"I Would Just Want to Know What It's Being Used for and Who's Using It": Barriers to the Adoption of *SmartSurveys*

by

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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ABSTRACT

Objective

Smartphones stand to transform the manner healthcare services gather patient experience information. However, there is still limited guidance on the context and circumstances which are appropriate for patients to use their smartphones to share their service experiences. The aim of this thesis is to understand the factors which act as barriers to adopting and using smartphone-based patient experience feedback (*SmartSurveys*).

Methods

Participants were asked to envision the use of MetricWire®'s mobile application to collect patient experience data. In-depth semi-structured interviews, guided with questionnaires, were conducted with smartphone owners (n=24) in order to capture their experiences, perceptions and attitudes with using *SmartSurveys*. Individuals were also categorized based on their technical knowledge and motivation to protect their privacy. With consent, interviews were audio-recorded, transcribed verbatim and thematically analyzed using QSR International's NVivo 11.

Results

Interviews and questionnaires revealed that there were few concerns related to risks or usability of *SmartSurveys* application. However, three major themes regarding privacy emerged from the interviews. With respect to information disclosure, participants were concerned about the recipients of information, the reliability of the communication structure, and risk of losing of information agency.

Conclusion

The use and adoption of *SmartSurveys* is highly contextual and nuanced. Participants stressed the need to disclose the purpose of data collection as well as how information is managed and by who. Healthcare providers and mHealth application developers should endeavour to inform end-users of the manner data is handled through their mobile application. Furthermore, providing the rationale for patient experience feedback will help patients comprehend how their opinions drive changes in service quality.

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CHAPTER ONE

Introduction

Patient experience is a key quality indicator for health services and systems. Achieving a better understanding of patient experiences will lead to better outcomes for health services by allowing for improvements in patient-centered care, quality, governance, public accountability and patient autonomy (Ahmed, Burt, & Roland, 2014) . A recent systematic review conducted by Doyle et al. (2013) found 55 studies conducted in primary care and hospitals settings which reported that patient views, patient safety and clinical effectiveness (e.g. accessibility to services) showed positive and consistent associations over a wide range of disease areas, settings, outcome measures, and study designs (Doyle, Lennox, & Bell, 2013). These findings lend support to the notion that patient experience assessments will lead to improvements in the quality of healthcare (Boulding, Glickman, Manary, Schulman, & Staelin, 2011).

The use of smartphone-based surveys, which we call *SmartSurveys*, provides new opportunities to improve the collection of patient experience data. Mobile technology has the capacity to gather large quantities of real-time data over a broad geographical area. As a result, smartphones can assist in overcoming several known limitations of traditional data collection techniques, including non-response, recall bias, and inadequate sample size, that skew research results (Miller, 2012; Tomlinson et al., 2009). Furthermore, smartphones can collect patient experience data in several ways, including SMS (short-message service), voice-based surveys, web-based forms and Java-based applications. Exploiting these modes of survey delivery would allow private and public sector services, healthcare providers, and government bodies to effectively engage the public in order to better respond to their needs.

At present, there is little guidance to help researchers understand when and where individuals are willing to disclose patient experience data using their smartphones, or what circumstances are appropriate for smartphone-facilitated user feedback.

The goal of this thesis is to better understand the factors which act as barriers to the adoption and use of *SmartSurveys* for health service research. Specifically, this thesis aims to answer the following questions:

1) What are users' beliefs, perceptions, and attitudes towards sharing patient feedback information using smartphones; and

2) What is the role of perceived risk and its dimensions on *SmartSurveys* adoption and use?

I conducted 24 semi-structured interviews with smartphone owners with varying educational backgrounds, technical knowledge and levels of motivation to protect online privacy. The interviews focused on discovering and understanding the types of risks that exists with smartphone-based patient feedback. Thematic analysis was employed to uncover the unique challenges of *SmartSurveys* adoption and use.

The key results demonstrate that usability and the classical dimensions of perceived risk raised minimal concerns for smartphone users. Instead, participants considered the doctor-patient relationship, reliability of the communication structure and the possible risk of losing information agency as agents for *SmartSurveys* use. Furthermore, the perceived level of the sensitivity of individuals' feedback can also influence the willingness to use the application. These results suggest that the use of *SmartSurveys* is contextual and nuanced depending on the user's technical knowledge and the context in which they are asked to share information. The findings also highlight a need to standardize surveys across providers in order to help build trust.

The main contribution of this thesis is in providing a basis for constructing a theoretical framework which can be used to predict the adoption and use of *SmartSurveys*. One implication from the results is that there is a demand to better communicate reasons for data collection, how it will be conducted, for what purpose, and for whom. Lastly, there is a need to further investigate the subtleties of information disclosure in a longitudinal study where patterns of *SmartSurveys* use can be analyzed and understood.

1.1 Chapter Outline

To describe this work, I first review literature related to the conditions for adoption and use of smartphone-based health solutions – or mobile health (mHealth) technologies in Chapter 2. This chapter also touches upon the attributes of usability and how it contributes to the use of mHealth applications. Moreover, the review includes previous research that has examined the role of perceived risk on e-services and mHealth applications. Finally, attitudes related to privacy and information disclosure as well as privacy persona segmentations is described. Chapter 3 discusses in detail the study design and methods used to collect qualitative data. The method for categorizing participants into privacy categories are also outlined. The responses from the usability test and perceived risk questionnaires are presented in Chapter 4. These results indicate that neither usability or perceived risks play a significant role in *SmartSurveys* adoption and use. In Chapter 5, a thematic analysis of the 24 participant interviews is provided. Three themes emerged from the interviews: recipients of information, confidence in the communication structure and the risk of losing information agency. Chapter 6 then highlights the major findings and discusses the implications on smartphone-facilitated patient experience feedback. Limitations of this thesis are also reported. Lastly, Chapter 7 summarizes the main findings of this thesis and provides recommendations for future research.

1.2 Contributions

This thesis makes the following contributions:

1. Establishes an empirical understanding of privacy and perceived risks in mHealth application adoption, highlighting the inconsistencies that exist between individuals of different age, level of use and risk-awareness

2. Demonstrates existing gaps in theoretical models such as Perceived Risk for understanding adoption of *SmartSurveys*

3. Identifies moderators for the adoption and use of *SmartSurveys* through thematic analysis. These moderators include the provider-patient relationship, the perception of feedback sensitivity, technical knowledge and the possible risk of losing information agency

CHAPTER TWO

Literature Review

In Canada, smartphone adoption has reached a rate of 76%, meaning that 3 in 4 people own a smartphone (CATALYST, 2016). With the ubiquity that comes with mobile devices, smartphones are set to transform the way that data is collected.

This chapter will first explore the influence of sociodemographic characteristics on the accessibility of online surveys. Next, considerations for the usability of smartphone applications, specifically mHealth applications, will be discussed. Perceptions of risk related to mHealth technologies will then be described. Finally, differences in user attitudes towards privacy and information disclosure will be investigated.

2.1 Systemic barriers: Paper versus Digital

Surveys in healthcare serve an integral role in patient engagement and service improvement (Doyle et al., 2013). They are designed to have specific measures and a clear purpose (Benson & Potts, 2014). When patient experience feedback is collected, collated and interpreted properly, findings can drive critical and necessary improvements in service quality, patient safety and clinical effectiveness. In recent years, health service research has begun to shift from "traditional" methods of survey administration towards a more technological approach for collecting data.

Differences between paper and digital methods of data collection can be distinguished using the Van der Vleuten's survey utility index; surveys can be evaluated for validity, reliability, cost-efficiency, acceptability and educational impact (Van Der Vleuten & Schuwirth, 2005). Current literature suggests that there are no significant differences in data equivalence nor

in data validity between paper- and web-based surveys (Abernethy et al., 2008; Etkind et al., 2015; Green, Rafaeli, Bolger, Shrout, & Reis, 2006; Marcano Belisario et al., 2015). However, there are distinct advantages and disadvantages for using digital inquiries over paper surveys. With mobile devices, researchers are able to collect large quantities of information over broad geographical areas. Further, the use of digital surveys can help improve adherence and data completeness of survey responses while reducing the time, cost and manual labour required to administer these surveys. Overall, using a technological approach to collect patient experience data can help overcome known research artefacts, such as recall bias and transcription error, to improve overall reliability of results (Sullivan, Bornstein, & McMurray, 2016).

Some of the challenges of administering strictly online-based surveys are sampling bias and lowered response rate due to different sociodemographic groups that lack access to internet and mobile devices, as well as the proficiency to navigate survey technology. The 2015 Pew Research Study (Perrin & Duggan, 2015) reports access to internet is strongly associated with age, income, educational attainment and community type (Horevoorts, Vissers, Mols, Thong, & van de Poll-Franse, 2015; LaVela & Gallan, 2014; Perrin & Duggan, 2015). These correlations are not surprising. For example, the largest group of internet users is young adults – only 1% of young adults between ages 18-29 are not accessing the web. Meanwhile, around 41% of older adults 65 years and over are the group most likely to never go online. Some of the reasons for this lag in adoption among older adults include physical challenges to using new technologies, skeptical attitudes about the benefits of technology and also, the difficulties of learning to use new technologies (Smith, 2014).

Sole reliance on online surveys would lead to exclusion of many participants from technologically-disadvantaged populations such as older adults, individuals with lower-income

or less education, or rural and minority groups (Barentsz et al., 2014; Bergeson, Gray, Ehrmantraut, Laibson, & Hays, 2013; Horevoorts et al., 2015; Mlikotic, Parker, & Rajapakshe, 2016; Perrin & Duggan, 2015; Rivara et al., 2011; van den Berg et al., 2011; Zuidgeest, Hendriks, Koopman, Spreeuwenberg, & Rademakers, 2011). Collectively, exclusive use of online-based surveys may result in a sample that is younger, more affluent, better educated, and living in urban or suburban areas.

2.2 Usability of mHealth Applications

According to Rubin and Chrisnell (2008) usability is defined as "the absence of frustration", such that the individual is able to "do what they want to do in the way they expect to be able to do it". The usability of a product can be determined through six attributes: usefulness, efficiency, effectiveness, learnability, satisfaction and accessibility. Table 2.1 describes these six attributes in greater detail.

Table 2.1 describes the seven usability attributes as defined by Rubin and Chisnell (2008).

Attribute	Description-Definition
Usefulness	The degree to which a product enables a user to achieve his or her goals, and is an assessment of the user's willingness to use the product at all.
Efficiency	The quickness with which the user's goal can be accomplished accurately and completely and is usually a measure of time.
Effectiveness	The extent to which the product behaves in the way that users expect it to and the ease with which users can use it to do what they intend.
Learnability	A part of effectiveness and has to do with the user's ability to operate the system to some defined level of competence after some predetermined amount and period of training.
Satisfaction	Refers to the user's perceptions, feelings and opinions of the product.
Improvements	Raw recommendations from the subjects with regard to ways to improve the software.
Visualizations	Refers to the user's interpretation of the user interface and used to determine if it is inherently usable in its current state.

Usability testing is one of the various research tools used in user-centered design (UCD). It focuses on techniques which collect empirical and qualitative data: researchers observe participant comments, behaviours and the issues encountered. Findings from usability testing informs evaluators of any existing flaws and more importantly, how to correct the issues in order to minimize or eliminate user frustrations. This process is often iterative in nature and can be done in the users' natural environment. (Rubin & Chisnell, 2008)

With respect to mHealth applications, usability testing has been described as "a cornerstone of best practices for the design of medical devices" (ANSI/AAMI HE75:2009, 2010). mHealth applications offer patients accessible and cost-effective options which enable them to actively engage in and self-manage their own care. mHealth applications cover a breadth of various health interventions such as nutrition, weight loss, health monitoring, fitness, and health promotion (McCurdie et al., 2012). Despite the potential positive effects of mHealth applications, pilot studies aimed at evaluating the effectiveness of mobile-based interventions yield mixed results (Chomutare, Fernandez-Luque, Arsand, & Hartvigsen, 2011; McCurdie et al., 2012; Tsai et al., 2007). One of the challenges that mHealth development faces is sustained user-engagement and application effectiveness. In other words, if the application does not engage the patient, then the patient will not return to using the app. For mHealth case studies in which UCD is employed, researchers discovered better end-user engagement and adherence (McCurdie et al., 2012). As a result, researchers were able to deliver appropriate assistance through their apps for certain chronic conditions, with minimal intervention from physicians.

2.3 Theoretical Frameworks

Various theoretical frameworks have been established, revised and expanded in an attempt to better predict user behaviour, specifically for adoption and implementation of technology (Ajzen & Fishbein, 1980; Davis, 1986; Fishbein & Ajzen, 1975; Venkatesh & Davis, 2000; Venkatesh, Morris, Davis, & Davis, 2003; Venkatesh, Thong, & Xu, 2012). In the following section, literature pertaining to perceived risks is provided in order to demonstrate its suitability in predicting and understanding mHealth adoption and use. Other theoretical models and frameworks used for understanding the relationships between behavioural intentions and actual performance for technology adoption can be found in APPENDIX A.

2.3.1 Perceived Risk

A user's perceptions of risk can have a negative effect on information systems (IS) adoption. Initially introduced in the context of consumer behaviour research, perceived risk can be conceptualized as the subjective expectation of loss experienced by a consumer during purchase decisions (Bauer, 1960). The greater the perceived nature and quantity of loss detected by an individual, the greater the risk and less likelihood an individual would be willing to participate in the purchase decision. Therefore, the attitudes and behaviour of the consumer are influenced by the anticipation of uncertain, and possibly unpleasant, consequences which they cannot foresee. In our understanding of perceived risk, uncertainty describes the consumer's subjective probability of occurrence, and consequence is the hazard that results after decision making (Cunningham, 1967).

Perceived risk is a multidimensional construct. Researchers first identified the presence of six dimensions: financial risk, performance risk, physical risk, psychological risk, social risk and time risk. Summaries of each dimension of perceived risk are defined in Table 2.2.

Table 2.2 Dimensions of Perceived Risk: This table adapted from Jacoby and Kaplan (1972) and Featherman and Pavlov (2003) provides descriptions of each related dimension of perceived risk.

Perceived Risk Dimension	Description-Definition
Performance risk	The possibility that product or service is not performing the way it was designed or advertised, therefore failing to deliver the expected benefits.
Financial risk	The possibility that the use of product or service will cause undesired financial loss (due to purchase and incurring fees or fraud).
Time risk	The possibility that product or service will cause the consumer to lose time from: researching the product, learning the use or returning the product if it underperforms.
Psychological risk	The risk that the purchase or performance of product or service will cause negative effect on the consumer's mind or self-perception (e.g. frustration or loss of self-esteem).
Social risk	The potential loss of the consumer's social circle due to the use of product or service.
Physical risk	The possibility that the use of product or service may be harmful or injurious to the consumer's health.
Overall risk	A general measure of perceived risk when all criteria are considered together.

In IS research, other facets have been included in addition to the "classical" six dimensions. For example, Featherman and Pavlou (2003) and Littler and Melanthiou (2006) found that privacy risk, potential loss of personal information without the consumers' knowledge following the use of service or product, is a big concern for users of e-services as well. Furthermore, the influence of each facet on consumer opinions, evaluations and adoption intentions varies depending on the product or service of interest.

