as a mediator in the relationships between Performance Expectancy and behavioral intention to use wearable devices.

H13c Behavioral intention to purchase wearable devices serves as a mediator in the relationships between Effort Expectancy and behavioral intention to use wearable devices.

H13d: Behavioral intention to purchase wearable devices serves as a mediator in the relationships between Social Influence and behavioral intention to use wearable devices.

H13e: Behavioral intention to purchase wearable devices serves as a mediator in the relationships between Facilitating Conditions and behavioral intention to use wearable devices.

H13f: Behavioral intention to purchase wearable devices serves as a mediator in the relationships between Hedonic Motivation and behavioral intention to use wearable devices.

H13g: Behavioral intention to purchase wearable devices serves as a mediator in the relationships between Price Value and behavioral intention to use wearable devices.

H13h: Behavioral intention to purchase wearable devices serves as a mediator in the relationships between habit and behavioral intention to use wearable devices.

H13i: Behavioral intention to purchase wearable devices serves as a mediator in the relationships between Perceived Health Risk and behavioral intention to use wearable devices.

H13j: Behavioral intention to purchase wearable devices serves as a mediator in the relationships between Perceived Privacy Risk and behavioral intention to use wearable devices.

H13k: Behavioral intention to purchase wearable devices serves as a mediator in the relationships between Perceived Fashionability and behavioral intention to use wearable devices.

H13l: Behavioral intention to purchase wearable devices serves as a mediator in the relationships between Wearable Comfort and behavioral intention to use wearable devices.

Besides these constructs, three control variables are included in this study: age, experience, and awareness of health risk. Age is controlled since there is a higher chance of younger consumers having better knowledge of wearable technology, impacting their reactions toward the technology. Consumers' reactions toward wireless earbuds would most likely change after they try or own the earbuds; thus, experience is controlled. Reactions toward wireless earbuds would be different between consumers who are aware and not aware of the earbuds' potential health risks; thus, awareness of wireless earbuds' potential health risks is also controlled.

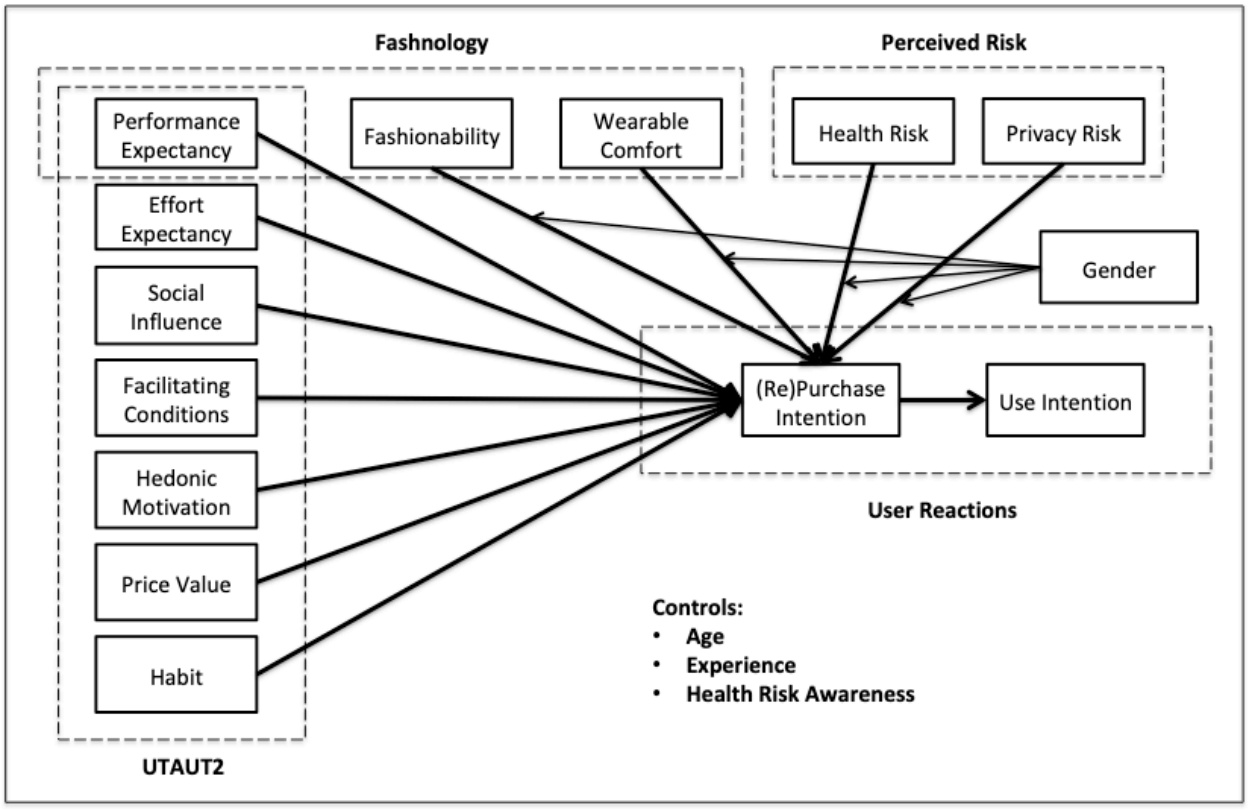

Figure 9. Conceptual Model.

Table 6. Definition of Perception Constructs.

Construct	Author(s)/Year	Definition
Performance Expectancy	Venkatesh et al. (2003)	"The degree to which an individual believes that using the system will help him or her to attain gains in job performance."
Effort Expectancy	Venkatesh et al. (2003)	"The degree of ease associated with the use of the system."
Social Influence	Venkatesh et al. (2003)	"The degree to which an individual perceives that important others believe he or she should use the new system."
Facilitating Conditions	Venkatesh et al. (2003)	"The degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system."
Hedonic Motivation	Brown & Venkatesh (2005)	"The fun or pleasure derived from using a technology."
Price Value	Dodds et al. (1991)	"Consumers' cognitive tradeoff between the perceived benefits of the applications and the monetary cost for using them."

Construct	Author(s)/Year	Definition
Habit	Limayem et al. (2007)	"The extent to which people tend to perform behaviors automatically because of learning."
Health Risk	Jacoby & Kaplan (1972)	"The risk to the buyer's or other's safety in using products."
Privacy Risk	Featherman & Pavlou (2003)	"Potential loss of control over personal information, such as when information about you is used without your knowledge or permission."
Fashionability	Homburg et al. (2015)	"The perception of the design component."
Wearable Comfort	Herz & Rauschnabel (2019)	"Consumers' overall subjective assessment of the physical feeling from wearing."

Chapter 3. Methodology

3.1 Measurement

Every scale is adapted from previous research. The survey items are included in Appendix B. The scales for Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Hedonic Motivation, Price Value, habit, and behavioral intention to use are drawn from Venkatesh et al. (2012). The scales for Perceived Health Risk, Perceived Privacy Risk, Perceived Fashionability, Wearable Comfort, and behavioral intention to (re)purchase are adapted from Herz and Rauschnabel (2019). Every survey item was measured using a seven-point Likert scale ranging from 1 ("strongly disagree") to 7 ("strongly agree"). Age was measured in years and gender was coded using a 0 or 1 dummy variable where 0 represents women. Experience was coded using a 0 or 1 dummy variable where 0 represents "does not own wireless earbuds" and 1 represents "owns wireless earbuds". Awareness of health risks was coded using a 0 or 1 dummy variable where 0 represents "not aware" and 1 represents "aware" of the potential health risks of wireless earbuds. For additional insights, duration of ownership and any feedback of purchasing and using wireless earbuds were asked as optional questions. Duration of ownership was measured in months. Except duration of ownership and feedback, every other question was set as required to answer for completing the survey in order to prevent missing value.

3.2 Participants and Data Collection Procedure

The survey included a short description of wireless earbuds and their main functionalities for participants who are not familiar with wireless earbuds. Based on the response of the control question asking experience (if the participant owns or not owns wireless earbuds), the participant accessed different question sets that were mostly identical but with slightly different terms to be

applicable to the participant's situation. First, 23 Doctorate of Business Administration (DBA) students completed the pilot survey. Based on responses from the pilot, quality of the survey questions was reviewed and improved. For example, there was confusion of the meaning of "re-purchasing wireless earbuds"; thus, a brief description was added ("additional pair for different occasions or upgrading to next model").

The finalized survey was then distributed to panelists through Qualtrics, an American experience management company. The survey was distributed to all consumers who own wireless earbuds and who do not own wireless earbuds. This set up a non-fragmented perspective on consumers' actual behavior toward wireless earbuds (Herz and Rauschnabel, 2019). The panelists were located in the United States and their ages were 18 or higher. A total of 304 panelists accessed the online survey and 276 of them completed the survey (90.79% response rate); however, 71 completed surveys were removed due to inaccurate answers. Thus, a total of 205 completed survey data was analyzed for this study (67.43% response rate out of 304 panelists). The sample size of 205 meets the suggested minimum threshold of "ten times the largest number of structural paths directed at a particular latent construct in the structural model" (Hair et al., 2011). In addition, 205 exceeds the sample size of 132 calculated by the G*Power software (version 3.1).

3.3 Data Analysis Methods

The Partial Least Squares (PLS) software was used to test the model as PLS is capable of testing the effects from a number of interaction terms (Chin et al., 2003). Using the Smart-PLS software (version 3.3.3), the measurement model and structural model were examined. The measurement model, also called the outer model, describes the relationships between the constructs and the indicator variables (Hair et al., 2016). The structural model, also called the

inner model, represents the constructs and describes the relationships between the constructs (Hair et al., 2016). Beside the optional questions, answering every survey question was required for completing the survey; thus missing value treatment was not needed.

The reliability and validity of the measurement model were evaluated by assessing internal consistency reliability (ICR), indicator reliability, convergent validity, and discriminant validity. Cronbach's alpha, which is a traditional criterion for internal consistency, provides an estimate of the reliability based on the intercorrelations of the observed indicator variables (Hair et al., 2016). For reliability to be acceptable, Cronbach's alpha from ICR needs to be higher than 0.70 (Hair et al., 2011). Indicator reliability is the size of the outer loading (Hair et al., 2016). For indicator reliability, the standardized indicator loadings should be 0.708 or higher (Hair et al., 2016).

Convergent validity is the degree to which a measure correlates positively with alternative measures of the same construct (Hair et al., 2016). The average variance extracted (AVE), which is a common measure to establish convergent validity on the construct level, is defined as "the grand mean value of the squared loadings of the indicators associated with the construct" (Hair et al., 2016). For convergent validity, AVE should be 0.50 or higher, meaning the construct explains more than half of the variance of its indicators on average (Hair et al., 2016). Discriminant validity is the degree to which a construct is truly distinct from other constructs by empirical standards (Hair et al., 2016). There are two measures of discriminant validity: cross-loadings and the Fornell-Larcker criterion (Hair et al., 2016). Cross-loadings mean the indicator's correlation with other constructs in the model and as a rule of thumb, an indicator's outer loading on the associated construct should be greater than any of its correlation on other constructs (Hair et al., 2016). The Fornell-Larcker criterion compares the square root of

the AVE values with their correlations with every other construct and as a rule of thumb, the square root of each construct's AVE should be greater than its highest correlation with any other construct in the model (Hair et al., 2016).

For evaluating the structural model, the coefficient of determination (R^2 value) and the level and significance of the path coefficients are the primary criteria (Hair et al., 2011). R^2 is a "measure of the model's predictive power and is calculated as the squared correlation between a specific endogenous construct's actual and predicted values" (Hair et al., 2016). As a rule of thumb, R^2 values of 0.75, 0.50, or 0.25 for endogenous latent variables can be respectively described as substantial, moderate, or weak (Hair et al., 2011). The level and significance of the path coefficients are assessed through bootstrapping (Hair et al., 2011). In bootstrapping, subsamples are randomly drawn from the original sample with replacement (Hair et al., 2016). This way, results will show if each direction in the model is significant and if they eventually support the hypotheses (Hair et al., 2011). For this study, 300 subsamples were set for bootstrapping.