Perceived risk and its dimensions are key predictors of electronic service (e-service) adoption. Consumer behaviour and IS research highlights perceived risk and its antecedents to be

key predictors of e-service adoption; for example, perceived risk and its dimensions are inhibitors on Technology Acceptance Model (TAM) variables (Featherman & Pavlou, 2003). Perceived risk significantly affects attitudes towards adopting mobile e-services in a negative way, as well as the intentions of use among both frequent and infrequent users of mobile e-services. Furthermore, results have consistently shown overall perceived risk to be mediated through privacy, financial, time and performance risks (Lee, 2009). Of all the facets of perceived risk, privacy (security) risk is demonstrated to be the most important barrier in the adoption of e-services – having both direct and indirect influences on the intention to adopt. Financial risk, the second most important inhibitor to adoption, also has a significant negative influence on attitudes toward adoption. Time risk has a negative influence on attitudes, implying consumers are concerned about delays and length of time to complete a transaction. The negative effects of performance risk on intention to adopt are mediated through the user's perceived usefulness and attitude. The results of this study have also been verified through the findings of Chen (2013). Findings from Chen's research also indicate that all five-risk categories negatively and significantly affect perceived risk. Collectively, these findings support previous research (Chen, 2008; Tan & Teo, 2000) which imply that a consumer's perceptions of risk and its constructs are major barriers to adopting mobile e-services.

With respect to mHealth application adoption studies, perceived risk and its dimensions also have significant and negative effects on attitudes towards adoption. Schnall et al.'s (2015) as well as Cocosila & Archer's (2010) research observed patient concerns regarding security (e.g. health information or location sharing) when referring to mHealth applications and smartphone devices. Their findings also correspond with Zhou's (2012) findings about privacy concerns related to location-based services.

2.4 Privacy Risks and Information Disclosure

An important consideration for mHealth technology is to understand the patients' attitudes towards online privacy. Protecting patient privacy is a necessary concern in healthcare due to information sensitivity. A body of research has been devoted to understanding what consumers know about privacy risks, and what their perceptions of risk are. These studies often incorporate a variety of qualitative methods including surveys, interviews, observations and focus groups to identify themes.

Not surprisingly, few individuals are comfortable with sharing their health-related information online. Atienza et al. (2015) found that among their 24 focus groups (n=256 participants), users were concerned for their privacy depending on the type of information they are asked to reveal, when and where the information is accessed, and the identity of the parties reviewing the data. Above all, users wanted to maintain control over their data; respondents were willing to disclose personal information in exchange for benefits of convenience and usefulness. These findings also correspond with prior studies done in this area of research. Ackerman et al. (1999) found users' concern for privacy depended on what kind of information they were asked to share as well as its perceived usefulness to the user. In addition, Lederer et al.'s (2003) and Joinson et al.'s (2010) studies both found that users are more concerned about their privacy depending on the requestors of their information rather than the situation in which they are asked for the information.

In addition to information agency, several studies have shown privacy risk concerns varied depending on age, level of use and risk-awareness. However, the findings from these studies have been inconsistent. First, Fife and Orjeula's (2012) study found that as age increased, concern for privacy and security issues also increased. The researchers suggest that these

findings emerged because older adults are often less experienced with their mobile devices and are skeptical towards using technology. Conversely, younger adults showed less concern about privacy (Park & Mo Jang, 2014). However, in another study, Sheehan (2002) noted that older users were either unconcerned or extremely concerned about privacy, while younger users (under 45) were more likely to be pragmatic about their privacy. Alternatively, findings from a Pew Research report suggests individual's level of privacy concerns depended on the value placed on what is being shared. (Rainie & Duggin, 2016).

One of the reasons for nuances between the results is because users, although demographically homogenous, have different tolerances for information disclosure. Acquisti and Grossman noted that "the vast majority of [Americans] expressed privacy concerns and still traded-off privacy for other (small) advantages." (Acquisti, Gross, & Heinz, 2006). Differences between privacy risk concerns and the degree of tolerance towards information disclosure among consumers are more noticeably distinguished once they have been categorized in privacy persona clusters. Recent research conducted by Dupree et al. (2016), as well as Morton and Sasse (2014), demonstrated that clustering consumers based on their attitudes and behaviours towards privacy practices was more appropriate in understanding and predicting their tolerance towards privacy risk and information disclosure.

2.4.1 Privacy Personas Clusters

Dupree et al.'s privacy personas group users based on their technical knowledge and level of motivation to protect privacy. They identified five clusters among their participants:

1. *Fundamentalist* (high knowledge, high motivation): similar to Dr. Allen Westin's definition of Privacy Fundamentalists (Kumaraguru & Cranor, 2005), these individuals

have little or no trust in security practices. They exercise extreme caution when handling their information, often encrypting their devices. They are highly concerned with privacy and show distrust toward corporate monitoring.

2. *Lazy Expert* (high knowledge, low motivation): these users share the same technical knowledge as Fundamentalists. In contrast to the Fundamentalists, Lazy Experts often choose convenience over security and socialization over privacy. They continue to put effort into protecting their privacy, however, not to the extent where they would limit their interactions with society.

3. *Technicians* (medium knowledge, high motivation): these users have less technical knowledge compared to the Fundamentalists and Lazy Experts. However, they show limited trust to privacy settings and are highly motivated to protect their privacy, often choosing privacy over being social. Given enough information, these users are willing to change their behaviours.

4. *Amateurs* (medium knowledge, medium motivation): these users are just learning about security concepts. These individuals are not nearly as motivated or knowledgeable as the other previously mentioned groups. Despite having limited knowledge, this group will still act to protect themselves from privacy threats.

5. *The Marginally Concerned* (low knowledge, low motivation): this group of users have limited knowledge about security concepts. They trust networks and websites which claim to be safe. They are aware of potential privacy threats, but feel these threats are unlikely to happen to them, therefore are not as motivated to protect themselves.

Morton and Sasse, who performed their research concurrently with Dupree et al. in the area of privacy clustering also identified five clusters: Benefit Seekers, Information Controllers,

Crowd Followers, Security Concerned and Organizational Assurance Seekers (Morton & Sasse, 2014). These categories correspond to Dupree et al.'s clusters, respectively, Lazy Experts, Fundamentalists, Marginally Concerned, Technicians and Amateurs. For this thesis, participants will be clustered using Dupree et al.'s categorizations.

Privacy persona clustering originates from Westin's privacy 3 Likert-Question categorizations (see: Chapter 3.3.1). Westin's privacy categories separate technology users into three types of users: Privacy Fundamentalist, Pragmatic Majority and the Marginally Concerned. Westin's segmentation reports that each cluster varies in terms of their willingness to share their personal information online while relative sensitivity towards each type of information remains consistent across the clusters.

Although Westin's privacy clusters have been used to segment users, this methodology of classifying users has faced criticism. Researchers such as Consolvo et al. (2005), King (2014), and Woodruff et al. (2014) have found a lack of correlation between Westin's categories and factors that may influence user behaviours and attitudes (i.e. willingness to share information) such as mental models, risk perception, knowledge, advertising perception and impression management strategies (Consolvo et al., 2005; King, 2014; Woodruff et al., 2014). For example, King (2014), sampling 907 participants, found a lack of correlation between privacy knowledge, privacy behaviors and privacy attitudes and Westin's categories.

Dupree et al.'s categories differ from Westin's in several ways. First, there is added contextual information around each cluster: groups are segmented based on different sets of behaviours and levels of knowledge and motivation. Dupree et al. also fragments Westin's 'Pragmatic Majority' into three distinct groups (Lazy Experts, Technicians, Amateurs) to reduce

subtleties among users in that group. These clusters provide a better understanding of the underlying effort (proactivity) and the user's ability to act upon privacy risk concerns.

2.5 Where Current Research Falls Short

This chapter first described the challenges of using online-based surveys for certain sociodemographic groups. Concerns pertaining to the usability of mHealth applications, such as loss of user engagement and appropriateness of mHealth applications, was also discussed. This chapter also explored the negative effects of perceived risk and its constructs on IS system and technology adoption models. In particular, the literature points to perceived risk as a suitable model to consider mHealth adoption and use. mHealth stands to transform the process of data collection in healthcare, especially for patient experience feedback. However, literature has revealed that information disclosure can be affected by many different factors including: the type of information users are asked to share, perceived usefulness of the information, the requestors of data as well as the user's overall perception of privacy. To better understand the nuances in beliefs, attitudes and perceptions among smartphone users in employing *SmartSurveys*, I conducted a series of interviews, described in the next chapter.

CHAPTER THREE

Study Design and Methods

Health research has benefited from insights gained from qualitative methods, specifically in understanding the needs and abilities of e-health and m-health technology users (Dennison, Morrison, Conway, & Yardley, 2013). A variety of qualitative techniques such as surveys, interviews, observations and focus groups have been used to identify underlying themes. Taking a qualitative approach for this thesis created opportunities to ask questions such as "how" and "why" certain smartphone user concerns and attitudes influence their decision to use *SmartSurveys*. Therefore, rather than quantifying data, qualitative studies provide breadth of ideas and opinions. In particular, qualitative methods were used inform the following research questions:

1. What are user beliefs, perceptions, and attitudes towards sharing patient feedback information using smartphones; and

2. What is the role of perceived risk and its dimensions on *SmartSurveys* use and adoption?

This chapter describes the use of in-depth interviews as the primary source of data collection for this thesis. In addition, this chapter informs of the criteria used to select and categorize participants. The considerations made during the recruitment and interview stage as also discussed. Finally, the steps taken for the analysis of the interview transcripts in QSR International's NVivo 11 are described.

3.1 Participants

To better our understanding of smartphone users' perceptions of risk when using *SmartSurveys* to share patient feedback information, smartphone users over the age of 18, and comfortable with speaking English were recruited. A total of 24 participants (17 female; median age: 22.5; mean age: 23.9 years old) were recruited.

Table 3.1 displays the demographics (gender, age group, education background) of participants.

	Gender	**Age Group**	**Field of Study/Education Level**
P1	Female	18-21	Health Studies/Undergraduate
P2	Female	18-21	Public Health/Undergraduate
P3	Female	18-21	Computer Science/ Undergraduate
P4	Female	18-21	Health Studies/Undergraduate
P5	Female	22-25	Math/PhD
P6	Female	22-25	Statistics/Masters
P7	Male	22-25	Math/Masters
P8	Female	22-25	Honours Math/Undergraduate
P9	Male	26-30	ECE/PhD
P10	Female	26-30	SPHHS/PhD
P11	Male	31-40	Kinesiology/PhD
P12	Male	31-40	Political Science/PhD
P13	Female	18-21	Speech Comm./Undergraduate
P14	Male	31-40	Geography and Env. Management/PhD
P15	Male	18-21	Math/Undergraduate
P16	Female	18-21	ARBUS/Undergraduate
P17	Female	26-30	Computer Security & Privacy/Masters
P18	Female	18-21	Social Development/Undergraduate
P19	Female	22-25	Rhetoric, media and professional communication/Undergraduate
P20	Female	26-30	Architecture/PhD
P21	Female	18-21	Public Health/Undergraduate
P22	Male	22-25	Kinesiology/Undergraduate
P23	Female	18-21	Chemical Engineering/Undergraduate
P24	Female	22-25	Chemical Engineering/Graduate

Participants for this thesis represent a convenience sample: Participants were easily accessible, have diverse uses for technology, and varied in their abilities, concerns and knowledge of sharing information using smartphones.

3.2 Privacy Persona Classifications

To ensure the sample had a broad range of technology users, participants were first clustered into user categories based on Westin's privacy user characteristics and subsequently, Dupree et al.'s Privacy Personas. A breakdown of participant demographics and technology user types can be found in Chapter 4.

3.2.1 Westin's Categorization

Westin's classification is based on a 5-point Likert scale responses (strongly agree, somewhat agree, somewhat disagree, strongly disagree) to each of the three following questions:

Question 1: Consumers have lost all control over how personal information is collected and used by companies.

Question 2: Most businesses handle the personal information they collect about consumers in a proper and confidential way.

Question 3: Existing laws and organizational practices provide a reasonable level for consumer privacy today.

Privacy Fundamentalists agree (strongly or somewhat) with Question 1 and disagree (strongly or somewhat) with Questions 2 and 3. The Privacy Unconcerned disagree (strongly or somewhat) with Question 1 and agree (strongly or somewhat) with Questions 2 and 3. Privacy pragmatists answers Questions 1 to 3 without any pattern of responses.

3.2.2 Privacy Persona Clusters

Using the interview transcripts, the 24 participants were evaluated on their knowledge and level of motivation to protect their privacy. Similar to Dupree et al. (2016), security and privacy were analyzed together because participants themselves did not separate the two concepts. Using an iterative process, participants were subjectively rated on having high, medium, or low knowledge and low, medium or high motivation. Ratings were also guided by the descriptions of traits attributed to each privacy persona from Dupree et al's study (2016). Once participants were assigned a knowledge and motivation rating, they were labeled using one of five privacy personas: Fundamentalist, Lazy Experts, Self-Educated Technicians, Amateurs and the Marginally Concerned. Next, to examine homogeneity within each cluster, participant transcripts in each grouping were analyzed for similarities in their answers. Participants who differed from the rest of the grouping were eliminated and reassigned to a different cluster. All dissimilarities in ratings and groupings were discussed between the thesis supervisor and myself until agreement was reached.

3.3 Data Collection

The following section includes the criteria and the process of participant recruitment. Details pertaining the participant interviews, such as the questionnaire content and interview process, are provided as well.

3.3.1 Study Criteria

Participant interviews were conducted with the intent to capture the views of smartphone users as they relate to the *SmartSurveys* mobile application. One-on-one semi-structured in-depth

interviewing ensured a personalized approach to research which is better received by participants than written questionnaires (Rooney et al., 2011). To be eligible for participation, interviewees must be 18 years of age and comfortable with having conversations in English. Most importantly, participants must own a smartphone device. The study required individuals to own a smartphone device in order for them to properly conceptualize basic functions such as downloading an app.

3.3.2 Recruitment

Once ethics approval for this thesis was obtained from the University of Waterloo (UW)'s Office of Research Ethics, participants were recruited from UW's main campus. UW is a public research university which currently enrolls 29, 912 undergraduate students, 3,927 graduate students and employs 1, 211 full-time faculty members, 322 international faculty members and 2,325 staff members (University of Waterloo, 2015a, 2015b). The university has program offerings from six faculties: Applied Health Sciences, Arts, Engineering, Environment, Math and Science. Therefore, the UW campus provided a rich and diverse representation of age-groups, ethnicities, educational and sociodemographic backgrounds.

Physical advertisement posters were distributed across the UW campus (APPENDIX B). An online advertisement was also posted and on UW's Graduate studies website and distributed to graduate students via email through UW's graduate student e-news. In order to encourage participation, participants were compensated with $10 in cash. Once participants responded to the advertisements, they were screened for eligibility via phone or email. Those who responded through email and who fit the recruitment criteria were asked to read a formal information letter and consent form (APPENDIX C). Once participants had read and given consent either verbally

or in writing, a time and location was arranged at the participant's convenience. In total, 24

participants were recruited and interviewed between January 2017 to February 2017.

3.3.3 Participant Interviews

Participants were welcomed upon their arrival to the study session. They were then given

an overview of the purpose of the study and what it will entail by the researcher. Participants

were also provided physical copies of the information consent form to review and to keep. If

participants were comfortable with being involved in the study, they were asked to sign a consent

form.

Data was collected from participants in two ways: questionnaires and interview.

Participants were asked to complete a total of three short questionnaires (APPENDIX D)

followed by a semi-structured interview. In the first questionnaire, participants were asked to

share their demographic information such as age, gender and field of study. In the second

questionnaire, participants were first prompted to answer Westin's privacy user questions and

subsequently, questions that were related to their knowledge and motivation to protect their

privacy. Lastly, the third questionnaire was adapted from Jacoby and Kaplan's perceived risk

study to assess the perceptions of risk experienced by the participants. While completing the

questionnaires, participants were encouraged to verbalize the reasoning behind their answers.

The information gathered from the participants from the questionnaires is to provide contextual

information to further classify participants into privacy persona clusters, as well as provide

complementary data to interview content.