From a preliminary analysis, it was discovered that the constructs from fashnology (Perceived Fashionability and Wearable Comfort) and perceived risk (Perceived Health Risk and Perceived Privacy Risk) were highly correlated with some of the constructs from UTAUT2. This was one of the anticipated results due to the complexity of the model. In addition, this is the first time for fashnology constructs and perceived risk constructs to be examined with UTAUT2 constructs. As the purpose of this study is to primarily examine the influence of fashionability and perceived risks on a consumer's intention to (re)purchase and use wearable devices, it was decided to analyze data only from the fashnology and perceived risk constructs. Therefore,

hypotheses H8 to H12, H13a, and H13i to H13l are examined. Table 7 is the list of focused hypotheses and Figure 10 is the focused model.

Table 7. Focused Hypotheses.

H8	Perceived Health Risk has a negative influence on behavioral intention of purchasing wearable devices.
H9	Perceived Privacy Risk has a negative influence on behavioral intention of purchasing wearable devices.
H10	Perceived Fashionability has a positive influence on behavioral intention of purchasing wearable devices.
H11	Wearable Comfort has a positive influence on behavioral intention of purchasing wearable devices.
H12a	Gender moderates the influence of Perceived Health Risk on behavioral intention to purchase wearable devices, such that the effect will be stronger among women.
H12b	Gender moderates the influence of Perceived Privacy Risk on behavioral intention to purchase wearable devices, such that the effect will be stronger among women.
H12c	Gender moderates the influence of Perceived Fashionability on behavioral intention to purchase wearable devices, such that the effect will be stronger among women.
H12d	Gender moderates the influence of Wearable Comfort on behavioral intention to purchase wearable devices, such that the effect will be stronger among women.
H13a	Behavioral intention to purchase wearable devices has a significant influence on behavioral intention to use wearable devices.
H13i	Behavioral intention to purchase wearable devices serves as a mediator in the relationships between Perceived Health Risk and behavioral intention to use wearable devices.
H13j	Behavioral intention to purchase wearable devices serves as a mediator in the relationships between Perceived Privacy Risk and behavioral intention to use wearable devices.
H13k	Behavioral intention to purchase wearable devices serves as a mediator in the relationships between Perceived Fashionability and behavioral intention to use wearable devices.
H13l	Behavioral intention to purchase wearable devices serves as a mediator in the relationships between Wearable Comfort and behavioral intention to use wearable devices.

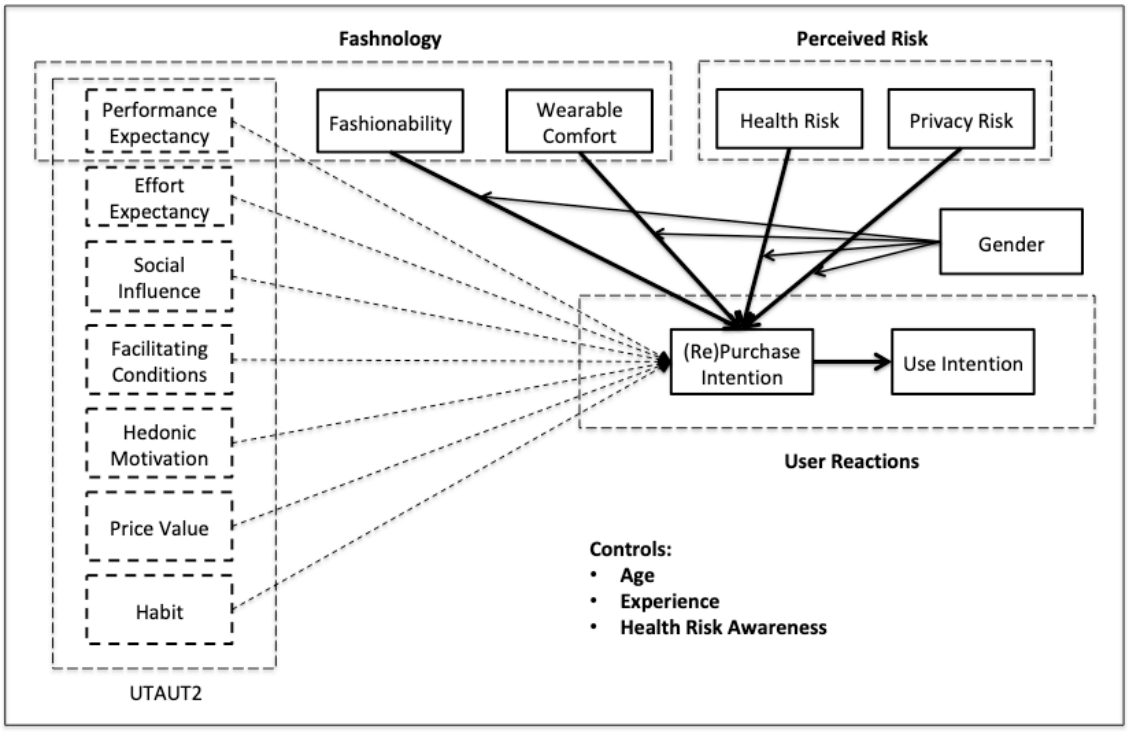

Figure 10. Focused Model.

Chapter 4. Data Analysis and Findings

4.1 Demographic Data Analysis

Answers from the control variable, moderator, and optional questions provide demographic information of the respondents: age, ownership of wireless earbuds, awareness of health risk, and gender. The youngest respondent is 18 years old and the oldest is 89. The average of the respondents' age is 43. The most respondents (60 respondents) in the age range from 30 to 39. The age range from 40 to 49 has the second most respondents (59 respondents). Table 9 provides the count of respondents by each age range. Among those who already owned earbuds, the shortest duration of owning wireless earbuds is a month and the longest duration is 100 months (eight years and four months). In this group, the average duration of ownership is 16 months (a year and four months).

Table 8. Descriptive Statistics of Age and Duration of Ownership.

Category	Minimum	Maximum	Mean
Age	18	89	43
Duration of Ownership (months)	1	100	16

Table 9. Count by Age Range.

Age Range	Count	Percentage
18 - 19	4	2.0%
20 - 29	22	10.7%
30 - 39	60	29.3%
40 - 49	59	28.8%
50 - 59	29	14.1%
60 - 69	20	9.8%
70 - 79	10	4.9%
80 - 89	1	0.5%

Out of the total 205 respondents, there are more respondents who own wireless earbuds than who do not. One hundred and thirty respondents, which are 63.4% of the sample group, own wireless earbuds. More respondents are aware of the potential health risk of wireless earbuds than who are not. One hundred and sixteen respondents, which are 56.6% of the sample group, are aware of the potential health risks of wireless earbuds. There are more males than females who completed the survey. One hundred and sixteen males, which are 56.6% of the sample group, completed the survey. Table 10 provides the count and percentage of ownership, awareness of health risk, and gender.

Table 10. Count by Experience (Ownership), Awareness of Health Risk, and Gender.

Category	Count	Percentage
Experience (Ownership)		
Yes	130	63.4%
No	75	36.6%
Awareness of Health Risk		
Yes	116	56.6%
No	89	43.4%

Gender		
Female	89	43.4%
Male	116	56.6%

4.2 Results without Moderator (Gender)

First, the measurement model and structural model are examined without the moderating effect from gender. Survey items with low loadings are removed in order to improve the constructs' reliability and validity. Removed survey items are indicated in Appendix B. PLS Algorithm from Smart-PLS provides the reports of construct reliability and validity, discriminant validity, collinearity statistics (variance inflation factor), and R^2. Bootstrapping provides the specific indirect effects report for mediation effects and path coefficients report for path significance.

The construct reliability and validity report provides each construct's Cronbach's alpha and AVE. Cronbach's alpha needs to be higher than 0.70 for reliability (Heir et al., 2016). Cronbach's alpha from every construct exceeds 0.80; thus, all constructs are reliable. AVE needs to be 0.50 or higher for convergent validity (Heir et al., 2016). Every construct has AVE higher than 0.50, and thus satisfied validity. Table 11 provides every construct's Cronbach's alpha and AVE. Discriminant validity is examined by the Fornell-Larcker criterion. According to the discriminant validity report (Table 12), there are no constructs that have exceptionally high correlations. This means the constructs are truly distinct from each other by empirical standards. The correlation between Perceived Fashionability and Wearable Comfort is higher than others; however, it is believed to be reasonable since both of them are related to fashion. The collinearity statistics report provides the variance inflation factor (VIF), which is defined as "the reciprocal of the tolerance (Heir et al., 2016)". A potential collinearity problem is indicated if the VIF value

is 5 or higher (Heir et al., 2011). According to the collinearity statistics report (Table 13), every VIF value is below 5; thus, there are no collinearity problems.

Table 11. Construct Reliability and Validity without Moderator.

	Cronbach's Alpha	**Average Variance Extracted (AVE)**
(Re)Purchase Intention	0.884	0.812
Age	1.000	1.000
Awareness	1.000	1.000
Behavioral Intention to Use	0.914	0.853
Fashionability	0.820	0.847
Health Risk	0.806	0.560
Ownership	1.000	1.000
Privacy Risk	0.845	0.599
Wearable Comfort	0.853	0.773

Table 12. Discriminant Validity without Moderator (Fornell-Larcker Criterion).

	Purchase Intention	Age	Awareness	BI to Use	Fashionability	Health Risk	Ownership	Privacy Risk	Wearable Comfort
Purchase Intention	0.901								
Age	-0.272	1.000							
Awareness	0.201	-0.249	1.000						
BI to Use	0.840	-0.279	0.192	0.924					
Fashionability	0.668	-0.323	0.294	0.658	0.920				
Health Risk	-0.422	0.112	0.087	-0.442	-0.319	0.748			
Ownership	0.432	-0.288	0.254	0.524	0.363	-0.309	1.000		
Privacy Risk	-0.137	0.185	0.130	-0.175	-0.110	0.534	-0.098	0.774	
Wearable Comfort	0.642	-0.256	0.114	0.626	0.676	-0.406	0.356	-0.152	0.879

Table 13. Collinearity Statistics without Moderator (Variance Inflation Factor).

	VIF
Age	1.000
APHR	1.000
BITP1	3.100
BITP2	2.949
BITP3	2.052
BITU1	2.799
BITU2	3.417

BITU3	3.457
OWN	1.000
PF1	1.932
PF2	1.932
PHR1_r	1.219
PHR2	2.278
PHR3	2.455
PHR4	2.016
PPR1	2.637
PPR2	2.822
PPR3	2.010
PPR4	2.071
WC1	2.661
WC2	1.924
WC3	2.126

R^2 values of 0.75, 0.50, or 0.25 are respectively described as substantial, moderate, or weak (Heir et al., 2011). According to the R^2 report (Table 14), R^2 of (re)purchase intention is 0.560 and R^2 of behavioral intention to use is 0.757. Therefore, the model's predictive power is substantial. The specific indirect effects report provides the significance of the mediator. According to the report (Table 15), it is significant (p-value less than 0.05) that behavioral intention to (re)purchase mediates the relationship of Perceived Health Risk, Perceived Fashionability, and Wearable Comfort with behavioral intention to use. Therefore, hypotheses H13i, H13k, and H13l are supported. However, it is not significant that behavioral intention to (re)purchase mediates the relationship between Perceived Privacy Risk and behavioral intention to use. Therefore, hypothesis H13j is not supported. The path coefficients report provides the significance of each path in the model. According to the report (Table 16), p-values of behavioral intention to (re)purchase, Perceived Fashionability, Perceived Health Risk, and Wearable Comfort are lower than 0.05. Therefore, hypotheses H8, H10, H11, and H13a are supported. However, p-value of Perceived Privacy Risk is higher than 0.05. Therefore, Hypothesis H9 is not

supported. Table 17 provides a summary of the results of every hypothesis without moderation (H12).

Table 14. R Square without Moderator.

	R Square	**R Square Adjusted**
(Re)Purchase Intention	0.560	0.544
Behavioral Intention to Use	0.757	0.747

Table 15. Specific Indirect Effects without Moderator.

	Original Sample	**Sample Mean**	**Standard Deviation**	**t-statistic**	**p-value**
Age -> (Re)Purchase Intention -> BI to Use	-0.018	-0.015	0.034	0.524	0.600
Privacy Risk -> (Re)Purchase Intention -> BI to Use	0.035	0.023	0.042	0.837	0.403
Ownership -> (Re)Purchase Intention -> BI to Use	0.086	0.089	0.042	2.037	**0.043**
Health Risk -> (Re)Purchase Intention -> BI to Use	-0.114	-0.108	0.048	2.383	**0.018**
Fashionability -> (Re)Purchase Intention -> BI to Use	0.230	0.223	0.061	3.789	**0.000**
Awareness -> (Re)Purchase Intention -> BI to Use	0.018	0.021	0.034	0.517	0.606
Wearable Comfort -> (Re)Purchase Intention -> BI to Use	0.167	0.167	0.067	2.505	**0.013**

Table 16. Path Coefficients without Moderator.

	Original Sample	**Sample Mean**	**Standard Deviation**	**t-statistic**	**p-value**
(Re)Purchase Intention -> BI to Use	0.624	0.621	0.076	8.250	**0.000**
Age -> (Re)Purchase Intention	-0.028	-0.025	0.054	0.528	0.598
Age -> BI to Use	0.002	0.007	0.046	0.047	0.963
Awareness -> (Re)Purchase Intention	0.028	0.034	0.056	0.509	0.611
Awareness -> BI to Use	-0.014	-0.014	0.039	0.355	0.723
Fashionability -> (Re)Purchase Intention	0.368	0.359	0.084	4.407	**0.000**
Fashionability -> BI to Use	0.124	0.122	0.061	2.026	**0.044**

Health Risk -> (Re)Purchase Intention	-0.183	-0.174	0.075	2.446	**0.015**
Health Risk -> BI to Use	-0.049	-0.053	0.047	1.029	0.304
Ownership -> (Re)Purchase Intention	0.137	0.142	0.059	2.308	**0.022**
Ownership -> BI to Use	0.175	0.173	0.043	4.066	**0.000**
Privacy Risk -> (Re)Purchase Intention	0.057	0.040	0.069	0.825	0.410
Privacy Risk -> BI to Use	-0.022	-0.020	0.052	0.418	0.676
Wearable Comfort -> (Re)Purchase Intention	0.268	0.269	0.098	2.726	**0.007**
Wearable Comfort -> BI to Use	0.059	0.061	0.054	1.086	0.278

Table 17. Significance of Hypotheses without Moderator.

Hypothesis		**Result**
H8	Perceived Health Risk has a negative influence on behavioral intention of purchasing wearable devices.	**Supported**
H9	Perceived Privacy Risk has a negative influence on behavioral intention of purchasing wearable devices.	Not Supported
H10	Perceived Fashionability has a positive influence on behavioral intention of purchasing wearable devices.	**Supported**
H11	Wearable Comfort has a positive influence on behavioral intention of purchasing wearable devices.	**Supported**
H13a	Behavioral intention to purchase wearable devices has a significant influence on behavioral intention to use wearable devices.	**Supported**
H13i	Behavioral intention to purchase wearable devices serves as a mediator in the relationships between Perceived Health Risk and behavioral intention to use wearable devices.	**Supported**
H13j	Behavioral intention to purchase wearable devices serves as a mediator in the relationships between Perceived Privacy Risk and behavioral intention to use wearable devices.	Not Supported
H13k	Behavioral intention to purchase wearable devices serves as a mediator in the relationships between Perceived Fashionability and behavioral intention to use wearable devices.	**Supported**
H13l	Behavioral intention to purchase wearable devices serves as a mediator in the relationships between Wearable Comfort and behavioral intention to use wearable devices.	**Supported**

4.3 Results with Moderator (Gender)

As the moderator (gender) is a single item construct, it does not impact the reliability, discriminant validity, and VIF of the existing constructs. Therefore, analysis of the measurement model is not repeated and only the structural model is re-examined after adding the moderator. According to the R^2 report (Table 18), R^2 of (re)purchase intention is 0.568 and R^2 of behavioral intention to use is 0.757. Therefore, the model's predictive power is substantial. According to the specific indirect effects report (Table 19), it is significant (p-value less than 0.05) that behavioral intention to (re)purchase mediates the relationship of Perceived Health Risk, Perceived Fashionability, and Wearable Comfort with behavioral intention to use; thus, hypotheses H13i, H13k, and H13l are supported. However, it is not significant that behavioral intention to (re)purchase mediates the relationship between Perceived Privacy Risk and behavioral intention to use; thus, hypothesis H13j is not supported. According to the path coefficients report (Table 20), p-values of behavioral intention to (re)purchase, Perceived Fashionability, Perceived Health Risk, and Wearable Comfort are below 0.05. Therefore, hypotheses H8, H10, H11, and H13a are supported. However, p-values of Perceived Privacy Risk and every moderating effect from gender are higher than 0.05. Therefore, Hypotheses H9 and H12 are not supported. Table 21 provides a summary of the results of every hypothesis, including moderation (H12).

Table 18. R Square with Moderator.

	R Square	**R Square Adjusted**
(Re)Purchase Intention	0.568	0.541
Behavioral Intention to Use	0.757	0.745

Table 19. Specific Indirect Effects with Moderator.

	Original Sample	**Sample Mean**	**Standard Deviation**	**t-statistic**	**p-value**
Gender/PHR -> (Re)Purchase	0.019	0.022	0.045	0.426	0.671

Intention -> BI to Use					
Age -> (Re)Purchase Intention -> BI to Use	-0.019	-0.017	0.037	0.512	0.609
Privacy Risk -> (Re)Purchase Intention -> BI to Use	0.007	-0.004	0.056	0.123	0.902
Ownership -> (Re)Purchase Intention -> BI to Use	0.084	0.082	0.044	1.901	0.058
Gender/PF -> (Re)Purchase Intention -> BI to Use	0.060	0.047	0.069	0.875	0.382
Gender/PPR -> (Re)Purchase Intention -> BI to Use	0.034	0.038	0.041	0.822	0.412
Health Risk -> (Re)Purchase Intention -> BI to Use	-0.133	-0.135	0.063	2.102	**0.036**
Fashionability -> (Re)Purchase Intention -> BI to Use	0.187	0.194	0.069	2.703	**0.007**
Gender -> (Re)Purchase Intention -> BI to Use	-0.098	-0.086	0.203	0.481	0.631
Gender/WC -> (Re)Purchase Intention -> BI to Use	-0.066	-0.063	0.084	0.791	0.430
Awareness -> (Re)Purchase Intention -> BI to Use	0.015	0.018	0.036	0.415	0.678
Wearable Comfort -> (Re)Purchase Intention -> BI to Use	0.225	0.220	0.084	2.678	**0.008**

Table 20. Path Coefficients with Moderator.

	Original Sample	**Sample Mean**	**Standard Deviation**	**t-statistic**	**p- value**
(Re)Purchase Intention -> BI to Use	0.655	0.653	0.084	7.805	**0.000**
Age -> (Re)Purchase Intention	-0.029	-0.027	0.057	0.511	0.609
Age -> BI to Use	0.008	0.006	0.043	0.178	0.859
Awareness -> (Re)Purchase Intention	0.023	0.028	0.054	0.425	0.671
Awareness -> BI to Use	-0.008	-0.009	0.038	0.216	0.829
Fashionability -> (Re)Purchase Intention	0.285	0.296	0.097	2.949	**0.003**
Fashionability -> BI to Use	0.125	0.120	0.063	1.964	0.050
Gender -> (Re)Purchase Intention	-0.149	-0.134	0.310	0.482	0.630
Gender -> BI to Use	0.099	0.106	0.141	0.704	0.482
Gender/BITP -> BI to Use	-0.037	-0.040	0.050	0.744	0.457
Gender/PF -> (Re)Purchase Intention	0.092	0.072	0.102	0.900	0.369
Gender/PHR -> (Re)Purchase Intention	0.029	0.033	0.067	0.440	0.660

	Original Sample	Sample Mean	Standard Deviation	t-statistic	p- value
Gender/PPR -> (Re)Purchase Intention	0.051	0.061	0.064	0.801	0.423
Gender/WC -> (Re)Purchase Intention	-0.101	-0.097	0.127	0.796	0.427
Health Risk -> (Re)Purchase Intention	-0.202	-0.207	0.091	2.221	**0.027**
Health Risk -> BI to Use	-0.044	-0.053	0.047	0.939	0.349
Ownership -> (Re)Purchase Intention	0.128	0.124	0.063	2.046	**0.042**
Ownership -> BI to Use	0.167	0.167	0.048	3.482	**0.001**
Privacy Risk -> (Re)Purchase Intention	0.011	-0.006	0.085	0.124	0.901
Privacy Risk -> BI to Use	-0.024	-0.019	0.048	0.508	0.612
Wearable Comfort -> (Re)Purchase Intention	0.344	0.336	0.121	2.834	**0.005**
Wearable Comfort -> BI to Use	0.061	0.060	0.057	1.072	0.285

Table 21. Significance of Hypotheses with Moderator.

Hypothesis		**Result**
H8	Perceived Health Risk has a negative influence on behavioral intention of purchasing wearable devices.	**Supported**
H9	Perceived Privacy Risk has a negative influence on behavioral intention of purchasing wearable devices.	Not Supported
H10	Perceived Fashionability has a positive influence on behavioral intention of purchasing wearable devices.	**Supported**
H11	Wearable Comfort has a positive influence on behavioral intention of purchasing wearable devices.	**Supported**
H12a	Gender moderates the influence of Perceived Health Risk on behavioral intention to purchase wearable devices, such that the effect will be stronger among women.	Not Supported
H12b	Gender moderates the influence of Perceived Privacy Risk on behavioral intention to purchase wearable devices, such that the effect will be stronger among women.	Not Supported
H12c	Gender moderates the influence of Perceived Fashionability on behavioral intention to purchase wearable devices, such that the effect will be stronger among women.	Not Supported
H12d	Gender moderates the influence of Wearable Comfort on behavioral intention to purchase wearable devices, such that the effect will be stronger among women.	Not Supported
H13a	Behavioral intention to purchase wearable devices has a significant influence on behavioral intention to use wearable devices.	**Supported**

Hypothesis		Result
H13i	Behavioral intention to purchase wearable devices serves as a mediator in the relationships between Perceived Health Risk and behavioral intention to use wearable devices.	**Supported**
H13j	Behavioral intention to purchase wearable devices serves as a mediator in the relationships between Perceived Privacy Risk and behavioral intention to use wearable devices.	Not Supported
H13k	Behavioral intention to purchase wearable devices serves as a mediator in the relationships between Perceived Fashionability and behavioral intention to use wearable devices.	**Supported**
H13l	Behavioral intention to purchase wearable devices serves as a mediator in the relationships between Wearable Comfort and behavioral intention to use wearable devices.	**Supported**

Chapter 5. Discussions and Conclusion

Based on the results of this study, Perceived Health Risk, Perceived Fashionability, and Wearable Comfort have a significant impact on the consumer's decision of purchasing wireless earbuds. However, the moderating effect of gender on every path in the model is not significant. In addition, there is little difference between the results with and without gender as a moderator. By adding gender to the analysis, the R^2 of Purchase Intention has increased only slightly (from 0.560 to 0.568); however, the adjusted R^2 has decreased (from 0.544 to 0.541). The R^2 of Use Intention has remained the same (0.757); hence, the adjusted R^2 has decreased (from 0.747 to 0.745). The decrease of adjusted R^2 indicates that the added predictor (gender) as a moderator does not improve the model as expected. This could be because wireless earbuds are popular to everyone; thus, gender does not play a role when deciding to purchase or use wireless earbuds. In addition, there may be no difference in technical knowledge between genders. It has been almost 10 years since Venkatesh et al. studied the moderating effect of gender in UTAUT2 (Venkatesh et al., 2012). Each gender's characteristics may have changed since then. Further research is needed to better understand why gender is no longer a significant moderator as it used to.