Interviews with the participants occurred following the surveys. Each session ran for

approximately 20 – 40 minutes in length. An interview guide (APPENDIX E) was used to lead

discussions in a conversational manner. The interview guide was developed with the purpose of understanding how an individual's perceptions of risk influenced their willingness and comfort level in sharing patient feedback. The interview also covered topics such as sharing global positioning system (GPS) data for service quality improvement, and data utility concerns. Each interview was conducted by the same researcher and digitally recorded for transcription. Throughout the interview and at the end of the interview, the researcher summarized and explained their interpretation of the responses to participants. Participants were encouraged to add any additional information that they felt was missing from their answers and the interview. This process served as an informal method for member checking. At the completion of the interview, participants were thanked for their time and compensated with $10 in cash.

3.4 Usability of *SmartSurveys*

Prior to completing the final questionnaire, participants were given the opportunity to learn more about the *SmartSurveys* mobile application through an exploratory process called cognitive walkthrough (CW). CW emphasizes cognitive issues related to a system's functionalities such as learnability (Holzinger, 2005). For this thesis, CW gave participants an opportunity to evaluate key features and the user interface design of the survey application. Furthermore, users were encouraged to identify and discuss issues they had while interacting with the *SmartSurveys*.

Participants were informed of the developers of the application, the set-up process and key features of the application such triggers and reminders. *SmartSurveys*, the mobile survey application that was assessed in this study, is developed by a local Waterloo region start-up, *MetricWire* Inc. The mobile application is a data collection tool for clinical, educational and

research settings. Service providers and researchers are able to design the surveys themselves (e.g. create own questions), enroll participants, and set "triggers" based on time and GPS location to remind or encourage participants to complete their surveys. Responses are automatically aggregated to a cloud-based storage provider which service providers or researchers are able to download their data from whenever they want.

To access the *SmartSurveys* application as a patient or client, users can download the application from Google Play or Apple's App Store. After creating an account using their email address, participants can be enrolled into existing surveys.

On a mobile phone with *SmartSurveys* pre-downloaded, participants were asked to think back to the last time they visited a doctor's office. Then, participants were asked to complete a patient feedback survey on the application as if they were providing feedback in a healthcare setting. Specifically, the WatLX™ tool for measuring patient experience in rehabilitative settings was utilized for this thesis (APPENDIX F). While using the application, participants were also encouraged to share their opinions about the design of the mobile survey tool, how it could be improved and/or whether the application was suitable for use in a healthcare setting.

3.6 Data Analysis: Interview Content

Participant data was collected until saturation, where saturation being when no new themes or evidence emerges from the interviews. Upon completion of the interviews, participant answers were transcribed manually from the digital recordings for subsequent hybrid thematic analysis using QSR International's NVivo 11 (Fereday & Muir-Cochrane, 2006).

To analyze the data, interview transcripts underwent initial open-ended coding where quotes were divided into 4 concepts and 12 sub-concepts based on similarities in meaning or context.

Table 3.2 presents the concepts and sub-concepts which were derived from the interview transcripts upon initial open ended coding.

Concept	Sub-concept
Risk of Loss	Data being used/misused
	Loss of personal information/individual identity
Loss Tolerance	Privacy vs. Social
	Privacy vs. Perceived Benefit
	Privacy vs. Perceived Usefulness
Information Disclosure Concerns	Inquirer of information
	Recipient of information
	Sensitivity of information
Ease of use (Usability)	Convenience
	Portability
	Survey characteristics (length)
	Familiarity of device

These concepts were then discussed among the researcher, supervisor and one other researcher committee member to further develop themes. The themes were determined based on the dimensions of perceived risks (deductive reasoning), and the interview transcripts (inductive reasoning) (Creswell, 2009). The theme codes were modified and refined as subtle differences emerged. The three subsequent themes were found:

Recipients of Information	Confidence in Communication Structure	Risk of Losing Information Agency
Willingness of individuals to divulge information based on the identity of information requestors	Belief that the process of survey administration was conducted with integrity	Losing the ability to dictate how information is used that may lead to subsequent mild or severe consequences

3.7 Summary

This chapter began by reviewing the role of qualitative methods in public health research and the two research questions for this thesis:

1. What are user beliefs, perceptions, and attitudes towards sharing patient feedback information using smartphones; and

2. What is the role of perceived risk and its dimensions on *SmartSurveys* use and adoption?

Twenty-four smartphone users were recruited to participate in in-depth semi-structured interviews. Participants were asked about their opinions on current corporate practices for handing consumer information. Individuals also shared their habits and knowledge related to their smartphone use and privacy. Participants were then acquainted with the *SmartSurvey* application in order for them to assess usability issues as well as types of risk that accompany the use of the application. The interviews revealed three overriding themes: recipients of information, confidence in communication structure and risk of losing information agency. The following two chapters will report on the results from the perceived risk questionnaire, usability testing and thematic analysis.

CHAPTER FOUR

Results

Usability and perceived risk are two variables that can influence a user's willingness to partake in smartphone-based patient feedback (see: Chapter 2.2.2 and 2.3.1). This chapter examines the nuances of participants' views towards *SmartSurvey* usability as well as their perceptions of risks. Specifically, this chapter addresses the following two research objectives:

1) To understand participant opinions on the usability of the *SmartSurveys* application
2) To explore the perceptions of risks and dimensions of risk surrounding the use of *SmartSurveys* for patient experience feedback

Objective 1 was addressed by asking participants to subjectively evaluate the *SmartSurveys* application. Participants were briefed on the features of the application and given the opportunity to complete a patient feedback survey using *SmartSurveys*. Participant self-assessment of the application also contributed to Objective 2, as they were able to view the features of *SmartSurveys* as well as the survey content. The discussions regarding perceived risk were guided by a questionnaire inquiring about financial, performance, physical, psychological, social, time and overall risk of downloading and using *SmartSurveys*.

I first present an overview of participant background associated with their beliefs towards information privacy and their experience with technology. Next, I report the responses related to attitudes towards service improvement surveys. Lastly, I discuss the questionnaire and interview responses pertaining to *SmartSurveys* usability and associated perceptions of risks. Direct quotes from participants are used to provide complimentary information for their questionnaire answers.

4.1 Participant Background

For this study, a total of 24 participants (female: n=17; male: n=7) were recruited

between January 2017 and February 2017. All participants have either received post-secondary

or post-graduate education. The average age of this sample was 23.9 years old.

Classifying participants based on Dupree's privacy personas provided breadth; clusters

ensured individuals with different technical backgrounds as well as varying degrees of privacy

tolerance were included in the sample. The sample for this thesis represents all of Westin's

categories and Dupree's privacy personas. A break-down of participant classifications into

Westin's categories and Dupree's Privacy Personas can be found in Tables 4.1 and 4.2.

With respect to Westin's classifications, the distribution of Fundamentalists, Privacy

Pragmatists and The Marginally Unconcerned is 21%, 58% and 21%, respectively, among this

sample of participants. The distribution of Westin's categorization from this thesis is comparable

with prior investigations in this area of privacy research (Ackerman et al., 1999; Consolvo et al.,

2005; Dupree et al., 2016; Sheehan, 2002).

Table 4.1 reports the distribution of Westin's categorization from previous research as well as
this thesis'.

	This thesis	Dupree	Sheehan	Consolvo	Ackerman
Fundamentalists	21%	16%	16%	19%	27%
Pragmatists	58%	78%	81%	69%	56%
Marginally Concerned	21%	6%	3%	12%	17%

Dupree's privacy persona distribution of Fundamentalists, Lazy Experts, Technicians,

Amateurs and Marginally Concerned for this sample is 4%, 8%, 29%, 21% and 33%,

respectively. Participant 4 was rated with low technical knowledge yet high motivation to protect

their privacy. Therefore, they did not fit into any of the privacy persona and is listed as

"undefined".

Table 4.2 Participant responses to Westin's 3 Likert-scale questions (strongly disagree, somewhat disagree, somewhat agree, strongly disagree) and their corresponding classification. The first statement is related to the amount consumer control on personal data collection by companies. The second statement asks about the ethical practices of data collection demonstrated by businesses. The final statement is associated to the level of consumer protection through existing laws and organizational practices. Based on their responses, participants were categorized as a Privacy Fundamentalist, Privacy Pragmatist or Privacy Unconcerned.

	Consumer Control	Consumer Confidentiality	Consumer Privacy	Westin's Categorization
P1	Somewhat disagree	Somewhat disagree	Strongly agree	Privacy Pragmatist
P2	Somewhat agree	Somewhat agree	Strongly agree	Privacy Pragmatist
P3	Somewhat disagree	Somewhat agree	Somewhat agree	Privacy Unconcerned
P4	Somewhat agree	Somewhat agree	Somewhat agree	Privacy Pragmatist
P5	Somewhat agree	Somewhat disagree	Somewhat agree	Privacy Pragmatist
P6	Somewhat agree	Somewhat agree	Somewhat agree	Privacy Pragmatist
P7	Somewhat agree	Somewhat agree	Strongly agree	Privacy Pragmatist
P8	Somewhat agree	Somewhat disagree	Somewhat agree	Privacy Pragmatist
P9	Strongly agree	Strongly agree	Somewhat disagree	Privacy Pragmatist
P10	Somewhat agree	Somewhat disagree	Somewhat agree	Privacy Pragmatist
P11	Somewhat disagree	Somewhat agree	Somewhat agree	Privacy Unconcerned
P12	Strongly agree	Somewhat disagree	Somewhat disagree	Fundamentalist
P13	Somewhat agree	Somewhat agree	Strongly agree	Privacy Pragmatist
P14	Somewhat agree	Somewhat disagree	Somewhat agree	Privacy Pragmatist
P15	Somewhat disagree	Strongly agree	Strongly agree	Privacy Unconcerned
P16	Somewhat disagree	Strongly agree	Somewhat agree	Privacy Unconcerned
P17	Somewhat agree	Somewhat disagree	Strongly disagree	Fundamentalist
P18	Somewhat agree	Somewhat disagree	Somewhat disagree	Fundamentalist
P19	Somewhat disagree	Somewhat agree	Strongly agree	Privacy Unconcerned
P20	Strongly agree	Strongly agree	Strongly disagree	Privacy Pragmatist
P21	Somewhat agree	Somewhat agree	Strongly agree	Privacy Pragmatist
P22	Somewhat agree	Somewhat disagree	Somewhat disagree	Fundamentalist
P23	Somewhat agree	Somewhat agree	Somewhat agree	Privacy Pragmatist
P24	Strongly agree	Strongly disagree	Strongly disagree	Fundamentalist

Table 4.3: Subjective rating of participants' technical knowledge (high, medium, low) and motivation to protect their privacy (low, medium high). Subsequently, participants are categorized using Dupree et al.'s privacy personas: Fundamentalist (high knowledge, high motivation); Lazy Expert (high knowledge, low motivation); Technician (medium knowledge, medium motivation); Amateur (medium knowledge, low motivation); and Marginally Concerned (low knowledge, low motivation).

	Knowledge (High, Medium, Low)	Motivation (Low, Medium, High)	Privacy Persona
P1	Low	Low	Marginally Concerned
P2	Medium	Medium	Amateur
P3	Medium	High	Technician
P4	Low	High	Undefined
P5	Medium	High	Technician
P6	Low	Low	Marginally Concerned
P7	Medium	High	Technician
P8	Medium	Medium	Amateur
P9	Medium	High	Technician
P10	Medium	High	Technician
P11	Low	Low	Marginally Concerned
P12	Medium	High	Technician
P13	Medium	Medium	Amateur
P14	High	Low	Lazy Expert
P15	Low	Low	Marginally Concerned
P16	Low	Low	Marginally Concerned
P17	High	High	Fundamentalist
P18	Low	Low	Marginally Concerned
P19	Low	Low	Marginally Concerned
P20	Low	Low	Marginally Concerned
P21	Medium	Medium	Amateur
P22	High	Low	Lazy Expert
P23	Medium	Medium	Amateur
P24	Medium	High	Technician

4.1.1 Participant Questionnaire Responses

Participants were questioned about their knowledge of technical terms such as "cookies", "encryption", "certificate", "firewall" and "WPA/2". More than half of the participants indicated that they had a good grasp of the technical terms.

Q: I have a good understanding of technical terms such as "cookies", "encryption", "certificate", "Firewall" and "WPA/2".	Number of Participants (% of Participants)
Strongly Agree	4 (17)
Somewhat Agree	12 (50)
Somewhat Disagree	3 (12)
Strongly Disagree	5 (21)
Total	24 (100)

Participants were then asked about their familiarity with the "Terms of Use" of services they signed up for. Over half of participants either do not read or are unfamiliar with the terms of use before signing up for a service or product.

Q: I am familiar with the "Terms of Use" of the services or products I sign up for.	Number of Participants (% of Participants)
Strongly Agree	3 (12.5)
Somewhat Agree	7 (29.2)
Somewhat Disagree	10 (41.6)
Strongly Disagree	4 (16.7)
Total	24 (100)

Lastly, participants were asked to respond to the statement: I have a good understanding of how to use the basic functions on my smartphone. The majority of the participants were confident in their ability to use basic functions on their smartphones.

Q: I have a good understanding of how to use the basic functions on my smartphone.	Number of Participants (% of Participants)
Strongly Agree	21 (88)
Somewhat Agree	2 (8)
Somewhat Disagree	0 (0)
Strongly Disagree	1 (4)
Total	24 (100)

4.1.2 Attitudes towards providing Service Improvement Feedback

Participants were asked to discuss whether giving feedback to service providers was important to them. Twelve out of 24 participants (50%) believed providing feedback was an integral part of service improvement. As a consumer or user of a service or product, individuals felt their input drove changes in the quality of services. More importantly, they believed service providers would want that sort of data in order to strengthen their business:

> *Yeah, I'd say so because I guess since I'm a consumer and I'm using their service it's important to know. If I'm on their side, I would want feedback. I would want to know what works and what's not.* (Participant 21, Amateur)

A third of participants (n=8) cited that their willingness to offer feedback was influenced by their service experience. Individuals, such as Participant 22 and 13, provided feedback on the occasions in which they received excellent or poor service. Yet, they would be less inclined to complete surveys if service quality was within their expectations. Furthermore, their decision to provide feedback is also influenced by the length of the survey and whether there was remuneration for their time:

> *Could I say somewhat agree on that? It's a little bit but I wouldn't do it all the time. I think if I had a largely positive or largely negative experience, it becomes a little more important. And depending on sometimes the length of a survey then it would influence how willing I am to spend my time.* (Participant 22, Lazy Expert)

> *I think it depends. I think sometimes if it's something exception happen, then providing them with, oh yeah that was really good, or if something is really bad it's more or less it's a complaint, but letting them know as well. I think if it's more or less mediocre but you don't get incentive out of it, I probably wouldn't do it.* (Participant 13, Amateur)

There were also a few participants (n=4) who did not consider their feedback to be important or useful to service providers. Their impression of service feedback was that it was a formality rather than a tool to better understand consumer needs:

> *I would like to think it's important. It's not important personally that they hear it. I just don't think all the time they're going to be taking into consideration seriously what my feedback is. I don't think my opinion to them matters so much. I think their strategy is pretty much defined, at least from the survey that I've taken, and they're not going to change it so I don't really care about giving them feedback.* (Participant 12, Technician)

4.2 *SmartSurveys* Usability

For participants to better gauge the usability associated with the *SmartSurveys* application, they were asked to fill out a sample patient experience feedback survey during a CW. While the majority of participants found *SmartSurveys* "good", "straight-forward" or "easy-to-use", several participants believed there was potential for improvements:

> *I think it's good, the interface. Very minimalist and I think they contain what they want to do, like the question and just clicks. Easy to use. Intuitive.* (Participant 15, Marginally Concerned)

The most common participant comment was about the Likert scale design. Participants expressed a need for clear instructions on how to indicate their answers using the Likert scale tool:

> *I think it's like a survey, but it's an app? It's a good idea. It's good. It's very simple. If you want to make it add comments, it'd be nice. And the sliding bar, I didn't get it at the beginning 'cause I thought it was multiple choice question. After I noticed, you can write a comment about [it] and it's a sliding bar. If it was clearer, it'd be nicer."* (Participant 9, Technician)

> *Yeah, it's pretty intuitive and straight-forward. The only thing that was a little confusing at first, you have a nominal variable type, a scalar variable. It's not*

clear 100% I didn't know where I had to touch it or type it 1-5. Then I realize oh, you just put your finger on the button there. (Participant 12, Technician)

Another aspect of the application that could be enhanced was the manner instructions and questions were presented at the start of the survey:

> *Fairly easy to go through. Fairly quick. Fairly obvious what you had to do, very linear which is good, or at least I think so. Other than that, first time I had trouble differentiating the question from the instructions, I can't think any issues I had with it. I guess the obvious this is as subjective as it gets, I'm not sure if the colour scheme was the nicest. That's pretty much all I can think of.* (Participant 14, Lazy Expert)

The Fundamentalist in the sample of participants gave many suggestions to the design of the application to ensure fewer errors in data submission and in system security. For example, they suggested to change the colour of the 'submit' button to inform respondents of the ability to scroll through all their responses. Furthermore, the Fundamentalist recommended adding additional comment space after each question that would allow patients to give details that cannot be captured using a Likert scale. Lastly, the participant also found some of the questions of the survey to be too invasive, particularly when asking about the reason for patient visit.