The significance of Perceived Health Risk fills in the gap of literature in wearable technology, as the impact of Perceived Health Risk on accepting wearable devices has not been adequately studied so far. In addition, the significance of Perceived Health Risk provides a reason why Perceived Health Risk should be studied more for future research. Perceived Health Risk has a significant impact on intention to purchase wireless earbuds; however, it does not have a significant impact on intention to use wireless earbuds. This could mean that even before considering using wireless earbuds, consumers would not purchase wireless earbuds at all due to their potential health risks. In addition, once consumers purchase wireless earbuds, Perceived

Health Risk does not seem to affect their subsequent usage. Poor sales impact business; thus, it is important for practitioners to make sure that their technology and products are fully tested and safe to use before introducing them to the market. In addition, practitioners should help consumers understand that their products are safe to use. Differently from Perceived Health Risk, Perceived Privacy Risk does not have a significant impact on both intention to purchase and intention to use wireless earbuds. This could mean that consumers do not consider potential privacy risks when they purchase and use wireless earbuds or they may not be aware of any privacy risk related to wireless earbuds. None of the survey respondents mention privacy risks in their qualitative feedback while every other construct, including UTAUT2 constructs, is mentioned (Appendix C). For future research, adding a survey question asking if the respondent is aware of any privacy risk from using wearable devices will provide more insight.

The significance of Perceived Fashionality and Wearable Comfort reaffirms that consumers view wearable devices as not only technical devices, but also fashion items. Perceived Fashionality has a significant impact on both intention to purchase and intention to use wireless earbuds. This means consumers may not purchase and use a wearable device if they think the product is ugly. Practitioners should make sure to produce wearable devices that are not only highly technical, but also fashionable. In addition, wearable devices need to be not only fashionable, but also comfortable to wear.

Comparing the path coefficients and effect size between the three significant variables (Perceived Health Risk, Perceived Fashionality, and Wearable Comfort) provides insights of how impactful each variable is. Wearable Comfort has the highest path coefficient (0.344) while Perceived Fashionability is the second highest (0.285) and Perceived Health Risk the lowest (-0.202). The effect size, as known as f-Square, analyzes the relevance of constructs in explaining

selected endogenous constructs (Hair et al., 2016). A higher f-Square means larger effects of the construct on endogenous constructs. Same as the comparison of path coefficients, Wearable Comfort has the highest effect size (0.052) while Perceived Fashionability is the second highest (0.041) and Perceived Health Risk the lowest (0.039). The results of path coefficients and effect size imply that Wearable Comfort has the most impact on the consumer's intention to (re)purchasing wireless earbuds. In other words, consumers consider the fashion of wireless earbuds more than the wireless earbuds' potential health risks.

This study has limitations that could be opportunities for future research. First, survey data of constructs from UTAUT2 was excluded due to high correlation with the main constructs (perceived risks and fashnology) of this study. The small sample size was another reason for reconsidering the use of UTAUT2 variables. Studying each UTAUT2 construct (especially Hedonic Motivation which is another gap in literature) or a mix of them with perceived risk and fashnology constructs would provide a more accurate model of wearable technology acceptance and deeper insights of consumers' perceptions toward the technology. Second, the sample group for the survey is not truly random as Qualtrics hired the respondents through their panel program. Respondents were paid for completing the survey. If extra cash is the main reason for respondents spending their time on completing surveys, there may be a chance of them being price-sensitive consumers. This could impact the study results of Price Value on technology acceptance. A number of respondents mentioned in their qualitative feedback that the main reason they did not purchase wireless earbuds is their price. Studying a larger and truly randomized sample group will provide more insightful and accurate results. In addition, with a larger sample group, it will be possible to compare results between who already owns and those who do not own a wearable device. This approach will provide more insights of how ownership

could impact consumers' perceptions toward wearable devices and the consumers' intention of (re)purchasing and using wearable devices.

Even though studying the same model, results could be different depending on the type of wearable device, type of consumer, and how or why the device was purchased. The impact of perceptions could be different when accepting wireless earbuds and when accepting smart watches. For example, consumers may be more sensitive to privacy risk when accepting smart watches since they display personal information, such as emails and text messages, while wireless earbuds transmit sounds only. Im, et al. studied the impact of technology type on accepting communication technology (Im, et al., 2008). Adding technology type to the model for future research with a larger sample group could provide a more generalizable result. Different type of consumers will have different perceptions and needs. For example, a few of the survey respondents did not see the need of purchasing and using wireless earbuds due to their hearing conditions (hearing issues or wearing hearing aids). Patients who need to track their health conditions would have different motivations for using wearable devices. Motivation of purchasing a wearable device would be different if the buyer and the actual user are different. For example, perceptions toward wearable devices would be different between parents, who are purchasing the device for their children, and children who would be the actual users of the device. Consumers with different education level, salary, or jobs may also have different perceptions toward wearable devices.

Qualitative data from the survey provides more ideas of constructs to be added for future research. A number of respondents mentioned that they did not purchase wireless earbuds because they think wireless earbuds are small and easy to lose. Based on this perception, portability could be a new construct to be added for research. There was also a comment that the

respondent will not repurchase more wireless earbuds because they break easily; thus, durability could be another construct to be studied. Availability of alternatives could be another factor that impacts acceptance of wearable devices. Wired headsets could be an alternate option of wireless earbuds for listening to music. However, there is no alternative that provides the same functionality that smart glasses offer. A number of respondents also mentioned that they are against using wireless earbuds because they think wireless earbuds could become a distraction or a blocker of surroundings. These concerns could be added as new types of perceived risk. Conducting not only quantitative research, but also qualitative research could provide more insights and ideas for future research of wearable technology. As technology advances, new types of emerging technology will be introduced to the market. Technology acceptance models and studies should also evolve in order to understand consumers' perceptions toward these new technologies from an academic and also a practical point-of-view.

References

Abdrbo, A., & Hassanein, S. (2017). Effect of internet use for health information and internet addiction on adolescents' female high school health lifestyle. *Journal of Nursing Education and Practice*, *7*(12), 10-19.

Adapa, A., Nah, F. F. H., Hall, R. H., Siau, K., & Smith, S. N. (2018). Factors influencing the adoption of smart wearable devices. *International Journal of Human–Computer Interaction*, *34*(5), 399-409.

Adenuga, A. A. (2018). Investigating Adoption of Information Security Risk Assessment Methods and Tools in Healthcare Settings (Doctoral dissertation, Capella University).

Agarwal, R., & Prasad, J. (1997). The Role of Innovation Characteristics and Perceived Voluntariness in the Acceptance of Information Technologies. *Decision Sciences*, 28(3), 557–582. https://doi.org/10.1111/j.1540-5915.1997.tb01322.x

Ahadzadeh, A. S., Sharif, S. P., & Ong, F. S. (2018). Online health information seeking among women: the moderating role of health consciousness. *Online Information Review*, 42(1), 58-72.

Ahadzadeh, A. S., Sharif, S. P., Ong, F. S., & Khong, K. W. (2015). Integrating health belief model and technology acceptance model: an investigation of health-related internet use. *Journal of medical Internet research*, *17*(2), e45.

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, *50*(2), 179-211.

Ajzen, Icek. (1985). From Intentions to Actions: A Theory of Planned Behavior. In J. Kuhl & J. Beckmann (Eds.), *Action Control: From Cognition to Behavior* (pp. 11–39). Berlin, Heidelberg: Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-69746-3_2

Ajzen, Icek, & Fishbein, M. (1980). Understanding attitudes and predicting social behaviour. Prentice-Hall.

Ajzen, Icek., & Fishbein, M. (2005). The influence of attitudes on behavior. In D. Albarracín, B. T. Johnson, & M. P. Zanna (Eds.), *The handbook of attitudes* (p. 173–221). Lawrence Erlbaum Associates Publishers.

Anaya, L. S., Alsadoon, A., Costadopoulos, N., & Prasad, P. W. C. (2018). Ethical implications of user perceptions of wearable devices. *Science and engineering ethics*, *24*(1), 1-28.

Asingizwe, D., Poortvliet, P. M., Koenraadt, C. J., Van Vliet, A. J., Murindahabi, M. M., Ingabire, C., ... & Feindt, P. H. (2018). Applying citizen science for malaria prevention in Rwanda: an integrated conceptual framework. *NJAS-Wageningen Journal of Life Sciences*, 86, 111-122.

Baba, N. M., Baharudin, A. S., & Alomari, S. (2019). Determinants of users' intention to use smartwatch. *Journal of Theoretical and Applied Information Technology*, 97(18).

Babaoglu, H., Varan, O., Atas, N., Satis, H., Salman, R., Ozturk, M. A., ... & Tufan, A. (2019). Detection of Familial Mediterranean Fever attacks by using a connected activity tracker and assessment of impact of attacks to daily physical activities: a pilot study. *Clinical rheumatology*, *38*(7), 1941-1946.

Barfield, W., & Caudell, T. (2001). Basic concepts in wearable computers and augmented reality. In *Fundamentals of wearable computers and augmented reality* (pp. 19-42). CRC Press.

Basoglu, N. A., Goken, M., Dabic, M., Ozdemir Gungor, D., & Daim, T. U. (2018). Exploring adoption of augmented reality smart glasses: Applications in the medical industry. *Frontiers of Engineering Management*, 5(2), 167-181.

Bauer, R. A. (1960). Consumer behavior as risk taking. *Chicago, IL*, 384-398.

Becker, M. (2018). Understanding users' health information privacy concerns for health wearables. In Proc. 51st Hawaii Int. Conf. Syst. Sci. Vol. 9. pp. 3261–3270.

Bilton, N. (2015). The Health Concerns in Wearable Tech. *The New York Times*. Retrieved from https://www.nytimes.com/2015/03/19/style/could-wearable-computers-be-as-harmful-as-cigarettes.html

Bower, M., & Sturman, D. (2015). What are the educational affordances of wearable technologies?. *Computers & Education*, *88*, 343-353.

Brown, B. L. (2018). *Investigating Veterans' Behavior Factors and Attitude Toward Use of the eBenefits Portal* (Doctoral dissertation, Capella University).

Brown, S. A., & Venkatesh, V. (2005). A model of adoption of technology in the household: A baseline model test and extension incorporating household life cycle. *Management Information Systems Quarterly*, 29(3), 11.

Chin, W. W., Marcolin, B. L., & Newsted, P. R. (2003). A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study. *Information systems research*, *14*(2), 189-217.

Cocosila, M. (2011). User Acceptance of Cell Phone Support for Smoking Cessation: A UK – Canada Comparative Empirical Investigation. *ECIS 2011 Proceedings*, 127.

Cocosila, M. (2013). Role of user a priori attitude in the acceptance of mobile health: an empirical investigation. *Electronic Markets*, *23*(1), 15-27.

Cocosila, M., & Archer, N. (2010). Adoption of mobile ICT for health promotion: an empirical investigation. *Electronic Markets*, *20*(3-4), 241-250.

Cocosila, M., Archer, N., & Yuan, Y. (2009). Early investigation of new information technology acceptance: A perceived risk-motivation model. *Communications of the Association for Information Systems*, *25*(1), 30.

Cocosila, M., Turel, O., Archer, N., & Yuan, Y. (2006). Perceived Health Risk Effects on the Adoption of 3G Cell Phones. *AMCIS 2006 Proceedings*, 347.

Cocosila, M., Turel, O., Archer, N., & Yuan, Y. (2007). Perceived health risks of 3G cell phones: do users care?. Communications of the ACM, 50(6), 89-92.