Despite the many participant design recommendations, all individuals still found the *SmartSurveys* application simple to use and easy to understand.

4.3 Usability of Smartphones for Surveys

The majority of participants (n=21) have indicated that they have, in the past, used their

smartphones to complete a survey whether it was through an application or browser.

Table 4.4 reports the reasons that can influence participant willingness to use smartphones for
completing surveys.

Reason	Number of participants (% in total)	Mentions (% in total)
Availability of Survey	1 (3)	1 (3)
Ease of Use	5 (16)	5 (15)
Convenience	4 (12.5)	5 (15)
Portability	3 (9)	3 (9)
Effectiveness	1 (3)	1 (3)
Efficiency	7 (22)	7 (21)
Usefulness	7 (22)	7 (21)
Visualization	4 (12.5)	4 (12)
Total	32 * (100%)	33 * (100%)

*This is not equal to the sum of the numbers in the column due to multiple responses.

Ease of use, including convenience and portability of smartphones, was the main driver

for participants to use their smartphones to complete surveys:

> *It's kind of convenient to use smartphone. Using a computer kind of troublesome
> and I don't carry my computer every single day. So, having a smartphone is
> pretty easy to do it.* (Participant 8, Amateur)

For example, Participant 10 explained that with smartphones, less time was needed to

complete surveys:

> *Usually I use my smartphone because that's when I receive the survey or that
> was the most convenient to complete, whether it was amount of time or the
> interface.* (Participant 10, Technician)

A number of participants (n=5) did not differentiate between survey mediums. Their

selection of survey mediums depended on when and where they were receiving the surveys as

well as the survey's length:

Depends on when I'm on when I see the post or when someone emails me to fill it out. If I'm on my computer, I'll fill it there. If I'm on my phone, I'll do it there. But it also depends on the length, if it's long answer then I'll do it on my computer. If it's quick multiple choice like, what time works for you that kind of stuff, I'll do it on my phone." (Participant 16, Marginally Concerned)

Unrelated to the usability of smartphones, Participant 4 and Participant 12 completed surveys only if they found the topic of the survey personally important:

It's very time-consuming and I kind of found that it's not very important to me. Unless it's a big company or something like that. They're genuinely asking for feedback whereas there's small internet company or apps. If it's important feedback I'd give it back. If it's just general, then no." (Participant 4, Undefined)

No, I haven't. All the surveys I've done have either been on the phone or in person. And they're usually banking related. Those are the ones I would only do. (Participant 12, Technician)

Among the participants who have chosen to use their smartphones to complete surveys in the past, a few participants noted that they preferred the use of other digital devices for feedback. For example, Participant 7 was more comfortable using his computer:

I think the main reason, I haven't thought about it too much, I think the main reason might be I'm familiar with using a computer; I've been using my computer for a long time. Smartphone is a little more recent so, I mean, it's kind of normal for me to do surveys on a computer but doing it on the phone is a little awkward. Another reason, I guess, I'm not too fond of reading too much on a smartphone 'cause I have a smaller screen and the text is small. So, I'm okay with reading, I read emails and stuff, I don't use it as a primary source for reading something. I would usually use a smartphone for more visual stuff. So, I would usually prefer computer." (Participant 7, Technician

Similarly, Participant 9 opts for a large screen (computer) display, rather than a smaller one (smartphone), for better data and information visualization:

Usually I prefer to use my computer, my laptop, because it's a wider screen and nice to see. And when I open the browser on my smartphone, the phone to

questions are very small, very tiny, it's very difficult to see. The button you have to search it and move. It's very difficult. But I think this app is very nice." (Participant 9, Technician)

An interesting perspective that emerged from the interviews was the assumption that computers provided better security and privacy systems in comparison to smartphones:

> *Usually I don't like using cellphone for my financial information. I never enter credit card on my cellphone. Even with a browser, I don't even log on my internet banking or something like that using my smartphone. Just because I didn't put any anti-virus or something like that on my smartphone. I just leave it as it is. But on my computer, because I have a firewall and something like that. It will be much safer.* (Participant 9, Technician)

> *Maybe credit card information or financial information. I can do it online, not over the phone. I feel safer paying online and on my computer.* (Participant 21, Amateur)

In this sample, there were three participants who indicated that they have never used their smartphones to fill out surveys. Participant 6, having never used a *SmartSurveys* application, found the smartphone browser unsuitable for completing surveys:

> *If I have an app, I will use the smartphone because the browser [on a smartphone], it's not easy to use."* (Participant 6, Marginally Concerned)

Overall, most participants found their smartphones easier to use, more convenient and more efficient to complete surveys. Participants who chose different mediums to answer surveys preferred larger screens to visualize the information.

4.4 Perceived Risks Related to *SmartSurveys*

As described in Chapter 2.2.1, perceived risk and its dimensions are known to be inhibitors to IS adoption. Therefore, the greater the perceived risk, the more unlikely an

individual would be willing to use *SmartSurveys*. Participant rating of the "classical" dimensions

of risk are found in Table 4.4.1.

Table 4.5 Participant responses to the perceived risk questionnaire (Appendix D)

	Financial	Performance	Physical	Psychological	Social	Time	Overall
P1	1	2	1	1	1	1	4
P2	1	1	1	1	1	2	4
P3	1	3	1	1	1	2	3
P4	2	1	1	1	1	4	4
P5	2	3	1	1	1	2	4
P6	3	2	2	1	1	1	3
P7	1	3	1	1	1	2	2
P8	2	2	2	2	2	2	3
P9	1	1	1	1	1	1	4
P10	1	2	2	1	1	2	3
P11	1	3	1	1	1	2	4
P12	1	3	2	1	1	1	3
P13	1	2	1	1	1	1	4
P14	2	1	1	1	2	1	2
P15	1	2	1	2	1	1	4
P16	1	1	1	1	1	1	4
P17	3	3	3	1	d.r*	3	2
P18	1	2	2	1	1	2	4
P19	1	2	1	1	1	1	3
P20	1	1	1	1	1	1	4
P21	2	2	2	1	1	2	4
P22	1	2	1	1	1	1	2
P23	1	2	1	2	1	3	4
P24	1	3	1	2	1	3	4

d.r. : did not respond; (1= Very Unlikely, 2= Unlikely, 3= Likely, 4=Very Likely)

Based on the perceived risk questionnaire, more than half of participants (n=15/24) found

the *SmartSurveys* application, with all factors considered, 'Not Risky at All' to download and

use. Meanwhile, the remainder of participants (n=9) perceived some degree of risk (ranging: a

little risky, somewhat risky) if asked to download and use *SmartSurveys*. None of the

participants, however, perceived *SmartSurveys* to be 'Very risky'. The following sub-sections

will discuss each dimension of risk in greater detail.

Table 4.6 Perceived Risk Dimensions

Dimensions of Perceived Risk	Number of Participants (% in total)	Mentions (% in total)
Financial	2 (11)	2 (11)
Performance	12 (63)	12 (63)
Physical	1 (5)	1 (5)
Psychological	0	0
Social	0	0
Time	4 (21)	4 (21)
Total	19 * (100)	19 * (100)

*This is not equal to the sum of the numbers in the column due to multiple responses.

4.4.1 Financial Risk

Participants were first asked about their perceptions of financial risk related to downloading and using *SmartSurveys*. The majority of participants felt that the possibilities of financial loss associated with the application was either very unlikely (n=17) or unlikely (n=5). The low financial risk was attributed to the *SmartSurveys'* free download and lack of request for any financial information:

> *As a patient, would I have to pay money to download the app? Is this question geared towards a clinician? In this case, there doesn't seem like there's any chance that I would be losing money with SmartSurveys. I don't think it's asking for credit card information or anything.* (Participant 22, Lazy Expert)

> *I don't feel like I will lose money doing this. I just don't see any risks."* (Participant 18, Marginally Concerned)

> *Is this app compatible with android and iOS? I would say unlikely because I don't see how you would really lose money because you're not giving any financial information. Free? No in-app purchases, right?* (Participant 21, Amateur)

In contrast, Participant 6 and Participant 17 both rated the possibilities of financial loss while using *SmartSurveys* as likely. Participant 6 (Marginally Concerned) expressed

apprehension for using *SmartSurveys* because she feels the application may be able to retrieve additional information for fraud:

> *Because I'm not sure about the fraud thing, so I choose likely. Maybe if I download some app, maybe someone can get your personal information on your phone. But I'm not too sure about that.* (Participant 6, Marginally Concerned)

Participant 17 (Fundamentalist) shares a similar perspective. She explained that there is a chance that the patient experience feedback data could be exposed to a third party. Entities, such as an employer or insurance company, could potentially use patient experience feedback data as supporting information to deny individuals of employment or insurance claims. In doing so, the individual would suffer a financial loss. Thus, she senses there is a likelihood for financial loss associated to using and downloading *SmartSurveys*.

4.4.2 Performance Risk

With respect to performance risk, there was a mix of positive and negative responses from participants. Most participants perceived performance risk to be low when downloading or using *SmartSurveys*. Out of all the participants, one quarter of participants responded with 'very unlikely' (n=6) and almost half (n=11) answered with 'unlikely'.

Some participants considered *SmartSurveys* to be more simplistic in design and function in comparison with other applications on their phone. Therefore, participants suggested that the application's simple design would result in fewer malfunctions:

> *I'd say unlikely because from my point of view, it doesn't look too fancy or a gaming application with a lot of coding and stuff. It's simplistic. I feel like chances of it not working, the chances will be low.* (Participant 21, Amateur)

In addition, with the option to review answers before submitting their patient experience feedback data, Participant 14 believed the likelihood of submitting incorrect information would be low:

> *Chances that there's something would be more than any other app. Actually, probably lot less. It's not quite as advanced as some other apps. And since it submits it all at once, I have control over that. So, if something went wrong, I would be able to look at all the information before it's submitted. Yeah, very unlikely.* (Participant 14, Lazy Expert)

Other participants supported their evaluation of performance risk with their interaction with *SmartSurveys*:

> *It went very smooth. I don't think anything bad is going to happen. Nothing's going to crash or anything.* (Participant 16, Marginally Concerned)

Many participants believed there was a slight possibility for *SmartSurveys* to malfunction based on past personal or social experiences with smartphone applications:

> *It's unlikely. I mean in the beginning there might be glitches or sometimes halfway through the survey it might glitch. But that's the most.* (Participant 13, Amateur)

> *Unlikely, but I mean, it's always possible that something happens. Some apps don't work properly. It's always possible and it's new. It's unlikely. I'm sure we have good developers but you know.* (Participant 23, Amateur)

> *So far it ran smoothly but apps always crash. So, I don't know. I don't know, I've used/filled out my patient information on an iPad and that's worked fine so I would say it's unlikely* (Participant 1, Marginally Concerned)

> *For question 8, I didn't put very unlikely. Because I did see you could see something wrong with the phone, or it can freeze. But it looks pretty efficient to use. I don't see that much of a problem.* (Participant 18, Marginally Concerned)

A small percentage of participants believed that the possible performance risks were likely due to the novelty of the application:

> *I think if this is the first iteration of this product, I think it's possible that there could be something wrong with it, simply because things have to go through multiple rounds until it's perfected, until you find out the things it might be wrong that you didn't think of. So, I said likely.* (Participant 11, Marginally Concerned)

In addition, participants viewed technical failures as a normal occurrence when it comes to using smartphone applications:

> *I think likely. Everybody encounters some trouble shooting with technical stuff, there's going to be something that comes up at some point.* (Participant 12, Technician)

> *I'm suspecting because you can have many different kinds of companies with their own specific requirements, you don't really know what would happen. They might design a survey that ends up being a bit troublesome. It's hard to foresee all possibilities at this point 'cause everything is kind of open. I think there will be, right now, likely be something wrong at some point.* (Participant 7, Technician)

Unsurprisingly, Participant 22 said that minor glitches in the application would not deter him from using the application:

> *It's a pretty vague question. I'm going assume it's talking about something catastrophically wrong with SmartSurveys. I'm going to go with unlikely and not very unlikely. I wouldn't be shocked to see a broken button on an app. I wouldn't delete it and never use it again if there's a broken button. I've done a little bit of work with software I know that there are bugs and they can be fixed.* (Participant 22, Lazy Expert)

Participant 17 also attributes potential performance risk to poor user interface design of the application. In addition, she fears changes in backend development could result in security vulnerabilities.

4.4.3 Physical Risk

Participant perceptions of physical risk for *SmartSurveys* were found to be low.

Participants expressed the physical risk of using *SmartSurveys* was comparable to any other

application on their smartphone:

> *Well, it's just filling out buttons on a survey. I don't think there should be health issues any more than health issues from just using a smartphone. So, I'm going to go with very unlikely.* (Participant 7, Technician)

> *I don't think there's any chance the application will not be safe from my experience from using any app on my smartphone.* (Participant 15, Marginally Concerned)

Participant 8 who rated perceived physical risk associated to *SmartSurveys* as 'unlikely'

explained that the application gave users a choice to 'skip' questions they were unwilling to

answer. As a result, participants evade or eliminate any possible physical threats they perceived:

> *I don't think it's going to harm you. I don't think it's going to have any injuries to your health physically, mentally or emotionally. If I don't want to answer it, I can skip it. There's a skip button over there. So, if I'm uncomfortable, I can just give it a skip. It's not like I'm being forced or it's mandatory to answer it. So, it's not going against my will as well.* (Participant 8, Amateur)

An interesting perspective brought up by Participant 10 was that the application itself was

not harmful. Instead, the content collected and delivered by the *SmartSurveys* could become

dangerous to the user's health:

> *Again, it's unlikely it might, just because it has nothing to do with the platform. If the questions that are being asked are just sort of general data collection and follow up. There's no reason it could be harmful. It could be harmful, only in my mind, if it's providing patients information or medical information or follow-up information about now you should go take these drugs or that out this prescription, that could have the potential. But the app in and of itself should not.* (Participant 10, Technician)

Furthermore, other participants sensed physical risk if their information was misused or disclosed to a third party in such a way that their health would be affected:

> *In Canada, I don't see the survey could be harmful to my health. In a place like the States if insurance got information they shouldn't, you could be denied healthcare but Canada? I can't really think of anything.* (Participant 14, Lazy Expert)

> *If it's not associated with my insurance company in any way, and it's only for the healthcare to improve their staff's interaction with their patient. I don't think it would be likely.* (Participant 24, Technician)

4.4.4 Psychological Risk

When asked to judge their perception of psychological risk associated with *SmartSurveys*, most of the participants (n=20) rated their perceived psychological risk to be 'very unlikely'. The remaining participants rated their perception of psychological risk to be 'unlikely'. In general, perception of psychological risk when using *SmartSurveys* is low. Participants expressed familiarity with providing feedback and with using smartphone applications. As mentioned earlier, twenty-one participants have used their smartphones to complete a survey before and majority of participants indicated that providing feedback was important to them:

> *Very unlikely. I'm just not sure how SmartSurveys will not fit in my self-image. It's a surveying system. I like to provide feedback if it's going to be helpful to the health provider. It's just what I do. It's unlikely that it will not fit.* (Participant 5, Technician)

> *I'm okay with abusing smartphones. I'm okay with filling out surveys. I'm okay with having an online way of doing things instead of on paper like this. So, I think it – oh it's a negative question -- not fit will be very unlikely.* (Participant 7, Technician)

For Q10, I would say it's very unlikely particularly because so many of us now use smartphones so having an extra survey app or SmartSurveys doesn't really in my mind change that self-image. (Participant 10, Technician)

I'm going to say very unlikely. I think I'm so used to using apps and what not. I mean, I'm sorry, I'm not a heavy app user but I use my smartphone quite a bit so this seems very benign in terms of how it would impact me. (Participant 11, Marginally Concerned)

Similar to perceived physical risk, a few participants the likelihood of psychological risks depended on the nature and sensitivity of the survey questions themselves:

I guess it depends the sort of questions I might get asked. With the questions, I just answered right now don't contradict my self-image to express how I felt or how I was treated in a health appointment. (Participant 24, Technician)

I'll say very unlikely because I'm providing feedback about the service and it's voluntary if there was something I didn't want to say or discuss, I wouldn't have taken it. If I took a survey, it would be something I'd want to discuss. (Participant 21, Amateur)

4.4.5 Social Risk

The likelihood of social risk was either rated 'very unlikely' (n=22) or 'unlikely' (n=2). Overall, participant detected a very low possibility of social risk. Participants believed that completing surveys on a smartphone was sociably acceptable:

I don't think. I'm on my phone a lot anyways. I'm answering surveys. I don't think anyone would think of me differently because it's just surveys. There's nothing special about answering surveys. So, I also think that's very unlikely. (Participant 7, Technician)

Again, very unlikely. I think it's quite normal as people use apps. It sort of almost seems normal that healthcare and whatnot will be going that way too. (Participant 11, Marginally Concerned)

Very unlikely because all I'm doing is providing feedback not really doing anything weird or unordinary. I feel like it won't affect in a negative way either. (Participant 21, Amateur)

Another reason that individuals perceived low social risk was because they believed their peers would not need to know whether or not they were completing survey, or whether they were using an application to do so:

It's very unlikely, you don't really have to tell anyone that you're using the app or anything. And it's pretty cool so I don't think anyone would care at all. (Participant 4, Undefined)

I think it's very unlikely that the SmartSurveys will affect the way others think of me 'cause usually when you fill out the survey, you wouldn't tell anyone else. (Participant 15, Marginally Concerned)

One participant said that if they were found out, they would disregard any criticism:

I don't really care. It's my phone. It's my app. And basically, I don't have to show it to the person if I don't want to. I don't think it's going to affect me unless it affects myself. (Participant 8, Amateur)

4.4.6 Time Risk

Many participants recognized there could be possible time loss associated to setting up the *SmartSurveys*. However, most participants indicated that the set-up time was probably no different than what is normally required for other applications:

I think the SmartSurveys is very simple to use and very intuitive so I don't think there's a possible time of loss and I think the set-up is very easy and there's name for each button for you to use. (Participant 15, Marginally Concerned)

I will have to download the app, I will make an account learn how to use it and complete the survey. It would take me 15-20 minutes at least. It's okay, it's nothing. It's likely, but it's not a huge problem. (Participant 23, Amateur)

Well, there could be a very likely or likely. For me personally, at this age, I can learn a new app but I think it's an age thing. So, there's likely an elderly person or someone who hasn't been trained could not easily work with app. But overall, I found the app very user-friendly. (Participant 24, Technician)

Q12, I don't see any time loss situations. It was very fast and efficient way to do it since it was very simplistic questions and the scale really helps instead of tapping. (Participant 18, Marginally Concerned)

Surprisingly, Participant 21 shared the time loss was "worth it" if they felt they were making a positive contribution:

So, unlikely because again it's voluntary and you're doing something good the time is worth it. You choose to do it. The set up and process is fairly simple so it's fine. (Participant 21, Amateur)

Meanwhile, Participant 4 indicated that possible time loss associated to *SmartSurveys* was 'very likely':

Very likely because it does benefit just the company, not really yourself. And like I said, it already takes a long time as an app it downloads and all that stuff too. I just want a phone for my basic stuff. Not too much information. If I can get it done, like paperwork, like you can physically you've finished it whereas an app, takes a few days. (Participant 4, Undefined)

Participant 4 further explained that with no personal incentive for providing feedback, any time required to download, set-up or use the survey application would be, to them, time loss.

4.4.7 Overall Risk

Most participants found *SmartSurveys* not risky at all to use. Participants perceived low physical, psychological and social risk related to using the application. In addition, participants

sensed some performance and time risk associated to *SmartSurveys*. A few participants perceived

financial and physical risk to be 'likely' with using *SmartSurveys*. Their risk concerns were often

associated with the loss or misuse of sensitive health information:

> *I mean, I think there's still is a little risk. Personally, I don't like the idea of data being collected on me. Because these are mobile-based apps. I have to give you my rationale for it. I say this as political scientist and I know there's a big issue right now around privacy and government intrusion and using mobile applications to collect data. If there's an app that could literally tell you physically where you're being, that's part of the meta data government can collect on you. So, I think there is some risk. I think it's naïve for anybody to think that there's no risk of information collecting, whether that's going to result in something bad happening to you. It's hard to say. I think there's still a risk.* (Participant 12, Technician)

For example, Participant 14 was worried about how their information could be distributed

if anything were to happen to the developers' business:

> *I would definitely say it was somewhat risky, just because of the nature of data you're providing. I guess if it's going direct to the people in charge of your health, they're under very stringent rules, but the company itself, MetricWire is a private entity I'm assuming? So, if it went bankrupt and started selling off its assets. That information. There's always a chance, the information is now on there, someone has it.* (Participant 14, Lazy Expert)

Participant 10 found that her perceptions of risk was derived by the collection of sensitive

information. She also spoke about the need to standardize the process of data collection – from

the conception of questions to the entities who will handle the data – to reduce risk:

> *So, on the whole, I don't think it's risky, but I'm not going to say not risky at all. I'm still going to say a little risky only because in the end it's still collecting your data and it is still health-related data and unless and until healthcare providers actually come up with a uniform platform or maybe bank of questions that they know they can ask or how to ask. It could get risky, it just depends on how it's being used and who decides what the content is.* (Participant 10, Technician)

Participants' also cited that their perception of risk was influenced by inquirer of information and as well as the credibility of the inquirer:

> *Because I feel like it's a little risky. It depends on who ask me to download it, if it's the doctor and it's certified by the hospital or something. Maybe it's pretty safe. But if it's just some anonymous thing, I might not really download it. If it's a private hospital, if it's a renown one, okay, maybe they just need some feedback. If it's not so well-known, and it's kind of sketchy, I might be. Okay, I'll download it and just walk off without downloading.* (Participant 8, Amateur)

Participant 22 mentioned that the credibility of the developers influenced his willingness to use the application:

> *I'm going to put somewhat risky it is giving out information, and you mentioned the geo-tracking feature but again, I think perception of the company building this app had to do with me trusting it. If you had said this is some huge corporation from wherever, then I might be like I'm not sure. Waterloo start-up, might not be applicable to people outside of Waterloo, but I feel okay about having them handle my information I supposed.* (Participant 22, Lazy Expert)

4.5 Summary

Based on the results reported in this chapter, the willingness to use *SmartSurveys* is not influenced by usability or the dimensions of perceived risk. A total of 24 participants were asked to evaluate the usability and perceived risks associated to *SmartSurveys*. Twenty-one out of the 24 participants were reported to have used their smartphones to share reviews. Participants enjoyed the ease of use, convenience and portability that smartphones allow. In terms of providing feedback, half of participants recognized the need for constructive criticism for service improvement.

From the participants' usability assessment of *SmartSurveys*, the application was found to be straightforward and easy-to-use. Although most participants described the application to be

intuitive, there were aspects of survey that required better instructions. In particular, participants commented on the lack of directions on how to use the Likert scale system.

Next, the perceived risk questionnaire revealed participant concerns related to using *SmartSurveys*. Overall, more than half of the participants found the application not risky to use. Among the six "classical" dimensions of risk, participants were least concerned about psychological and social risk. Most individuals are comfortable with using applications on their smartphones and most of them have used their devices to complete surveys. With respect to performance risk, participants noted malfunctions were anticipated, especially if the application is still under ongoing development. Similarly, when asked about possible time loss, individuals were prepared to spend time setting up the application. Financial and physical risks were perceived to be low. An interesting perspective that emerged from the discussions was the possibility of financial loss and physical harm if the survey data was intentionally or unintentionally mishandled. Denial of insurance money and employment contributed to participant perception of financial loss and physical risk.

Usability and the dimensions of Perceived Risk were not found to be significant barriers to *SmartSurveys* adoption. Yet, a number of issues concerning the misuse of personal information were raised. To better understand these concerns, I performed a thematic analysis, presented in Chapter 5.

CHAPTER 5

Thematic Analysis

Usability and perceived risks revealed few barriers to adoption, but the participant interviews suggested that there were a number of concerns with *SmartSurveys*. A thematic analysis revealed the following issues:

Recipients of Information	Confidence in Communication Structure	Risk of Losing Information Agency
Willingness of individuals to divulge information based on the identity of information requestors	Belief in the that the process of survey administration conduct with integrity	Losing the ability to dictate how information is used that may lead to subsequent mild or severe consequences

This chapter will explore varying participant views on their perceived privacy risk as well as the influence they have on the use of smartphones for patient feedback.

5.1 Privacy Concerns for Patient Experience Feedback Information Disclosure

The remainder of this interview can be divided into three overriding themes related to: information disclosure: recipients of information, confidence in communication structure and risk of losing information agency.

Table 5.1 reports the themes related to privacy risk, the number of participants who referred to the theme, as well as the mentions per theme.

Theme	Number of Participants (% in total)	Mentions (% in total)
Loss of Agency	18 (39)	22 (42)
Recipients of Information	15 (33)	16 (30)
Confidence in Communication Structure	13 (28)	15 (28)
Total	46 * (100)	53 * (100)

*This is not equal to the sum of the numbers in the column due to multiple responses.

5.1.1 Recipients of Information

Recipients of information refer to the entities that will receive the patient experience data upon submission. In some situations, the individuals receiving the information may also be the requestors and users of the data.

In an exploratory mixed-methods study, Atienza et al. (2015), found that participants were not universally comfortable with sharing health information with their smartphones with all entities. In addition, participants wanted to control over which individuals receive and view their data. This perception is shared by the participants in this thesis as well.

For this study, participants were asked if they were ever concerned with who was receiving their feedback information. More than half of the participants (n=14/24) mentioned that they were concerned with the entities receiving and viewing their information. Specifically, participants were worried about unauthorized third-party groups obtaining and accessing their data.

> *Absolutely. Yes. Just because a certain organization is collecting your data, doesn't mean they're the only ones using it. So, there are concerns about who what other third parties that could be passed on to and how long they're keeping that data. So yeah, I do have concerns about that.* (Participant 10, Technician)

One participant shared that he was willing to contribute data to help further businesses. However, he also noted that he would still prefer full disclosure on the identity of the groups using his information:

> *Yes, if I haven't specifically agreed to a party, my information, that sort of concerns me a little. I have in the past sacrificed that based on whatever product, service or app they're asking about. I would prefer to know who's got my information because I don't know what certain groups would do with it. And I guess even a company having my information to further their business is not necessarily evil. But I don't know if they've earned it just by virtue of saying you*

agree to give us all your information if you use this product. (Participant 22, Lazy Expert)

Having full disclosure in the data collection process can influence one's willingness to divulge information. For example, Participant 11 cited that knowing the purpose and the users of their data would help them decide whether or not to share feedback:

> *Yes. I just think I would just want to know what it's being used for and who's using it. And if someone could tell me that, then it might change my mind from not giving out that information to giving information. I feel like if I knew who was using the data, I would have a more informed decision.* (Participant 11, Marginally Concerned)

With respect to sharing feedback, several participants asserted that their comments should reach personnel who are in a position to make changes in service quality:

> *Yes, because I want my feedback to improve the service. I don't write my feedback for someone who can't change anything or improve anything. It's like they don't read it.* (Participant 20, Marginally Concerned)

In fact, one participant had a specific preference for who they wished their feedback to reach:

> *I do care about that. For example, for the housing surveys that I've filled, I do care the person I'm writing on, for example, the coordinator who doesn't look through the surveys, then that's pointless. I want somebody above that person to see my result.* (Participant 24, Technician)

> *People who don't really related and cannot use my data properly looks into. If I share my data with the doctor, the administrator will not benefit me if they look into my data. Anyone who's not really involved with the service. If I want to share my information in my smartphone, I want to give it to the doctor directly. Not even administrators or the nurses in the office. It's also the benefit of the smartphone, it can give it directly to the doctor.* (Participant 15, Marginally Concerned)

In contrast, some participants felt indifferent about who was receiving their data:

> *I have but I didn't give it much thought. I just been like I wonder what they actually do with this, if they even look at it or who looks at it but I didn't do anything.* (Participant 2, Amateur)

One of the reasons that individuals were unconcerned was due to the nature of feedback information. The comments provided by participants through feedback were only opinions about the quality of services. Participant 13 believed that these reviews could be disseminated openly with others:

> *Not really just because the information I give in regards to feedback, it's not that big of a deal everyone knows. It's usually about services, right? It's not a secret or anything so I don't really care who knows.* (Participant 13, Amateur)

Participant 13's comment revealed a fascinating perspective on sharing feedback. Individuals disregarded the identities of the recipients due to the non-sensitive nature of feedback. If their reviews or opinions were mishandled, there would be little to no consequences. Likewise, other participants shared the same thought:

> *I don't think so because I don't consider the information to be very sensitive. Even if it does go into the wrong hands, which would be weird, I probably wouldn't mind too much.* (Participant 7, Technician)

> *No. because I think this survey only about the quality the service of the hospital and other stuff. It's not personal information, it's just my opinion.* (Participant 9, Technician)

5.1.2 Confidence in Communication Structure

Confidence in the communication structure is the belief that the information traveling between the patient and their healthcare provider will be received, used properly and safe from unauthorized access.