Compeau, D. R., & Higgins, C. A. (1995). Computer Self-Efficacy: Development of a Measure and Initial Test. *MIS Quarterly*, 19(2), 189–211. https://doi.org/10.2307/249688

Davis, F. D. (1985). A technology acceptance model for empirically testing new end-user information systems : theory and results (Thesis, Massachusetts Institute of Technology). Retrieved from http://dspace.mit.edu/handle/1721.1/15192

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and Intrinsic Motivation to Use Computers in the Workplace1. *Journal of Applied Social Psychology*, 22(14), 1111–1132. https://doi.org/10.1111/j.1559-1816.1992.tb00945.x

Dehghani, M., & Dangelico, R. M. (2018). Smart wearable technologies: state of the art and evolution over time through patent analysis and clustering. *International Journal of Product Development*, *22*(4), 293-313.

Dehghani, M., & Kim, K. J. (2019). The effects of design, size, and uniqueness of smartwatches: perspectives from current versus potential users. *Behaviour & Information Technology*, *38*(11), 1143-1153.

Dimou, E., Manavis, A., Papachristou, E., & Kyratsis, P. (2016, April). A Conceptual Design of Intelligent Shoes for Pregnant Women. In *Workshop on Business Models and ICT Technologies for the Fashion Supply Chain* (pp. 69-77). Springer, Cham.

Dodds, W. B., Monroe, K. B., & Grewal, D. (1991). Effects of price, brand, and store information on buyers' product evaluations. *Journal of marketing research*, 28(3), 307-319.

Duffy, Clare. (2020). Why conspiracy theorists think 5G is bad for your health and why experts say not to worry. *CNN Business*. Retrieved from https://www.cnn.com/2020/06/14/tech/5g-health-conspiracy-debunked/index.html

Eadicicco, Lisa. (2019). Apple's AirPods are so popular they could become the company's third-largest product by 2021, analyst says. *Business Insider*. Retrieved from: https://www.businessinsider.com/apple-airpods-sales-growth-third-biggest-product-2021-2019-12

Elers, P. (2018). e-Healthcare: A critical examination of the patient portal initiative in New Zealand (Doctoral dissertation, Auckland University of Technology).

Featherman, M. S., & Pavlou, P. A. (2003). Predicting e-services adoption: a perceived risk facets perspective. *International journal of human-computer studies*, *59*(4), 451-474.

Fernandez, P. (2014). Wearable technology: beyond augmented reality. *Library Hi Tech News*.

Finucane, M. L., Slovic, P., Mertz, C. K., Flynn, J., & Satterfield, T. A. (2000). Gender, race, and perceived risk: The'white male'effect. *Health, risk & society*, *2*(2), 159-172.

Fishbein, M., & Ajzen, I. (1975). Belief, attitude, intention and behavior: an introduction to theory and research. Retrieved from https://trid.trb.org/view/1150648

Framingham, M. (2020). Shipments of Wearable Devices Reach 118.9 Million Units in the Fourth Quarter and 336.5 Million for 2019, According to IDC. *IDC*. Retrieved from https://www.idc.com/getdoc.jsp?containerId=prUS46122120

Goldberg, A. J. (2016). Industry Usage, Stakeholder Perceptions, and Usability Characteristics of Hazard Controls Leading to the Development of a Design Process and Taxonomy for Large Handheld Powered Equipment (Doctoral dissertation, Virginia Tech).

Gonzalez, E., Mitra, S., & Turel, O. (2018). Motivational Impacts on Intent to Use Health-Related Social Media. *Journal of Computer Information Systems*, 1-10.

Grewal, D., Gotlieb, J., & Marmorstein, H. (1994). The moderating effects of message framing and source credibility on the price-perceived risk relationship. *Journal of consumer research*, *21*(1), 145-153.

Grym, K., Niela-Vilén, H., Ekholm, E., Hamari, L., Azimi, I., Rahmani, A., ... & Axelin, A. (2019). Feasibility of smart wristbands for continuous monitoring during pregnancy and one month after birth. *BMC pregnancy and childbirth*, *19*(1), 1-9.

Guo, X., Han, X., Zhang, X., Dang, Y., & Chen, C. (2015). Investigating m-health acceptance from a protection motivation theory perspective: gender and age differences. *Telemedicine and e-Health*, *21*(8), 661-669.

Hachisu, T., Pan, Y., Matsuda, S., Bourreau, B., & Suzuki, K. (2018). FaceLooks: A Smart Headband for Signaling Face-to-Face Behavior. *Sensors*, *18*(7), 2066.

Hair Jr, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2016). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage publications.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing theory and Practice*, *19*(2), 139-152.

Hartwick, J., & Barki, H. (1994). Explaining the Role of User Participation in Information System Use. *Management Science*, 40(4), 440–465. https://doi.org/10.1287/mnsc.40.4.440

Heid, M. (2019). Are AirPods and Other Bluetooth Headphones Safe? Elemental. Retrieved from https://elemental.medium.com/are-airpods-and-other-bluetooth-headphones-safe-214a0449e13a

Herz, M., & Rauschnabel, P. A. (2019). Understanding the diffusion of virtual reality glasses: The role of media, fashion and technology. *Technological Forecasting and Social Change,* 138, 228-242.

Ho, S. M., Ocasio-Velázquez, M., & Booth, C. (2017). Trust or consequences? Causal effects of perceived risk and subjective norms on cloud technology adoption. *Computers & Security,* 70, 581–595. https://doi.org/10.1016/j.cose.2017.08.004

Homburg, C., Schwemmle, M., & Kuehnl, C. (2015). New product design: Concept, measurement, and consequences. *Journal of marketing*, *79*(3), 41-56.

Huh, Sung-Yoon. (2014). Quantifying Public Acceptance of Innovation Policy: A Demand-Oriented Analysis for Renewable Energy Policy (Doctoral dissertation, Seoul National University).

Im, I., Kim, Y., & Han, H. J. (2008). The effects of perceived risk and technology type on users' acceptance of technologies. *Information & Management*, *45*(1), 1-9.

"iPhone Accessories." (2020). *Apple*. Retreived from: https://www.apple.com/shop/iphone/iphone-accessories/headphones-speakers

Islam, S., Hoque, M. R., & Al Jamil, M. A. (2020). Predictors of users' preferences for online health services. *Journal of Consumer Marketing*, 37(2), 215-225.

Jacoby, J., & Kaplan, L. B. (1972). The components of perceived risk. *ACR Special Volumes*.

Joel, H. M. (2018). Consumer Willingness to Pay for Chicken Meat Derived From Chicken Fed on Insect-based Feed in Kenya (Doctoral dissertation, University of Nairobi).

Kalantari, M. (2017). Consumers' adoption of wearable technologies: literature review, synthesis, and future research agenda. *International Journal of Technology Marketing*, *12*(3), 274-307.

Kalantari, M., & Rauschnabel, P. (2018). Exploring the early adopters of augmented reality smart glasses: The case of Microsoft HoloLens. In *Augmented reality and virtual reality*(pp. 229-245). Springer, Cham.

Kim, H. (2018). Personal Health Records and Their Impact on Breast Cancer Screening among Women (Doctoral dissertation, The University of Memphis).

Kim, S. S., & Malhotra, N. K. (2005). A longitudinal model of continued IS use: An integrative view of four mechanisms underlying postadoption phenomena. *Management science*, *51*(5), 741-755.

Kwee-Meier, S. T., Bützler, J. E., & Schlick, C. (2016). Development and validation of a technology acceptance model for safety-enhancing, wearable locating systems. *Behaviour & Information Technology*, *35*(5), 394-409.

Li, J., Ma, Q., & Chan, A. (2019). HS. and Man. *Health monitoring through wearable technologies for older adults: Smart wearables acceptance model. Applied Ergonomics*, *75*, 2019.

Lidynia, C., Brauner, P., & Ziefle, M. (2017, July). A step in the right direction–understanding privacy concerns and perceived sensitivity of fitness trackers. In *International Conference on Applied Human Factors and Ergonomics* (pp. 42-53). Springer, Cham.

Limayem, M., Hirt, S. G., & Cheung, C. M. K. (2007). How habit limits the predictive power of intentions: the case of IS continuance. *MIS Quarterly*, 31(4), 705-737.

Luo, X., Li, H., Zhang, J., & Shim, J. P. (2010). Examining multi-dimensional trust and multi-faceted risk in initial acceptance of emerging technologies: An empirical study of mobile banking services. *Decision support systems*, *49*(2), 222-234.

Luthuli, M. M. (2017*). Data charges, delivery dependability, geographical distance, product risk and information quality as predictors of online purchase intention in the South African retail sector* (Doctoral dissertation, University of the Witwatersrand, Johannesburg).

MacDonald, A. J. (2017). Acceptance and Continuance Factors Associated with Mobile Medical App Use: A Qualitative Case Study of Diabetes Apps (Doctoral dissertation, Northcentral University).

Malhotra, N. K., Kim, S. S., & Agarwal, J. (2004). Internet users' information privacy concerns (IUIPC): The construct, the scale, and a causal model. *Information systems research*, *15*(4), 336-355.

Mani, Z., & Chouk, I. (2018). Consumer resistance to innovation in services: Challenges and barriers in the Internet of Things era. *Journal of Product Innovation Management*, *35*(5), 780-807.

Manika, D., Gregory-Smith, D., & Antonetti, P. (2017). Pride in Technology-Based Health Interventions: A Double-Edged Sword. *Psychology & Marketing*, *34*(4), 410-427.

Mann, S. (2013). Wearable computing. *The Encyclopedia of Human-Computer Interaction, 2nd Ed.*

Marín-Morales, J., Higuera-Trujillo, J. L., Greco, A., Guixeres, J., Llinares, C., Scilingo, E. P., ... & Valenza, G. (2018). Affective computing in virtual reality: emotion recognition from brain and heartbeat dynamics using wearable sensors. *Scientific reports*, *8*(1), 1-15.

Markovic, K., Temdemnou, A. K., & Ernst, C. P. H. (2016). The Influence of Perceived Reputation Enhancement on Wearable Action Camera Usage. *MKWI 2016 – Student Track*

Martins, C., Oliveira, T., & Popovič, A. (2014). Understanding the Internet banking adoption: A unified theory of acceptance and use of technology and perceived risk application. *International Journal of Information Management*, 34(1), 1–13. https://doi.org/10.1016/j.ijinfomgt.2013.06.002

Marton, C., & Choo, C. W. (2012). A review of theoretical models of health information seeking on the web. *Journal of Documentation*, 68(3), 330-352.

Meyer-Waarden, L. Elodie Attié. (2017). The impact of consumer well-being and trust on the Internet of Things adoption and word-of-mouth intentions. *Lars*, *7*(28.83), 30.

Mitchell, V. W. (1992). Understanding consumers' behaviour: Can perceived risk theory help. *Management Decision*, *30*(3), 26-31.

Molfenter, T. D. (2004). Modeling change agent behavior and sustainable adherence (Doctoral dissertation, The University of Wisconsin-Madison).

Monroe, V. D. (2018). Testing a smartphone application intervention to improve medication adherence in African American female clinic patients with unstable high blood pressure: A two-group randomized control trial (Doctoral dissertation, Texas Woman's University College of Nursing).

Moore, G. C., & Benbasat, I. (1991). Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation. *Information Systems Research*, 2(3), 192–222. https://doi.org/10.1287/isre.2.3.192

Muaremi, A., Arnrich, B., & Tröster, G. (2013). Towards measuring stress with smartphones and wearable devices during workday and sleep. *BioNanoScience*, *3*(2), 172-183.

Mwencha, P. M. (2015). Customers' perceptions and usage of online retailing services in Nairobi County, Kenya (Doctoral dissertation, Kenyatta University).

Nawawi, S. B., Roslin, R. B. M., & Hamid, N. B. A. (2018). Customers' Intention to Repurchase Halal Personal Care Products: The Moderating Role of Religiosity. In *Proceedings of the 2nd Advances in Business Research International Conference* (pp. 39-54). Springer, Singapore.

Nevitt, I. (2017). Motivations for the Adoption of M-Health Smartphone Applications (Doctoral dissertation, Northcentral University).