Participants were asked to discuss whether or not they were concerned with who was receiving their feedback. Among the participants who were unconcerned about identity of the recipients of their data, they explained that they trusted the recipients to use their data properly. Unsurprisingly, participants trusted their healthcare facilities and providers to comply with ethical treatment of data:

> *I agree because it's healthcare facility. I have complete trust in them. I feel like they would do it for the right reasons.* (Participant 2, Amateur)

A few participants also expected reputable and trusted service providers to abide to ethical practices for data collection. In terms of *SmartSurveys*, one participant commented on the credibility of the inquirer, which in this case was the University of Waterloo. A feedback request from a credible inquirer diminished her reluctance to provide feedback:

> *Not really. [SmartSurveys] said where it's from, who's it's conducted by. I saw University of Waterloo -- that's credible. I'm totally fine with that. But if it doesn't say and it's from some weird mystery source then I'll be like, okay, what is that. But if its credible then, yeah, I trust it.* (Participant 13, Amateur)

For Participant 22, the credibility of MetricWire®, *SmartSurvey*'s developer, influenced his willingness to use the application:

> *I'm going to put somewhat risky it is giving out information, and you mentioned the geo-tracking feature but again, I think perception of the company building this app had to do with me trusting it. If you had said this is some huge*

corporation from wherever, then I might be like I'm not sure. Waterloo start-up, might not be applicable to people outside of Waterloo, but I feel okay about having them handle my information I supposed. (Participant 22, Lazy Expert)

In a situation in which one participant was asked to complete an iPad-based survey form by their healthcare provider, she assumed that the information would reach the doctor:

No. I haven't really. The few times I went to the orthodontist or the doctor and they've had me fill out on an iPad. I just assumed all the information was going to them. (Participant 1, Marginally Concerned)

Similarly, Participant 8 also believed that the service provider who has asked for her feedback is the one who is interested in the information:

No, if it's a hospital asking for it, I guess it's the hospital that wants it. Unless the hospital sells my information to the Third party, then I'm kind of wary about it. Other than that, I don't really care. (Participant 8, Amateur)

She further elaborated that improper distribution of her data to other third parties was concerning. Her response indicates that there is an underlying expectation that feedback should be linear: data travels from the service user directly to the service provider. Participant 19 also believed that their data had a specific purpose and would not be disseminated to other groups:

Not really. When I've done studies in the past, it's for a reason and they won't just release it anywhere. (Participant 19, Marginally Concerned)

For Participant 5, she trusted the accuracy of the information provided by service providers regarding how her data was being collected. As a result, she is usually untroubled about providing feedback to service providers:

No. Usually, they would have a FAQ section saying who will see the feedback or whether feedback is anonymous or not. So usually that information is

provided and I trust that information is accurate. So usually, I don't worry.
(Participant 5, Technician)

While many participants expected their information to be used properly, not all participants shared the same view. For example, Participant 14, on the other hand, was concerned whether his information would be used at all:

In a way, I don't know if concerned is the right word, I feel like whoever's looking at it probably isn't using it or probably doesn't care. So, I'm not worry about my information used in a bad way, I'm just worry that it's not being used at all. (Participant 14, Lazy Expert)

Participants were also asked whether there would be any bad outcomes to sharing their feedback using smartphones. Participant 7 highlighted 3 factors that could contribute to loss: the type of information he was sharing, the receiving entity, as well as the possibility of losing his smartphone device:

… it's not really safe to send it through the smartphone. On that note, I'm more concerned smartphone feedback compared to say computer feedback because in addition to who's receiving it, the one receiving it who might misuse it or might not be safe, that's one issue. Another issue is that a smartphone can easily go into the wrong hands. It could get stolen, or even borrowed, maybe you just left it somewhere your friend came in started checking it out. That's why I'm more open to computer because a computer usually doesn't have that kind of risk. But a smartphone does have that kind of risk so in general, I would be very wary of sending sensitive information using smartphones. (Participant 7, Technician)

Smartphone system susceptibility to hackers or in-device vulnerabilities could also lend to possible information loss:

I'm going to disagree just because frankly, it's such an absolute statement that it makes me want to disagree. There are many benefits to sharing feedback, but also, it's about security. The chances that people are going to see it, other people who are unrelated who are going to see it is really low, but the system could be hacked or the network provider may go over that information. And because it is

about my personal health and privacy, there is a small risk that is associated to that but I'm willing to take that risk if I'm taking such services. (Participant 5, Technician)

I would disagree because there will always be something bad. It's not 100% safe. It's with smartphones. I'm not sure apps interact with each other in a smartphone, there could be many apps. Apps always requires access to this. I'm not sure if other apps can steal information from another app. It's not 100% safe. (Participant 21, Amateur)

One participant cited human error as the reason for his dissent. He explained that there is a chance that data is released by mistake. He also considered the possibility that service providers may have other vested interests in the data which are undisclosed to the informants:

Disagree. Well, I think that human error is a thing and your information could accidentally be posted on somewhere it shouldn't be. Human is a big thing, we can't rely on computers and machines to administer everything. So, there's a possibility of data being unintentionally released somewhere but also maybe the entity administering are not entirely truthful about why they're doing it. (Participant 12, Technician)

5.1.3 Risk of Losing Information Agency

The risk of losing information agency can be conceptualized as the possibility that collected data is used for purposes beyond what was initially intended or disclosed. In other words, participants may end up surrendering control over how their data is used.

Participants were asked to discuss whether they thought there would be bad outcomes if they were to share patient feedback using their smartphones. The emergent concern revealed through these discussions was that participants worried whether their information would be exposed:

I would say agree provided everything works properly. If there's a huge error and everything gets leaked somewhere wrong, that's not good. If it's implemented properly, I don't have any issues sharing medical information on my smartphone. (Participant 22, Lazy Expert)

Participant 11 also noted that his distrust stems from the occurrence of agency loss observed in the public setting:

Disagree, because I feel as though I've obviously seen cases in the media where there's been breach of privacy with respect comes to health and personal information. Based on past social experiences, that is quite obviously not the case. (Participant 11, Marginally Concerned)

The loss of agency can lead to subsequent consequences. For example, Participant 23 described other personal information, such as passwords, that can be acquired through her feedback.

I somewhat agree. I think it's safe. It's not risky to share feedback. But you never know. Sometimes people can get your secure passwords, your bank passwords. So, for all information the bad outcomes could be this kind of things if people get password or more information than they need to know about you. (Participant 23, Amateur)

Participant 8 also worried about the possibility of identity theft through if their privacy was shared with someone they did not know about:

Getting hacked, or maybe having my confidential privacy shared to someone else that I do not know about. Or someone's collecting it. Nowadays technology and stuff is really dangerous 'cause you don't know who it is. And for name, now giving names and sharing pictures online, and it's not as safe as the past. Someone can fake your account and become you but not you. So, it's very dangerous just by sharing name as well. (Participant 8, Amateur)

Participants were further asked to detail the types of circumstances they would consider to be "bad outcomes". Participant responses demonstrated aversion to having information leaked and used in an unauthorized manner.

> *Bad outcomes? Probably, if my information was leaked everywhere, like that's a worry with everything. Something else, my information being used for something I'm not comfortable with. I don't know. I haven't really experienced this personally. I don't know if I can think of.* (Participant 1, Marginally Concerned)

The loss of anonymity and confidentiality was also a concern for participants:

> *I can't think of anything bad. Them exposing your information when they said they wouldn't, but that's all I can think of.* (Participant 16, Marginally Concerned)

> *The one that comes to mind mostly is if you don't want your name published somewhere or someone to know who you are. Then, that's the most likely bad outcome is that you become identified when you want to remain private to the healthcare system. Does that make sense?* (Participant 12, Technician)

For Participant 21, she shared that the loss of agency can be very apparent. She explained that seeing online advertisements tailored to her daily life indicated that third-parties already have access to her information.

> *Maybe it's stuff you don't necessarily want a third party to know and they do know it because sometimes certain third party companies they display ads based on what you've done if you see an ad that's something related to you in story that you've done. Then you know the third party has your information. A fact you didn't want to know, but you now know 'cause you can see the app.* (Participant 21, Amateur)

Individuals also viewed their location as a form of personal information. When participants were asked whether they would be willing to share their global positioning service

(GPS) data for service quality improvement, majority participants (n=17/24) were reluctant about disclosing their location. For example, Participant 2 turns off her GPS to maintain privacy in her whereabouts and what she is doing:

> *No. I even have it turned it off on my phone. I'm kind of private when it comes to where I am and what I'm doing and all that. I don't like to share everything.* (Participant 2, Amateur)

For Participant 9, he felt that sharing his exact location was too risky and intrusive:

> *For me, sharing the location is very difficult because it's risky, too risky. If anyone knows my exact location, I think they can follow me. I don't feel comfortable sharing this information.* (Participant 9, Technician)

Similarly, Participant 13 felt uncomfortable with constantly sharing her location because she felt like she could be followed. In addition, the constant use of GPS would deplete her device's battery.

> *I think I would be a little bit more hesitant. You only turn it on when you're going to use the app or something like that. If it's on all the time, I feel like someone's following me all the time or someone can see that they're following me and it probably drains out my battery too.* (Participant 13, Amateur)

In fact, participants felt safer to provide an approximate location of their whereabouts rather than the precise readings from their GPS data.

> *I think I would do that. For once, it's a research study, so I see approved this and this. And normally, I know the ones that ask for my location, I had to type it in and it didn't just search me. So, I just feel safer.* (Participant 3, Technician)

Another concern with sharing GPS location was whether the interaction between the application and the participant would cause inconveniences:

I'm hesitant is the first reaction. I guess I'm a little skeptical on how much it would improve my service quality. I feel like I'd just be getting pop-ups and that's something I would not be interested in. I guess unlikely unless I could be convinced it can improve service quality in a way that matters to me. (Participant 22, Lazy Expert)

5.2 Summary

The in-depth semi-structured interviews revealed factors that influenced the participant's willingness to share feedback using their smartphones. These factors included the identities of the service providers, the belief that the communication structure is reliable and the potential loss of information agency.

In general, participants were willing to give patient feedback information if they were given sufficient information about how their data would be used and by who. With respect to service feedback, participants wanted their data to reach someone who could implement their suggestions. Participants who were indifferent about the entities receiving their data felt that their opinions would not lead to future consequences.

Participant's confidence in the communication structure also played a role in information dissemination. Many participants trusted the service providers, especially their healthcare providers, to use their feedback properly. Furthermore, the credibility of the service provider and the *SmartSurveys* developer was also considered in their decision to divulge information.

The risk of losing information agency deterred participants from wanting to use *SmartSurveys*. Participants pointed to the sharing of sensitive information, past social and public loss of information agency as well as personal experiences as the reasons for their concern. In addition, the majority of participants were hesitant to share their GPS data for service quality.

The implication of key findings will be discussed in the next chapter. Chapter 6 will also include limitations of this study.

CHAPTER 6

Discussion

The aim of this thesis was to explore perceptions and attitudes which act as barriers to the use of smartphone-based patient experience feedback. In particular, participants were asked about the usability and the perceptions of risk associated with *SmartSurveys*, a mobile application developed by local Waterloo start-up, MetricWire®. As previously mentioned in Chapter 2, perceived risk and its constructs were anticipated to be inhibitors of *SmartSurveys* adoption. Yet, minimal concerns were raised when participants were asked to describe the types of risks they anticipated while using *SmartSurveys*. In addition, participants found the application intuitive and easy-to-use, therefore, suggesting there were few usability issues. Through thematic analysis, the 24 participant interviews revealed other factors that influenced the decision to accept *SmartSurveys* as a conduit for patient experience feedback. Three major themes emerged from the participant interviews: recipients of feedback, confidence in the communication structure, and potential loss of information agency. This discussion will highlight the implications of these key findings on appropriating future design for smartphone-based patient experience feedback. The limitations of this study will also be discussed.

6.1 Key Findings

The results of this thesis concur with prior investigations in mHealth privacy research; individuals desire to have control over technology as well as the freedom to select the recipients and users of their data. The findings from this study also corroborate with previous research which proposed individuals are concerned with unauthorized access and secondary usage of their data (Atienza et al., 2015; Joinson et al., 2010; Lederer et al., 2003). However, with respect to

SmartSurveys, there are some notable differences in attitudes towards sharing patient feedback worth mentioning. In the following sections, I will describe each major theme in greater detail.

6.1.1 Recipients of Information

With respect to patient experience feedback, participants wanted healthcare providers or individuals who have the authority to implement changes in services to receive their comments. Participants' trust in these entities reflects three beliefs. First, they believe service providers have the ability and knowledge to make the service improvements. Next, service providers are able to handle feedback information ethically such that feedback data will remain safe. Lastly, service providers exhibit no mal-intent in asking for patient experience data (e.g. feedback is collected in order to improve patient care) (Gefen, Karahanna, & Straub, 2003; Kim, Ferrin, & Rao, 2008). Prior research has shown that trust can help facilitate the intent to use certain technologies by reducing perceptions of risk (Beldad, De Jong, & Steehouder, 2010; Luo, Li, Zhang, & Shim, 2010; Slyke, Lou, & Belanger, 2010). Researchers Joinson et al. (2010) have also suggested that the moderating effect of trust on privacy may be the reason why individuals are willing to surrender privacy concerns when faced with a trusted inquirer and why privacy is important when the requestor is not trusted. Therefore, trust in healthcare providers and *SmartSurveys'* developer, MetricWire®, may help to explain why there were few concerns related to the dimensions of perceived risk.

Despite having trust in healthcare providers, the level of concern in who was viewing the data still varied depending on how sensitive individuals believed their feedback to be. Individuals who did not consider their feedback as sensitive information were less concerned about who was viewing and using their data. These individuals viewed patient experience

feedback as a rating process for their health services. In other words, they feel as though they are simply providing an account of how their healthcare facilities are operating. Thus, their review would only benefit the healthcare providers who have asked for it. In addition, the promise of anonymity upon submission also minimized concerns about the recipients of their information. Anonymity ensures that individuals viewing data would not be able to identify the person giving the feedback. Therefore, if the feedback data was somehow revealed publicly, the identities of the patients would remain protected. Hence, individuals viewed feedback to be less sensitive and were, therefore, less concerned about the entities reviewing and using their data.

In contrast, individuals who observed feedback data as sensitive information were more concerned about the entities who are able to access and use their data. These individuals believed their feedback could directly or indirectly be used to retrieve additional information (e.g. financial, medical) about themselves. Therefore, having a skip option in *SmartSurveys* for questions patients find too invasive to transmit online may help to overcome the issue of sensitivity. Healthcare providers and researchers should also seek to standardize patient experience feedback such that questions are helpful yet safe for patients to answer. More importantly, healthcare providers should affirm who and how the feedback data will be used as well as encourage their patients to ask questions about their patient feedback data.

6.1.2 Confidence in the Communication Structure

This thesis also reported differences in the confidence that information would reliably reach the intended recipient(s). The role and credibility of the healthcare provider is integral in facilitating the use of *SmartSurveys* among patients. As previously mentioned, participants believed their healthcare providers would use the feedback data for "the right reasons" i.e.

service improvement. The trust established in the healthcare provider-patient relationship also

increased participants' confidence in the feedback communication structure. Therefore,

participants assumed that once they hit the 'submit' button, their comments would directly reach

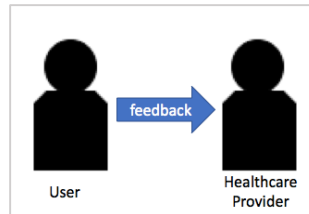their health providers as depicted in Figure 6.1.

Figure 6.1 illustrates a simplified feedback pathway between the patient and provider.

Participants also cited that an understanding of how their feedback data would be utilized

influenced their willingness to share feedback with their providers. However, for individuals

with higher technical knowledge, disclosure of the intricacies involved in the communication

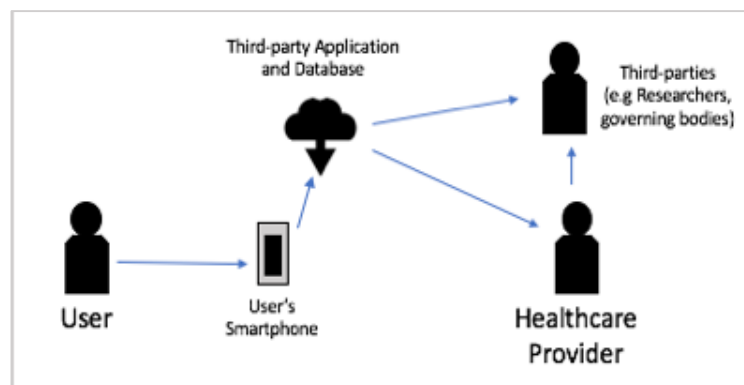structure was equally important.

Figure 6.2 depicts an example of a communication structure that curates feedback
between the patient and their healthcare provider, as well as other entities.

As anticipated, our observations align with Dupree et al.'s finding in that not all digital

natives possess the same level of technical knowledge (Dupree et al., 2016). Highly

knowledgeable participants inquired about the types of permissions the application required, the type of data server, whether information would be encrypted, where their data would be stored and the length of time their information would be kept for. These requests indicate individuals with higher knowledge have a better understanding of the actors involved in the information pathway (Fig. 6.2). Furthermore, they are aware of possible system vulnerabilities such as malicious attackers, security failures in backend development or within the smartphone itself. Therefore, their willingness to participate in smartphone-based patient feedback is dependent on both their relationship with their healthcare providers and their perceptions of the communication structure. Consequently, information regarding the communication structure should be made comprehensible and available for individuals of varying technical backgrounds.

6.1.3 Risk of Agency Loss

Joinson et al.'s (2010) study found that individuals may find certain situations riskier depending on the context rather than their disposition towards privacy. Their results seem to be true among our participants as well. The risk of losing information agency was observed to be the central concern among all privacy personas. Many individuals stated they would be uncomfortable if their feedback data was somehow leaked or mishandled. While there were disagreements about the sensitivity of feedback data (see Chapter 6.1.1), participants were hesitant to share any information if there was a possibility of unauthorized use or access of data. Furthermore, participants believed that the loss of information agency may lead to subsequent inconveniences (e.g. telemarketing interactions) or consequences (e.g. identity theft). In some cases, participants believed the loss of information agency could lead to the loss of privacy, finances and physical well-being. (e.g. loss of employment, insurance fraud).

These results reveal that the risk of losing information agency affects the disclosure of both static (e.g. patient experience feedback) and dynamic (e.g. location) data. The perceived risk of losing information agency is augmented when participants were asked about sharing GPS information for service quality improvement. The *SmartSurveys* application can utilize GPS information (via geo-fencing) to remind or prompt users to complete surveys. However, the majority of participants found this particular feature too intrusive and risky to employ. On their devices, most participants had their GPS function turned off. Furthermore, participants were conscious of consequences associated to being known of their exact location at any given moment. In lieu of sharing GPS data, participants preferred to indicate a general location of their whereabouts. These findings are consistent with prior research which demonstrate concerns for privacy are higher when the service is based on tracking the user's location (Barkuhus & Dey, 2003).

6.2 Perceived Risks and *SmartSurveys*

Several theoretical models have been considered to predict the adoption and use of *SmartSurveys*. Perceived risk was the variable that we thought would best represent the concerns or barriers that individuals would encounter in their decision to engage in *SmartSurveys*. We found that the perceived risk model, while demonstrating to be an inhibitor in other mHealth studies, was not helpful in understanding the types of concerns that individuals had for *SmartSurveys*. Privacy risk, though important, was not an alarming concern within the context of providing patient experience feedback through smartphones. The prevalence of online reviews for products and services may help to explain why individuals are comfortable with sharing their feedback in public forums. Furthermore, having the ability to comment and to critique helps

cultivate transparency, dialogue and better rapport between businesses and consumers. In some cases, reviews may even have persuasive power over purchase decisions.

Privacy risk and the risk of agency loss are different. Privacy risk is defined as potential loss of personal information without the consumers' knowledge following the use of a service or a product (Featherman & Pavlou, 2003). The loss of information agency, however, is the loss of control over the interactions after information has been divulged. An example of the loss of information agency is if service providers began to send marketing emails following a service encounter without prior consent. In this example, the consequence that exists is the inconvenience of marketing emails. On the other hand, an example of privacy risk is if *SmartSurveys* was compromised and personal information is unknowingly lost through the ordeal.

6.3 Suitability of IS Adoption Models for *SmartSurveys*

The Unified Theory of Adoption and Use of Technology (UTAUT) and UTAUT2 are salient models used in IS research to predict usage behavior intentions and attitudes towards using certain technologies. Yet, the privacy-related variables from this study are not well-defined in these models (APPENDIX A). The use of *SmartSurveys* is nuanced and contextual depending on the relationship between the service provider and consumer, privacy preferences, situational cues and the risk of losing information agency. Thus, UTAUT and UTAUT2 may not be the ideal models to determine the adoption and use of *SmartSurveys*.

UTAUT and UTAUT2 are traditionally employed to evaluate IS in organizational settings where individuals may not be able to select the type of technology they wish to use (Davis, 1986; Venkatesh & Davis, 2000; Venkatesh et al., 2003). In contrast, consumers have the

liberty of downloading, using, deleting or even re-downloading *SmartSurveys* at their own discretion. There is also an altruistic component associated with *SmartSurveys*. Since individuals may not become direct beneficiaries of service improvements, their feedback is provided "for the greater good". Due the voluntary use of *SmartSurveys*, adoption models such as UTAUT and UTAUT2 may not be a good fit in predicting attitudes and behavioral intent in *SmartSurveys* adoption.

6.4 Co-Creation: How 'important' is important?

The results from this study suggests positive rapport between patients and healthcare providers cultivated greater participation in patient experience feedback. However, participants stressed the importance of full disclosure on the details of who is using data, why service providers need it and how will it be used. Thus, healthcare providers and MetricWire® should endeavour to inform end-users the manner their data is handled through their application.

The interviews with participants also revealed a need to better communicate research goals to patients. Out of the sample, only half of the participants believed their feedback was important. In addition, a third of participants cited that their willingness to share feedback information was based on the quality of health services they received; individuals would only provide feedback if the service was either outstanding or terrible. In contrast, a few participants regarded feedback as trivial and unimportant. These participants held a belief that feedback was more of a formality rather than a tool to improve services. Collectively, these attitudes point to a lack of motivation and incentive to provide feedback due to an inability to sense the importance of patient experience feedback for changes in healthcare quality. Therefore, providing the rationale for feedback may help patients comprehend how their opinions refine healthcare

services. Healthcare providers should also seek to communicate with patients when feedback has been received and implemented to demonstrate that patient feedback is important to them. Furthermore, *SmartSurveys* could be used as a tool to bolster dialogue between healthcare providers and their patients regarding recommendations or reviews. Lastly, healthcare providers should seek to access necessary resources to support changes to their practice.

6.5 Limitations

The themes which have transpired from this thesis adds new attributes to understanding the contexts which are appropriate for information disclosure through smartphone-based application. Nevertheless, we are careful to generalize the findings to all types of mHealth applications. There are some limitations that are worth mentioning.

The attitudes and perceptions of risk held by the participants were captured at one point in time. Participants interacted with *SmartSurveys* for short and limited length of time prior to sharing their opinions about the application. In addition, participants did not use *SmartSurveys* to its full capacity without assistance (e.g. app set-up, geo-fencing, completing surveys on their own). Previous IS research demonstrates user attitudes towards adoption can change over time as they become more familiar with technology (Venkatesh & Davis, 2000; Venkatesh et al., 2003). Thus, the attitudes as well as the perceptions of risk for *SmartSurveys* may also be change over time as users become more accustomed to the technology.

Participants were not asked to download and subsequently use the application on their own devices. Furthermore, participants were not given multiple scenarios to test different types of perceptual risks. Consequently, there may have been less consideration of risks since

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participants did not need to surrender any personal information or need to react to extreme situatations. Moreover, *SmartSurveys* application offers a GPS tracking feature which can trigger reminders and prompts to complete surveys. Since time was a constraint on sampling and data collection, tracking participants' actual use of the *SmartSurveys* was not possible for this thesis.

Participants were recruited through convenience sampling. Although equal representation of participants was not a recruitment objective, the participant demographic for this study was narrow as most individuals were younger and more educated digital natives. Anticipating the possibility of having a narrow demographic of participants, privacy segmentation was considered in order to detect nuances between perceptions of (privacy) risk among users. Yet, despite broadening the scope of sample to all smartphone owners, individuals with higher technical knowledge and higher levels of motivation to protect their privacy i.e. Fundamentalists, were under-represented in this thesis. We hypothesize this group of users may be less willing and less trusting overall to divulge any type personal information.

Lastly, methodologically, a limitation of qualitative interviews is the ability to qualify but not quantify the prevalence of the themes through the discovery process. The goal of the study allowed us to understand *what*, *how* and *why* rather than *how much*, *how often*, and *how many*.

6.6 Summary

This chapter discussed the findings from Chapter 4 and 5. The key findings suggest that willingness to use *SmartSurveys* is highly contextual and nuanced. Participants exhibited different thresholds of comfort for using *SmartSurveys* depending on their relationship with their healthcare provider, the sensitivity and type of feedback data as well as their technical backgrounds. Better communication of research and data goals between researchers, healthcare

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providers, application developers and patients may also contribute to future use of *SmartSurveys*.

Finally, the limitations of the study were outlined.

CHAPTER 7

Conclusion

The use of *SmartSurveys* to collect patient experience data provides new and exciting opportunities for both healthcare providers and patients to assess the quality of health services. Research has examined the different privacy concerns related to information disclosure using mHealth technology. In this thesis, I conducted 24 semi-structured interviews with smartphone users to explore the types of risks that may exist when using *SmartSurveys*. While there were minimal concerns associated with usability and perceived risks, the thematic analysis uncovered several barriers to *SmartSurveys* adoption and use. These barriers include:

1. Recipient and user of information
2. Confidence in the reliability of the communication structure
3. Risk of losing information agency

I also emphasized *what* researchers and healthcare providers need to communicate to their patients in full disclosure such as the purpose(s) of research and the systems that are in place to uphold ethical handling of information. In addition, to satisfy the demands of strong technical and privacy-concerned users, service providers and developers should seek to provide details about the communication system. Implications of this research will improve the present and future design and implementation of mHealth applications aimed to collect patient experience feedback.

7.1 Contributions

As mentioned in Chapter 1, this thesis makes the following contributions:

1. Established an empirical understanding of privacy and perceived risks in mHealth application adoption, highlighting the inconsistencies that exist between individuals of different age, level of use and risk-awareness

2. Demonstrated existing gaps in theoretical models such as Perceived Risk for understanding adoption of *SmartSurveys*

3. Identified moderators for the adoption and use of *SmartSurveys* through thematic analysis. These moderators include the provider-patient relationship, the perception of feedback sensitivity, technical knowledge and the possible risk of losing information agency

7.2 Directions for Future Research

This research suggests several opportunities for future exploration based on the insights gained from this study.

Future work should focus on investigating perceptions and usage of *SmartSurveys* over time (longitudinal) to determine the challenges and effectiveness of using smartphone-based surveys. Previous study suggests that there may be a difference between individual's reported privacy concerns and their actual behaviour (Joinson et al., 2010). Longitudinal studies will allow researchers to investigate patterns of *SmartSurveys* use through quantitative measures in addition to qualitative data. In addition, researchers should examine the collection of static and dynamic data through *SmartSurveys* to truly grasp the concerns related to the application's GPS function.

This study evaluated *SmartSurveys'* use from the patient's perspective. Future research should explore the challenges faced by healthcare providers who are in the researcher position. This would allow us to understand healthcare providers are given sufficient technical support to

educate patients on the process which is involved with sharing patient experience data. Investigations involving healthcare providers will also help to determine whether they are given enough resources to address the issues raised by their patients.

Our long-term research goal is to understand the circumstances which are appropriate for users to provide patient experience feedback information. However, the subtleties which determine the threshold of comfort with sharing patient experience feedback data through *SmartSurveys* is not well characterized in existing technology adoption models. Therefore, researchers should seek to create and test a model which can encompass the different variables associated to sharing patient experience feedback data.

REFERENCES

Abernethy, A. P., Herndon, J. E., Wheeler, J. L., Patwardhan, M., Shaw, H., Lyerly, H. K., & Weinfurt, K. (2008). Improving health care efficiency and quality using tablet personal computers to collect research-quality, patient-reported data. *Health Services Research*, *43*(6), 1975–1991. http://doi.org/10.1111/j.1475-6773.2008.00887.x

Ackerman, M. S., Cranor, L. F., & Reagle, J. (1999). Privacy in E-Commerce: Examining User Scenarios and Privacy Preferences. *Proceedings of the 1st ACM Conference on Electronic Commerce - EC '99*, (1998), 1–8. http://doi.org/10.1145/336992.336995

Acquisti, A., Gross, R., & Heinz, H. J. (2006). Imagined Communities: Awareness, Information Sharing, and Privacy on the Facebook. In G. Danezis & P. Golle (Eds.), *Privacy Enhancing Technologies* (pp. 36–58). Retrieved from http://people.cs.pitt.edu/~chang/265/proj10/zim/imaginedcom.pdf

Ahmed, F., Burt, J., & Roland, M. (2014). Measuring patient experience: Concepts and methods. *Patient*, *7*(3), 235–241. http://doi.org/10.1007/s40271-014-0060-5

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour*. Englewood Cliffs: Prentice-Hall.

ANSI/AAMI HE75:2009. (2010). *Human Factors Engineering - Design of Medical Devices*. Arlington, VA.

Atienza, A. A., Zarcadoolas, C., Vaughon, W., Hughes, P., Patel, V., Chou, W.-Y. S., & Pritts, J. (2015). Consumer Attitudes and Perceptions on mHealth Privacy and Security: Findings From a Mixed-Methods Study. *Journal of Health Communication*, *20*(6), 673–679. http://doi.org/10.1080/10810730.2015.1018560

Barentsz, M. W., Wessels, H., van Diest, P. J., Pijnappel, R. M., Haaring, C., van der Pol, C. C., … Verkooijen, H. M. (2014). Tablet, web-based, or paper questionnaires for measuring anxiety in patients suspected of breast cancer: patients' preferences and quality of collected data. *Journal of Medical Internet Research*, *16*(10), e239. http://doi.org/10.2196/jmir.3578

Barkuhus, L., & Dey, A. (2003). Location-Based Services for Mobile Telephony: a Study of Users' Privacy Concerns. In *INTERACT*. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.10.527&rep=rep1&type=pdf

Bauer, R. A. (1960). Consumer Behavior as Risk Taking. In *43rd. Conference of the American Marketing Association* (pp. 389–398). Hancock.

Beldad, A., De Jong, M., & Steehouder, M. (2010). How shall I trust the faceless and the intangible? A literature review on the antecedents of online trust. *Computers in Human Behavior, 26*, 857–869. http://doi.org/10.1016/j.chb.2010.03.013

Benson, T., & Potts, H. W. (2014). A short generic patient experience questionnaire: howRwe development and validation. *BMC Health Services Research*, *14*(499), 1–10. http://doi.org/10.1186/s12913-014-0499-z

Bergeson, S. C., Gray, J., Ehrmantraut, L. A., Laibson, T., & Hays, R. D. (2013). Comparing Web-based with Mail Survey Administration of the Consumer Assessment of Healthcare Providers and Systems (CAHPS(®)) Clinician and Group Survey. *Primary Health Care: Open Access*, *3*(1), 1–6. http://doi.org/10.4172/2167-1079.1000132

Boulding, W., Glickman, S. W., Manary, M. P., Schulman, K. A., & Staelin, R. (2011). Relationship Between Patient Satisfaction With Inpatient Care and Hospital Readmission Within 30 Days. *The American Journal of Managed Care*, *17*(1). Retrieved from http://www.ajmc.com/journals/issue/2011/2011-1-vol17-

n1/AJMC_11jan_Boulding_41to48/

CATALYST. (2016). Smartphone Behaviour in Canada and the Implications for Marketers in 2016 - Catalyst. Retrieved May 29, 2017, from http://catalyst.ca/2016-canadian-smartphone-behaviour/

Chen, C. (2013). Perceived risk, usage frequency of mobile banking services. *Managing Service Quality: An International Journal*, *23*(5), 410–436. http://doi.org/10.1108/MSQ-10-2012-0137

Chen, L. da. (2008). A model of consumer acceptance of mobile payment. *International Journal of Mobile Communications*, *6*(1), 32. http://doi.org/10.1504/IJMC.2008.015997

Chomutare, T., Fernandez-Luque, L., Arsand, E., & Hartvigsen, G. (2011). Features of mobile diabetes applications: review of the literature and analysis of current applications compared against evidence-based guidelines. *Journal of Medical Internet Research*, *13*(3), e65. http://doi.org/10.2196/jmir.1874

Cocosila, M., & Archer, N. (2010). Adoption of mobile ICT for health promotion: An empirical investigation. *Electronic Markets*, *20*, 241–250. http://doi.org/10.1007/s12525-010-0042-y

Consolvo, S., Smith, I. E., Matthews, T., Lamarca, A., Tabert, J., & Powledge, P. (2005). Location Disclosure to Social Relations: Why, When, & What People Want to Share. In *CHI*. Retrieved from https://pdfs.semanticscholar.org/938d/92272fc2622f77458791376daea7c24c098c.pdf

Creswell, J. W. (2009). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (3rd ed.). Thousand Oaks: Sage Publications Inc.