Newcomb, Alyssa. (2016). First reaction to Appe's AirPods? Anger, Confusion – and Memes. *NBC News*. Retrieved from https://www.nbcnews.com/tech/apple/first-reactions-apple-s-airpods-anger-confusion-memes-n644886

Niknejad, N., Ismail, W. B., Mardani, A., Liao, H., & Ghani, I. (2020). A comprehensive overview of smart wearables: The state of the art literature, recent advances, and future challenges. Engineering Applications of Artificial Intelligence, 90, 103529.

Nölke, L., Mensing, M., Krämer, A., & Hornberg, C. (2015). Sociodemographic and health-(care-) related characteristics of online health information seekers: a cross-sectional German study. *BMC public health*, *15*(1), 31.

Norfadzila, S., & Aderus, W. (2017). Modeling predictive factors of online health information use by urbanized Malaysian women (Doctoral dissertation, University of Malaya).

Null, K. D. (2010). Consumer Acceptance of Health-related Technologies: Incorporating Perceived Health Risk Into the Technology Acceptance Model (Doctoral dissertation, University of Mississippi).

Nunes, G. S., & Arruda Filho, E. J. M. (2018). Consumer behavior regarding wearable technologies: Google Glass. *Innovation & Management Review*.

Nwadeyi, E. (2018). Colorectal Cancer: Early Detection and Screening Among Immigrant Nigerians in the Western United States (Doctoral dissertation, Capella University).

O'Cass, A. and Julian, C.C. (2001),"Fashion clothing consumption: studying the effects of materialistic values, self-image/product-image congruency relationships, gender and age on fashion clothing involvement", *School of Commerce and Management. Southern Cross University*, pp. 1-6.

Otika, U., Olise, E., & Oby, O. B. (2019). Risk Perceptions and Online Shopping Intention among Internet Users In Nigeria. *Global Journal of Management And Business Research*, 19(6).

Ouverson, K., Kelly, N., & Gilbert, S. B. (2017, July). Fashion and technology: Implications for the social acceptability of a wearable device. In *International Conference on Human-Computer Interaction* (pp. 203-213). Springer, Cham.

Pound, Jesse. (2019). AirPods were a $6 billion business for Apple this year and will be even bigger next year, top analyst says. *CNBC*. Retrieved from: https://www.cnbc.com/2019/12/20/airpods-a-6-billion-business-for-apple-will-be-bigger-next-year.html?&qsearchterm=apple

Profita, H., Albaghli, R., Findlater, L., Jaeger, P., & Kane, S. K. (2016, May). The AT effect: how disability affects the perceived social acceptability of head-mounted display use. In *proceedings of the 2016 CHI conference on human factors in computing systems* (pp. 4884-4895).

Rauschnabel, P. A. (2018). A conceptual uses & gratification framework on the use of augmented reality smart glasses. In *Augmented reality and virtual reality* (pp. 211-227). Springer, Cham.

Rauschnabel, P. A., Hein, D. W., He, J., Ro, Y. K., Rawashdeh, S., & Krulikowski, B. (2016). Fashion or technology? A fashnology perspective on the perception and adoption of augmented reality smart glasses. *i-com*, *15*(2), 179-194.

Ricci, M., Terribili, M., Giannini, F., Errico, V., Pallotti, A., Galasso, C., ... & Saggio, G. (2019). Wearable-based electronics to objectively support diagnosis of motor impairments in school-aged children. *Journal of biomechanics*, *83*, 243-252.

Schindler, M. A. (2018). Content analysis of Twitter skin cancer awareness campaign "SunSmart" (Bachelor's thesis, University of Twente).

Seo, H. J. (2018). Attitudes, Perception and Preventive Behaviors for Health and Safety among College Students. *Korean Journal of Health Promotion*, *18*(4), 169-176.

Shakir, S. M. M., Wong, L. P., Abdullah, K. L., & Adam, P. (2019). Factors associated with online sexually transmissible infection information seeking among young people in Malaysia: an observational study. *Sexual health*, *16*(2), 158-171.

Sharma, S., & Khadka, A. (2019). Role of empowerment and sense of community on online social health support group. *Information Technology & People*, 32(6), 1564-1590.

Shuford III, B. J. (2018). An Assessment of the Perceptions of Telehealth Services by Veterans in theSan Francisco Bay Area (Doctoral dissertation, Golden Gate University).

Silver, R. A., Subramaniam, C., & Stylianou, A. (2020). The Impact of Portal Satisfaction on Portal Use and Health-Seeking Behavior: Structural Equation Analysis. *Journal of Medical Internet Research*, *22*(3), e16260.

Siraye, Z. (2014). Customers' adoption of electronic banking service channels in Ethiopia: an integration of technology acceptance model and perceived risk with theory of planned behaviour. *International Journal of Electronic Finance*, 8(1), 21. https://doi.org/10.1504/IJEF.2014.063993

Solangi, Z. A., Solangi, Y. A., & Aziz, M. S. A. (2017, August). An empirical study of Internet of Things (IoT)—Based healthcare acceptance in Pakistan: PILOT study. In *2017 IEEE 3rd International Conference on Engineering Technologies and Social Sciences (ICETSS)* (pp. 1-7). IEEE.

Svendsen, G. B., Soholt, Y., Munch-Ellingsen, A., Gammon, D., & Schurmann, A. (2009, January). The importance of being useful and fun: factors influencing intention to use a mobile system motivating for physical activity. In *2009 42nd Hawaii International Conference on System Sciences* (pp. 1-10). IEEE.

Tabaac, A. R. (2016). Gender and sexual health: Applying gender role theory to men and women's intention to engage in sexual health information seeking behaviors (Doctoral dissertation, Virginia Commonwealth University).

Tanwir, N. S., & Hamzah, M. I. (2020). Predicting Purchase Intention of Hybrid Electric Vehicles: Evidence from an Emerging Economy. *World Electric Vehicle Journal*, *11*(2), 35.

Tao, D., Shao, F., Liu, S., Wang, T., & Qu, X. (2016, September). Predicting factors of consumer acceptance of health information technologies: a systematic review. In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* (Vol. 60, No. 1, pp. 598-602). Sage CA: Los Angeles, CA: SAGE Publications.

Tatara, N., Kjøllesdal, M. K. R., Mirkovic, J., & Andreassen, H. K. (2016). eHealth use among first-generation immigrants from Pakistan in the Oslo area, Norway, with focus on diabetes: survey protocol. *JMIR research protocols*, *5*(2), e79.

Tatum, D., Ellen, P., Fitzgerald, P., & Eroglu, S. (2016, September). The Effect of Labeling on Mitigating Cognitive Biases about Food Irradiation: An Empirical Evaluation of Effects on Consumers' Attitudes and Purchase Intent. In *6th International Engaged Management Scholarship Conference*.

Tavares, J. M. S. F. (2018). Electronic health record portals adoption by health care consumers (Doctoral dissertation, NOVA Information Management School of Universidade NOVA de Lisboa).

Tavares, J., & Oliveira, T. (2016). Electronic health record patient portal adoption by health care consumers: an acceptance model and survey. *Journal of medical Internet research*, *18*(3), e49.

Tavares, J., & Oliveira, T. (2018). New integrated model approach to understand the factors that drive electronic health record portal adoption: cross-sectional national survey. *Journal of medical Internet research*, *20*(11), e11032.

Taylor, S., & Todd, P. (1995a). Assessing IT Usage: The Role of Prior Experience. *MIS Quarterly*, 19(4), 561–570. https://doi.org/10.2307/249633

Taylor, S., & Todd, P. A. (1995b). Understanding Information Technology Usage: A Test of Competing Models. *Information Systems Research*, 6(2), 144–176. https://doi.org/10.1287/isre.6.2.144

Tehrani, K., & Michael, A. (2014). Wearable technology and wearable devices: Everything you need to know. *Wearable Devices Magazine*, *26*.

Thompson, R. L., Higgins, C. A., & Howell, J. M. (1991). Personal Computing: Toward a Conceptual Model of Utilization. *MIS Quarterly*, 15(1), 125–143. https://doi.org/10.2307/249443

Tonacci, A., Billeci, L., Sansone, F., Masci, A., Pala, A. P., Domenici, C., & Conte, R. (2019). An innovative, unobtrusive approach to investigate smartphone interaction in nonaddicted subjects based on wearable sensors: A pilot study. *Medicina*, *55*(2), 37.

Utami, L. A., Kholil, I., Mazia, L., & Aulianita, R. (2018, August). Analysis of Electronic Logistics (E-Logis) System Acceptance Using Technology Acceptance Model (TAM). In *2018 6th International Conference on Cyber and IT Service Management (CITSM)* (pp. 1-6). IEEE.

van Lint, C. L. (2019). Exploring the potential of self-monitoring kidney function after transplantation: from patient acceptance to replacing outpatient care (Doctoral dissertation, Leiden University).

Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, 46(2), 186–204. https://doi.org/10.1287/mnsc.46.2.186.11926

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*, 27(3), 425–478. https://doi.org/10.2307/30036540

Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. *MIS quarterly*, 157-178.

Viseu, A. (2003). Social dimensions of wearable computers: an overview. *Technoetic Arts*, *1*(1), 77-82.

Wahyuni, R. (2017, August). Explaining acceptance of e-health services: An extension of TAM and health belief model approach. In *2017 5th International Conference on Cyber and IT Service Management (CITSM)* (pp. 1-7). IEEE.

Wang, W., van Lint, C. L., Brinkman, W. P., Rövekamp, T. J., van Dijk, S., van der Boog, P. J., & Neerincx, M. A. (2017). Renal transplant patient acceptance of a self-management support system. *BMC medical informatics and decision making*, *17*(1), 1-11.

Waugh, R. (2019). Wireless headphones like Apple Airpods 'could pose cancer risk', scientists warn. *Yahoo News*. Retrieved from https://news.yahoo.com/wireless-headphones-like-apple-airpods-pose-cancer-risk-scientists-warn-144751987.html

Weidman, J. E. (2012). Dust Control Usage: Strategic Technology Interventions (Doctoral dissertation, Virginia Tech).

Weidman, J., Dickerson, D. E., & Koebel, C. T. (2016). Effective intervention strategy to improve worker readiness to adopt ventilated tools. *Journal of Construction Engineering and Management*, *142*(8), 04016028.

Weidman, J., Dickerson, D., & Koebel, C. T. (2015). Prevention through Design: A Macroergonomic Conceptual Approach to Risk Reduction. *IIE Transactions on Occupational Ergonomics and Human Factors*, *3*(1), 24-36.

Weiz, D., Anand, G., & Ernst, C. P. H. (2016). The influence of subjective norm on the usage of smartglasses. In *The drivers of wearable device usage* (pp. 1-11). Springer, Cham.

Wertheimer, N., & Leeper, E. D. (1979). Electrical wiring configurations and childhood cancer. *American journal of epidemiology*, *109*(3), 273-284.

Wertheimer, N., & Leeper, E. D. (1982). Adult cancer related to electrical wires near the home. *International Journal of Epidemiology*, *11*(4), 345-355.

Wright, R., & Keith, L. (2014). Wearable technology: If the tech fits, wear it. *Journal of Electronic Resources in Medical Libraries*, *11*(4), 204-216.

Wu, Debby. (2019). Apple AirPods Shipments Expected to Double to 60 Million in 2019. *Bloomberg*. Retrieved from: https://www.bloomberg.com/news/articles/2019-11-22/apple-airpods-shipments-are-said-to-double-to-60-million-in-2019

Yun, E. K., & Park, H. A. (2010). Consumers' disease information–seeking behaviour on the Internet in Korea. *Journal of clinical nursing*, *19*(19-20), 2860-2868.

Zhang, L., Tan, W., Xu, Y., & Tan, G. (2012). Dimensions of Perceived Risk and Their Influence on Consumers' Purchasing Behavior in the Overall Process of B2C. In *Engineering Education and Management* (pp. 1-10). Springer, Berlin, Heidelberg.

Zhang, L., Xu, Y., Tan, G., He, Y., & Liu, X. (2011, August). Empirical research on the dimensions of consumer's perceived risk in the overall process of B2C. In *2011 2nd International Conference on Artificial Intelligence, Management Science and Electronic Commerce (AIMSEC)*(pp. 3013-3016). IEEE.

Zhang, Y., Liu, C., Luo, S., Xie, Y., Liu, F., Li, X., & Zhou, Z. (2019). Factors Influencing Patients' Intentions to Use Diabetes Management Apps Based on an Extended Unified Theory of Acceptance and Use of Technology Model: Web-Based Survey. *Journal of medical Internet research*, *21*(8), e15023.

Zhou, X. (2019). Examining the Influence of Technology Affordances of Fitness Trackers and Health Psychographic Factors on Physical Activity (Doctoral dissertation, State University of New York at Albany).

Appendices

Appendix A: Articles from Literature Review and Gaps

Author(s) /Year	Objective	Health Tec	Certain Tech Type	Certain Demographic Type	Not Tech Related	Perceived Health Risk not included
Abdrbo, A., & Hassanein, S. (2017)	Effect of Internet use for health information and internet addiction on adolescents female high school health lifestyle	X	X	X		X
Adapa, A., Nah, F. F. H., Hall, R. H., Siau, K., & Smith, S. N. (2018)	Factors influencing the adoption of smart wearable devices		X			
Adenuga, A. A. (2018)	Investigating adoption of information security risk assessment methods and tools in healthcare settings	X	X	X		X
Ahadzadeh, A. S., Sharif, S. P., & Ong, F. S. (2018)	Online health information seeking among women: the moderating role of health consciousness	X	X	X		
Ahadzadeh, A. S., Sharif, S. P., Ong, F. S., & Khong, K. W. (2015)	Integrating health belief model and technology acceptance model: an investigation of health-related internet use	X	X			
Asingizwe, D., Poortvliet, P. M., Koenraadt, C. J., Van Vliet, A. J., Murindahabi, M. M., Ingabire, C., ... & Feindt, P. H. (2018)	Integrated model of determinants of malaria prevention behavior			X	X	
Baba, N. M., Baharudin, A. S., & Alomari, S. (2019)	Intention to use Smart Watch		X			
Basoglu, N. A., Goken, M., Dabic, M., Ozdemir Gungor, D., & Daim, T. U. (2018)	Exploring adoption of augmented reality smart glasses: Applications in the medical industry	X	X	X		X
Brown, B. L. (2018)	Investigating veterans' behavior factors and attitude toward use of the eBenefits portal		X	X		X
Cocosila, M. (2013)	Role of user a priori attitude in the acceptance of mobile health	X	X			X

Author(s) /Year	Objective	Health Tec	Certain Tech Type	Certain Demographic Type	Not Tech Related	Perceived Health Risk not included
Cocosila, M., & Archer, N. (2010)	Adoption of mobile Information and Communications Technology (ICT) for health promotion: an empirical investigation	X	X			X
Cocosila, M., Archer, N., & Yuan, Y. (2009)	Early investigation of new information technology acceptance: A perceived risk-motivation model (wireless text messaging on cell phones to improve user adherence to healthy behavior)	X	X			X
Cocosila, M., Turel, O., Archer, N., & Yuan, Y. (2006)	Perceived Health Risk effects on the adoption of 3G cell phones		X			
Cocosila, M., Turel, O., Archer, N., & Yuan, Y. (2007)	Perception of health risks associated with mobile phones		X			
Elers, P. (2018)	e-Healthcare: A critical examination of the patient portal initiative in New Zealand	X	X	X		
Goldberg, A. J. (2016)	Industry usage, stakeholder perceptions, and usability characteristics of hazard controls leading to the development of a design process and taxonomy for large handheld powered equipment		X	X		
Gonzalez, E., Mitra, S., & Turel, O. (2018)	Motivational impacts on Intent to use health-related social media	X	X			X
Guo, X., Han, X., Zhang, X., Dang, Y., & Chen, C. (2015)	Investigating m-health acceptance from a protection motivation theory perspective: gender and age differences	X	X	X		
Herz, M., & Rauschnabel, P. A. (2019)	Virtual Reality (VR) Acceptance Framework		X			
Huh, Sung-Yoon. (2014)	Public acceptance of individual policies: A demand-oriented analysis for renewable energy policy				X	X
Joel, H. M. (2018)	Consumer willingness to pay for chicken meat derived from chicken fed on insect-based feed in Kenya			X	X	X
Kalantari, M. (2017)	Consumers' adoption of wearable technologies		X			

Author(s) /Year	Objective	Health Tec	Certain Tech Type	Certain Demographic Type	Not Tech Related	Perceived Health Risk not included
Kalantari, M., & Rauschnabel, P. (2018)	Exploring the early adopters of augmented reality smart glasses: The case of Microsoft HoloLens		X			X
Kim, H. (2018)	Personal health records and their impact on breast cancer screening among women	X	X	X		X
Luthuli, M. M. (2017)	Data charges, delivery dependability, geographical distance, product risk and information quality as predictors of online purchase intention in the South African retail sector		X	X		X
MacDonald, A. J. (2017)	Acceptance and continuance factors associated with mobile medical app use: A qualitative case study of diabetes apps	X	X	X		
Mani, Z., & Chouk, I. (2018)	Consumer resistance to innovation in services: Challenges and barriers in the Internet of Things era		X			
Manika, D., Gregory-Smith, D., & Antonetti, P. (2017)	Pride in technology-based health interventions	X	X			X
Markovic, K., Temdemnou, A. K., & Ernst, C. P. H. (2016)	The influence of perceived reputation enhancement on wearable action camera usage		X			X
Marton, C., & Choo, C. W. (2012)	A review of theoretical models of health information seeking on the web	X	X			
Meyer-Waarden, L. Elodie Attié (2017)	The impact of consumer well-being and trust on the Internet of Things (IoT)		X			
Molfenter, T. D. (2004)	Modeling change agent behavior and sustainable adherence				X	
Monroe, V. D. (2018)	Testing a smartphone application intervention to improve medication adherence in African American female clinic patients with unstable high blood pressure	X	X	X		
Mwencha, P. M. (2015)	Customers' perceptions and usage of online retailing services in Nairobi County, Kenya		X	X		X
Nawawi, S. B., Roslin, R. B. M., & Hamid, N. B. A. (2018)	Customers' intention to repurchase Halal personal care products: The moderating role of religiosity				X	
Nevitt, I. (2017)	Motivations for the adoption of M-health smartphone	X	X			X

Author(s) /Year	Objective	Health Tec	Certain Tech Type	Certain Demographic Type	Not Tech Related	Perceived Health Risk not included
	applications					
Niknejad, N., Ismail, W. B., Mardani, A., Liao, H., & Ghani, I. (2020)	A comprehensive overview of smart wearables		X			X
Nölke, L., Mensing, M., Krämer, A., & Hornberg, C. (2015)	Sociodemographic and health-(care-) related characteristics of online health information seekers	X	X			
Norfadzila, S., & Aderus, W. (2017)	Modeling predictive factors of online health information use by urbanized Malaysian women	X	X	X		
Null, K. D. (2010)	Consumer acceptance of health-related technologies	X	X			
Nwadeyi, E. (2018)	Colorectal cancer: early detection and screening among immigrant Nigerians in the Western United States	X	X	X		
Otika, U., Olise, E., & Oby, O. B. (2019)	Risk perceptions and online shopping intention among Internet users In Nigeria		X	X		X
Rauschnabel, P. A. (2018)	A conceptual uses and gratification framework on the use of augmented reality smart glasses		X			
Rauschnabel, P. A., Hein, D. W., He, J., Ro, Y. K., Rawashdeh, S., & Krulikowski, B. (2016)	A fashnology perspective on the perception and adoption of augmented reality smart glasses		X			X
Schindler, M. A. (2018)	Content analysis of Twitter skin cancer awareness campaign	X	X			
Seo, H. J. (2018)	Perception and preventive behaviors for health and safety among college students			X	X	X
Shakir, S. M. M., Wong, L. P., Abdullah, K. L., & Adam, P. (2019)	Factors associated with online sexually transmissible infection information seeking among young people in Malaysia	X	X	X		X
Sharma, S., & Khadka, A. (2019)	Role of empowerment and sense of community on online social health support group	X	X			X
Shuford III, B. J. (2018)	Perceptions of Telehealth Services by Veterans	X		X		

Author(s) /Year	Objective	Health Tec	Certain Tech Type	Certain Demographic Type	Not Tech Related	Perceived Health Risk not included
Silver, R. A., Subramaniam, C., & Stylianou, A. (2020)	The Impact of Portal Satisfaction on Portal Use and Health-Seeking Behavior	X	X			
Solangi, Z. A., Solangi, Y. A., & Aziz, M. S. A. (2017, August)	An empirical study of Internet of Things (IoT)—Based healthcare acceptance in Pakistan	X	X	X		
Svendsen, G. B., Soholt, Y., Munch-Ellingsen, A., Gammon, D., & Schurmann, A. (2009, January)	Factors influencing intention to use a mobile system motivating for physical activity	X	X			
Tabaac, A. R. (2016)	Gender role theory to men and women's intention to engage in sexual health information seeking behaviors	X		X		X
Tanwir, N. S., & Hamzah, M. I. (2020)	Predicting Purchase Intention of Hybrid Electric Vehicles		X	X		X
Tao, D., Shao, F., Liu, S., Wang, T., & Qu, X. (2016, September)	Consumer acceptance of health information technologies	X	X			X
Tatara, N., Kjøllesdal, M. K. R., Mirkovic, J., & Andreassen, H. K. (2016)	eHealth use among first-generation immigrants from Pakistan in the Oslo area, Norway, with focus on diabetes	X	X	X		
Tatum, D., Ellen, P., Fitzgerald, P., & Eroglu, S. (2016, September)	The effect of labeling on mitigating cognitive biases about food irradiation: An empirical evaluation of effects on consumers' attitudes and purchase intent				X	
Tavares, J. M. S. F. (2018)	Electronic health record portals adoption by health care consumers	X	X	X		X
Tavares, J., & Oliveira, T. (2016)	Electronic health record patient portal adoption by health care consumers	X	X	X		X
Tavares, J., & Oliveira, T. (2018)	New integrated model approach to understand the factors that drive electronic health record portal adoption	X	X			X
Utami, L. A., Kholil, I., Mazia, L., & Aulianita,	Analysis of Electronic Logistics (E-Logis) System acceptance using Technology Acceptance		X			X

Author(s) /Year	Objective	Health Tec	Certain Tech Type	Certain Demographic Type	Not Tech Related	Perceived Health Risk not included
R. (2018, August)	Model (TAM)					
van Lint, C. L. (2019)	Renal Transplant Patient Technology Acceptance Model	X	X	X		X
Wahyuni, R. (2017, August)	Acceptance of e-health services	X	X			
Wang, W., van Lint, C. L., Brinkman, W. P., Rövekamp, T. J., van Dijk, S., van der Boog, P. J., & Neerincx, M. A. (2017)	Renal transplant patient acceptance of a self-management support system	X	X	X		X
Weidman, J. E. (2012)	Prevention through Design (PtD) Adoption Readiness Model				X	
Weidman, J., Dickerson, D. E., & Koebel, C. T. (2016)	Effective intervention strategy to improve worker readiness to adopt ventilated tools		X	X		
Weidman, J., Dickerson, D., & Koebel, C. T. (2015)	Prevention through Design: A macroergonomic conceptual approach to risk reduction				X	
Weiz, D., Anand, G., & Ernst, C. P. H. (2016)	The influence of Subjective Norm on the usage of Smartglasses		X			X
Yun, E. K., & Park, H. A. (2010)	Consumers' disease information–seeking behavior on the Internet in Korea	X	X	X		
Zhang, L., Tan, W., Xu, Y., & Tan, G. (2012)	Dimensions of Perceived Risk and their influence on consumers' purchasing behavior in the overall process of B2C e-commerce		X			
Zhang, L., Xu, Y., Tan, G., He, Y., & Liu, X. (2011, August)	Empirical research on the dimensions of consumer's perceived risk in the overall process of B2C e-commerce		X			
Zhang, Y., Liu, C., Luo, S., Xie, Y., Liu, F., Li, X., & Zhou, Z. (2019)	Factors influencing patients' intentions to use diabetes management apps based on an extended unified theory of acceptance and use of technology model	X	X	X		
Zhou, X. (2019)	Examining the Influence of Technology Affordances of Fitness Trackers and Health Psychographic Factors on Physical Activity	X	X			

Appendix B: Survey Items

Seven-point Likert scale: Ranging from 1 (“strongly disagree”) to 7 (“strongly agree”)

Performance Expectancy (Adapted from Venkatesh et al., 2012)

PE1. I think wireless earbuds would be useful in my daily activities.

PE2. I think the sound from wireless earbuds would be high quality.

PE3. I think the connectivity between wireless earbuds and the sound platform (smartphone, computer, etc.) would be stable with no delays.

PE4. I think wireless earbuds would have strong battery life.

PE5. I think using wireless earbuds would increase my productivity.

Effort Expectancy (Adapted from Venkatesh et al., 2012)

EE1. I think learning how to use wireless earbuds would be easy for me.

EE2. I think the instructions to use wireless earbuds would be clear and understandable.

EE3. I think it would be easy to connect my wireless earbuds to my sound platform (smartphone, computer, etc.)

EE4. I think wireless earbuds are easy to use.

EE5. I think it would be easy for me to become skillful at using wireless earbuds.

Social Influence (Adapted from Venkatesh et al., 2012)

SI1. People who are important to me think that I should purchase wireless earbuds.

SI2. People who influence my behavior think that I should purchase wireless earbuds.

SI3. People whose opinions that I value prefer that I purchase wireless earbuds.

SI4. I will not purchase wireless earbuds if people make jokes about them.

SI5. I will not purchase wireless earbuds if people complain about them.

Facilitating Conditions (Adapted from Venkatesh et al., 2012)

FC1. I think I have the resources necessary to use wireless earbuds.

FC2. I think I have the knowledge necessary to use wireless earbuds.

FC3. I think wireless earbuds would be compatible with other technologies I use.

FC4. I think I could get help from others when I have difficulties using wireless earbuds.

Hedonic Motivation (Adapted from Venkatesh et al., 2012)

HM1. I think using wireless earbuds would be fun.

HM2. I think using wireless earbuds would be enjoyable.

HM3. I think using wireless earbuds would be very entertaining.

Price Value (Adapted from Venkatesh et al., 2012)

PV1. I think wireless earbuds are reasonably priced.

PV2. I think wireless earbuds are good value for the money.

PV3. I think wireless earbuds provide a good value at the current price.

Habit (Adapted from Venkatesh et al., 2012)

HT1. I think using wireless earbuds would become a habit for me.

HT2. I think I would be addicted to using wireless earbuds.

HT3. I think I must use wireless earbuds.

HT4. I think using wireless earbuds would become natural to me.

Perceived Health Risk (Adapted from Herz & Rauschnabel, 2019)

PHR1. I believe wearing wireless earbuds is completely safe.

PHR2. I think wearing wireless earbuds could negatively affect my health.

PHR3. I think the more I use wireless earbuds, the more they would expose me to health risks.

PHR4. I think wearing wireless earbuds could increase the risk of cancer due to their wireless radiation.

Perceived Privacy Risk (Adapted from Herz & Rauschnabel, 2019)

PPR1. I think by using wireless earbuds, manufacturers could gather too much personal information about me.

PPR2. I think wireless earbuds could gather too much personal information about me.

PPR3. I think wireless earbuds could be easily hacked.

PPR4. I think hackers could target wireless earbuds to eventually hack smartphones connected to them.

PPR5. I think my privacy would be safe using wireless earbuds. *(Removed to improve reliability and validity)*

Perceived Fashionability (Adapted from Herz & Rauschnabel, 2019)

PF1. I think I would look good wearing wireless earbuds.

PF2. I think wireless earbuds are fashionable.

PF3. I think wearing wireless earbuds would make me look funny. *(Removed to improve reliability and validity)*

PF4. I don't think wireless earbuds look appropriate to wear at work. *(Removed to improve reliability and validity)*

Wearable Comfort (Adapted from Herz & Rauschnabel, 2019)

WC1. I think wearing wireless earbuds would be comfortable.

WC2. I think wireless earbuds are light enough to wear them.

WC3. I think wireless earbuds would fit into my ears comfortably.

WC4. I don't think it would be comfortable wearing wireless earbuds for a long period of time. *(Removed to improve reliability and validity)*

Behavioral Intention to (Re)Purchase (Adapted from Herz & Rauschnabel, 2019)

BITP1. I would (re)purchase wireless earbuds (repurchase additional pair for different occasions or upgrading to next model).

BITP2. I plan on (re)purchasing wireless earbuds.

BITP3. (Re)Purchasing wireless earbuds is a good idea.

Behavioral Intention to Use (Adapted from Venkatesh et al., 2012)

BITU1. I intend to continue using wireless earbuds in the future.

BITU2. I will use wireless earbuds instead of alternatives for my daily activities.

BITU3. I plan to continue to use wireless earbuds frequently.

Moderator

GEN. What is your gender?

Controls

OWN. Do you own wireless earbuds?

OWND. How long have you used wireless earbuds? (Answer by number of months)

APHR. Are you aware of the potential health risks associated with wireless earbuds?

AGE. How old are you?

Optional (Qualitative)

OQ1. Please provide any thoughts you have on purchasing or using wireless earbuds, such as why you purchased or not have purchased wireless earbuds.

Appendix C: Qualitative Feedback on Purchasing and Using Wireless Earbuds

Survey Question

(Optional) Please provide any thoughts you have on purchasing or using wireless earbuds, such as why you purchased or not have purchased wireless earbuds.

Performance Expectancy

"It's helpful"

"Noise reduction is helpful."

"Don't see a need except for on planes."

"Because it helps many way to use it."

"Sound quality, fit, and price are the most important to me."

"I purchased because it has good quality."

"Hands-free is great."

"No wire is worth it."

"To listen to music anywhere and anytime."

"It is good and so helpful."

"Because it is helpful in many daily work."

"I like wireless earbuds because you do not have to deal with a cord."

"Use it at work and communicate with friends."

"Give me privacy and comfort at work."

"Do not have to be connected to a phone or device and free to move away from it, move around freely."

"I like that there are no cords to hassle me when doing numerous activities. It is easy to take one out when needed. Walking my dog was SO MUCH EASIER!!"

"Hands free usage."

“I have not yet purchased wireless eyebuds, but the more I see people using them the more interest I am getting. I believe they will be so very useful when I doing something that requires me to be moving around or using my hands. I think they would be quite useful.”

“To help me at work.”

“I use them at work to eliminate distractions.”

“It is a modern technology. I like it.”

“Because this is wireless.”

“This product is so nice and strong.”

“Helpful for me.”

“Lose sound balance from the previous one.”

“I purchased wireless earbuds because they are continent to use and less hassle.”

Effort Expectancy

“I like these kind of earbuds so much. Too easy to work anything.”

“I have purchased earbuds because they are comfortable and convenient to use.”

“I purchased wirelessly earbuds because it’s more convenient to use.”

“It is very easy to use.”

“I purchased earbuds because I am comfortable with it. It’s easy to use and simple to hear sounds.”

“I purchased them because they are convenient to use.”

“It is easier and comfortable to use. It is price friendly.”

“I like that there are no cords to hassle me when doing numerous activities. It is easy to take one out when needed. Walking my dog was SO MUCH EASIER!!”

“Wireless earbuds are very easily use product. They are fashionable products in present time. So I use them.”

“Wire headphones are difficult to use. That is why I bought wireless earbuds.”

“Much more convenient than knotted up wired models. Freedom to move around freely without tangling.”

“It is easy to move anywhere anytime.”

Social Influence

“Have never tried them, but my grandson has some and he likes them. I will probably buy some eventually.”

“They can damage your hearing if too loud, expensive, too easy to lose, look funny and interfere with hearing people around you.”

“I have not yet purchased wireless eyebuds, but the more I see people using them the more interest I am getting. I believe they will be so very useful when I doing something that requires me to be moving around or using my hands. I think they would be quite useful.”

Facilitating Conditions

“I don't have a smart phone, therefore I do not use them.”

“I was experimenting with different devices and I really enjoyed using earbuds.”

“It is a very good service in the U.S.”

“They get broken easily in comparison to normal wired headphones. I have broken a fair share of wireless ones and it is not worth buying more and more of them.”

Hedonic Motivation

“Makes me happy.”

“I think wireless earbuds will help me enjoy my other entertainment more.”

“I was experimenting with different devices and I really enjoyed using earbuds.”

“I enjoy using it and right now using it.”

Price Value

“Current wireless earbuds are too expensive. I won’t consider buying until the prices significantly drops.”

“Sound quality, fit, and price are the most important to me.”

“I have not found a true need for them over the current cost of good ones.”

“Cost vs. loss and replacement are not for me.”

“They can damage your hearing if too loud, expensive, too easy to lose, look funny and interfere with hearing people around you.”

“It is easier and comfortable to use. It is price friendly.”

“I currently wear hearing aids and not sure if I should wear these instead and the cost is too high for me since hearing aids already are expensive to own.”

“I have ear issues that make most any version uncomfortable at best. It will all depend on cost.”

“The price point for the quality is why I have not purchased.”

“I have not got them because I do not have the money.”

Habit

“For my hobby.”

“I need to hear what is going on around me, not have my ears plugged up with something else.”

Fashionability

“They can damage your hearing if too loud, expensive, too easy to lose, look funny and interfere with hearing people around you.”

“Wireless earbuds are very easily use product. They are fashionable products in present time. So I use them.”

Wearable Comfort

“They usually don’t fit in my ears so I need to use the ones that wrap around my ear.”

“I have seen the product and wondered if my ears would be comfortable. I do not like hard earbuds.”

“Sound quality, fit, and price are the most important to me.”

“It is comfortable to use.”

“Comfortable.”

“I have purchased earbuds because they are comfortable and convenient to use.”

“It is easier and comfortable to use. It is price friendly.”

“It can be bought as it is easy in the ear.”

“I have ear issues that make most any version uncomfortable at best. It will all depend on cost.”

“Comfortable.”

Health Risk

“I would make some research about safety before purchasing.”

“They can damage your hearing if too loud, expensive, too easy to lose, look funny and interfere with hearing people around you.”

“I think they are safe for the most part in my own personal opinion.”

“I would like to see the proof through studies of the effects of wireless earbuds.”

Privacy Risk

(None)

(Re)Purchase Intention

“I love them. I would buy them.”

“I love them and plan on buying them again.”

“I would like to purchase.”

“I plan to buy earbuds as soon as possible for new ones.”

“I would buy wireless earplugs.”

“I will buy it. It is good.”

“I do not want to purchase ear buds.”

Use Intention

“I am not interested in using wireless earbuds.”

“I like them and I would recommend and plan to keep using in the future.”

Other Feedback

“Good.”

“Not interested.”

“It is good.”

“I am afraid I will lose them.”

“I love my wireless headphones.”

“I have no need for them.”

“They where a gift from my son.”

“Not interested at this time.”

“I got wireless air buds when I purchased my iPhone.”

“Have not purchased because I do not trust myself not to lose them.”

“Make sure you look at them real good.”

“I want to buy and try it but still I want to make my own way to read and pick the right one for me.”

“Great.”

“I have no need for them.”

“Very important.”

“Very good.”

“I love that.”

“I like them.”

“Better.”

“It is better than any other.”

“I like this.”

“They were a gift and I love them.”

“It is very good.”

“I have Bluetooth headphones and see no need for earbuds at this time.”

“I think they are a distraction.”