Cunningham, S. (1967). Risk taking and information handling in consumer behaviour. *Harvard University Press*, pp. 82–108. Boston.

Davis, F. (1986). A Technology Acceptance Model for Empirically Testing New End-User Information Systems: Theory and Results. *PhD Thesis - Massachussetts Institute of Technology*.

Dennison, L., Morrison, L., Conway, G., & Yardley, L. (2013). Opportunities and challenges for smartphone applications in supporting health behavior change: qualitative study. *Journal of Medical Internet Research*, *15*(4). http://doi.org/10.2196/jmir.2583

Doyle, C., Lennox, L., & Bell, D. (2013). A systematic review of evidence on the links between patient experience and clinical safety and effectiveness. *BMJ Open*, *3*(1), 1–18. http://doi.org/10.1136/bmjopen-2012-001570

Dupree, J. L., Devries, R., Berry, D. M., & Lank, E. (2016). Privacy Personas: Clustering Users via Attitudes and Behaviors toward Security Practices. *Conference on Human Factors in Computing Systems*, 5228–5239. http://doi.org/10.1145/2858036.2858214

Etkind, S. N., Daveson, B. A., Kwok, W., Witt, J., Bausewein, C., Higginson, I. J., & Murtagh, F. E. M. (2015). Capture, Transfer, and Feedback of Patient-Centered Outcomes Data in Palliative Care Populations: Does It Make a Difference? A Systematic Review. *Journal of Pain and Symptom Management*, *49*(3), 611–624. http://doi.org/10.1016/j.jpainsymman.2014.07.010

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. http://doi.org/10.1016/S1071-5819(03)00111-3

Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating Rigor Using Thematic Analysis: A Hybrid Approach of Inductive and Deductive Coding and Theme Development. *International Journal of Qualitative Methods*, *5*(1), 80–92.

http://doi.org/10.1063/1.2011295

Fife, E., & Orjuela, J. (2012). Mobile Phones and User Perceptions of Privacy and Security. In *International Conference on Mobile Business* (Vol. 23). Retrieved from http://aisel.aisnet.org/icmb2012

Fishbein, M., & Ajzen, I. (1975). *Beliefs, attitude, intention and behavior: an introduction to theory and research*. Reading: Addison-Wesley.

Gefen, D., Karahanna, E., & Straub, D. W. (2003). Inexperience and Experience With Online Stores: The Importance of TAM and Trust. *IEEE Transaction on Engineering Management*, *50*(3). http://doi.org/10.1109/TEM.2003.817277

Green, A. S., Rafaeli, E., Bolger, N., Shrout, P. E., & Reis, H. T. (2006). Paper or plastic? Data equivalence in paper and electronic diaries. *Psychological Methods*, *11*(1), 87–105. http://doi.org/10.1037/1082-989X.11.1.87

Holzinger, A. (2005). Usability Engineering Methods for Software Developers. *Commun. ACM*, *48*(1), 71–74. http://doi.org/10.1145/1039539.1039541

Horevoorts, N. J., Vissers, P. A., Mols, F., Thong, M. S., & van de Poll-Franse, L. V. (2015). Response rates for patient-reported outcomes using web-based versus paper questionnaires: comparison of two invitational methods in older colorectal cancer patients. *Journal of Medical Internet Research*, *17*(5), e111. http://doi.org/10.2196/jmir.3741

Jacoby, J., & Kaplan, L. B. (1972). The Components of Perceived Risk. *Purdue Papers in Consumer Psychology*, (118), 382–393. Retrieved from https://www.researchgate.net/publication/247814928

Joinson, A. N., Reips, U.-D., Buchanan, T., & Schofield, C. B. P. (2010). Human–Computer Interaction Privacy, Trust, and Self-Disclosure Online. *Human–Computer Interaction*, *25*(1), 1–24. http://doi.org/10.1080/07370020903586662

Kim, D. J., Ferrin, D. L., & Rao, H. R. (2008). A trust-based consumer decision-making model in electronic commerce: The role of trust, perceived risk, and their antecedents. *Decision Support Systems*, *44*(2), 544–564. http://doi.org/10.1016/j.dss.2007.07.001

King, J. (2014). Taken Out of Context: An Empirical Analysis of Westin's Privacy Scale. In *Workshop on Privacy Personas and Segmentation*. Retrieved from https://cups.cs.cmu.edu/soups/2014/workshops/privacy/s1p1.pdf

Kumaraguru, P., & Cranor, L. F. (2005). *Privacy Indexes : A Survey of Westin' s Studies*. Pittsburgh, PA. Retrieved from http://repository.cmu.edu/isr

LaVela, S., & Gallan, A. (2014). Evaluation and Measurement of Patient Experience. *Patient Experience Journal*, *1*(1), 28–36. Retrieved from http://pxjournal.org/journal/vol1/iss1/5

Lederer, S., Mankoff, J., & Dey, A. K. (2003). Who Wants to Know What When? Privacy Preference Determinants in Ubiquitous Computing. In *ACM Conference on Human Factors in Computer Systems*. http://doi.org/ACM 1-58113-630-7/03/0004

Lee, M. C. (2009). Factors influencing the adoption of internet banking: An integration of TAM and TPB with perceived risk and perceived benefit. *Electronic Commerce Research and Applications*, *8*(3), 130–141. http://doi.org/10.1016/j.elerap.2008.11.006

Littler, D., & Melanthiou, D. (2006). Consumer perceptions of risk and uncertainty and the implications for behaviour towards innovative retail services: The case of Internet Banking. *Journal of Retailing and Consumer Services*, *13*(6), 431–443. http://doi.org/10.1016/j.jretconser.2006.02.006

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. http://doi.org/10.1016/j.dss.2010.02.008

Marcano Belisario, J., Jamsek, J., Huckvale, K., O'Donoghue, J., Morrison, C., & Car, J. (2015). Comparison of self-administered survey questionnaire responses collected using mobile apps versus other methods (Review) Comparison of self-administered survey questionnaire responses collected using mobile apps versus other methods. *Cochrane Database of Systematic Reviews*, (7). http://doi.org/10.1002/14651858.MR000042.pub2.Copyright

McCurdie, T., Taneva, S., Casselman, M., Yeung, M., McDaniel, C., Ho, W., & Cafazzo, J. (2012). mHealth consumer apps: the case for user-centered design. *Biomedical Instrumentation & Technology / Association for the Advancement of Medical Instrumentation*, *Suppl*(September), 49–56. http://doi.org/10.2345/0899-8205-46.s2.49

Miller, G. (2012). The Smartphone Psychology Manifesto. *Perspectives on Psychological Science*, *7*(3), 221–237. http://doi.org/10.1177/1745691612441215

Mlikotic, R., Parker, B., & Rajapakshe, R. (2016). Assessing the Effects of Participant Preference and Demographics in the Usage of Web-based Survey Questionnaires by Women Attending Screening Mammography in British Columbia. *Journal of Medical Internet Research*, *18*(3), e70. http://doi.org/10.2196/jmir.5068

Morton, A., & Sasse, M. A. (2014). Desperately Seeking Assurances: Segmenting Users by their Information-Seeking Preferences. In *2014 Twelfth International Conference on Privacy, Security and Trust* (pp. 102–111). Retrieved from http://discovery.ucl.ac.uk/1443292/1/Desperately Seeking Assurances - Segmenting Users by their Information-Seeking Preferences - A Q Methodology Study of Users' Ranking of Privacy%2C Security %26 Trust Cues.pdf

Park, Y. J., & Mo Jang, S. (2014). Understanding privacy knowledge and skill in mobile communication. *Computers in Human Behavior*, *38*(September), 296–303. http://doi.org/10.1016/j.chb.2014.05.041

Perrin, A., & Duggan, M. (2015). Americans' Internet access: 2000-2015. *Pew Research Center*, (June), 1–13.

Rainie, L., & Duggin, M. (2016). Privacy and Information Sharing. *Pew Research Center Internet Project*, *15*(December 2015), 47. Retrieved from http://www.pewinternet.org/2016/01/14/privacy-and-information-sharing/

Rivara, F. P., Koepsell, T. D., Wang, J., Durbin, D., Jaffe, K. M., Vavilala, M., … Temkin, N. (2011). Comparison of telephone with world wide web-based responses by parents and teens to a follow-Up survey after injury. *Health Services Research*, *46*(3), 964–981. http://doi.org/10.1111/j.1475-6773.2010.01236.x

Rooney, L. K., Bhopal, R., Halani, L., Levy, M. L., Partridge, M. R., Netuveli, G., … Sheikh, A. (2011). Promoting recruitment of minority ethnic groups into research: qualitative study exploring the views of South Asian people with asthma. *Journal of Public Health (Oxford, England)*, *33*(4), 604–15. http://doi.org/10.1093/pubmed/fdq100

Rubin, J., & Chisnell, D. (2008). *Handbook of Usability Testing How to Plan, Design, and Conduct Effective Tests Handbook of Usability Testing, Second Edition: How to Plan, Design, and Conduct Effective Tests* (2nd ed.). Indianapolis: Wiley Publishing, Inc. Retrieved from http://ccftp.scu.edu.cn:8090/Download/efa2417b-08ba-438a-b814-92db3dde0eb6.pdf

Schnall, R., Higgins, T., Brown, W., Carballo-Dieguez, A., & Bakken, S. (2015). Trust, Perceived Risk, Perceived Ease of Use and Perceived Usefulness as Factors Related to
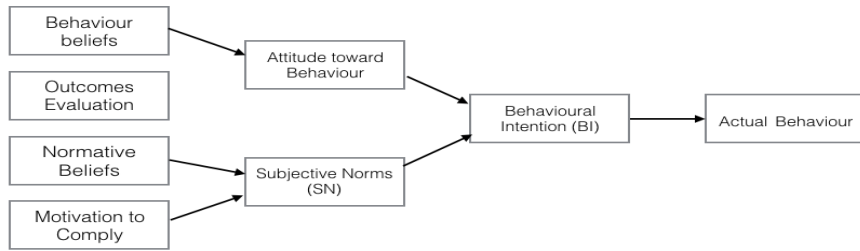
mHealth Technology Use. *Studies in Health Technology and Informatics*, *216*, 467–471. http://doi.org/10.3233/978-1-61499-564-7-467

Sheehan, K. B. (2002). Toward a Typology of Internet Users and Online Privacy Concerns. *The Information Society*, *18*, 21–32. http://doi.org/10.1080/01972240252818207

Slyke, C. Van, Lou, H., & Belanger, F. (2010). The Influence of Culture on Cognition. *Archives of Clinical Neuropsychology*, *14*(1), 581–592. http://doi.org/10.1016/S0887-6177(99)00007-4

Smith, A. (2014). Older Adults and Technology Use. *Pew Research Center*, (April), 1–26. http://doi.org/202.419.4500

Sullivan, M., Bornstein, S., & McMurray, J. (2016). *The Effectiveness of Digital Surveys for Collecting Patient Feedback in Newfoundland and Labrador*. St. John's. Retrieved from http://www.nlcahr.mun.ca/CHRSP/CompletedCHRSP.php

Tan, M., & Teo, T. S. H. (2000). Factors Influencing the Adoption of Internet Banking. *Journal of the Association for Information Systems*, *1*(5), 1–42. Retrieved from http://130.18.86.27/faculty/warkentin/SecurityPapers/Leigh/ZafarClark2009 Other References/TanTeo2000_JAIS1_FactorsInfluencingInternetBankingAdoption.pdf

Tomlinson, M., Solomon, W., Singh, Y., Doherty, T., Chopra, M., Ijumba, P., … Jackson, D. (2009). The use of mobile phones as a data collection tool: a report from a household survey in South Africa. *BMC Medical Informatics and Decision Making*, *9*(51), 8. http://doi.org/10.1186/1472-6947-9-51

Tsai, C. C., Lee, G., Raab, F., Norman, G. J., Sohn, T., Griswold, W. G., & Patrick, K. (2007). Usability and Feasibility of PmEB: A Mobile Phone Application for Monitoring Real Time Caloric Balance. *Mobile Networks and Apps*, *12*(2–3), 173–184. Retrieved from https://courses.cs.washington.edu/courses/cse590u/08wi/tsai-pervasivehealth2006-pmeb.pdf

University of Waterloo. (2015a). Instituional Analysis and Planning - Student Headcounts. Retrieved September 6, 2016, from https://uwaterloo.ca/institutional-analysis-planning/university-data-and-statistics/student-data/student-headcounts

University of Waterloo. (2015b). Performance Indicators - Faculty. Retrieved September 6, 2016, from https://uwaterloo.ca/performance-indicators/faculty-and-staff/faculty

van den Berg, M. H., Overbeek, A., van der Pal, H. J., Versluys, A. B., Bresters, D., van Leeuwen, F. E., … van Dulmen-den Broeder, E. (2011). Using web-based and paper-based questionnaires for collecting data on fertility issues among female childhood cancer survivors: differences in response characteristics. *Journal of Medical Internet Research*, *13*(3), e76. http://doi.org/10.2196/jmir.1707

Van Der Vleuten, C. P. M., & Schuwirth, L. W. T. (2005). Assessing professional competence: From methods to programmes. *Medical Education*, *39*(3), 309–317. http://doi.org/10.1111/j.1365-2929.2005.02094.x

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

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.

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*, *36*(1), 157–178. http://doi.org/10.1111/j.1540-4560.1981.tb02627.x

Woodruff, A., Pihur, V., Consolvo, S., Schmidt, L., Brandimarte, L., & Acquisti, A. (2014). Would a privacy fundamentalist sell their DNA for $1000... if nothing bad happened as a

result? The Westin categories, behavioral intentions, and consequences. In *Symposium on Usable Privacy and Security (SOUPS)*. Retrieved from https://www.usenix.org/system/files/conference/soups2014/soups14-paper-woodruff.pdf
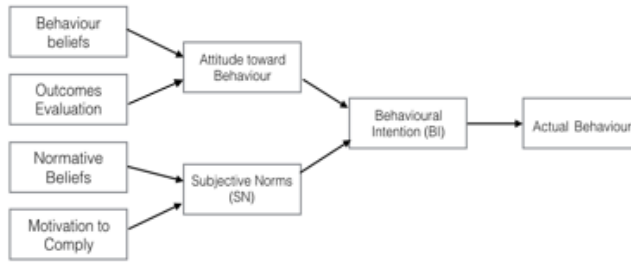
Zhou, T. (2012). Examining Location-Based Services Usage From the Perspectives of Unified Theory of Acceptance and Use of Technology and Privacy Risk. *Journal of Electronic Commerce Research*, *13*(2), 135–144. http://doi.org/10.1007/978-3-531-92534-9_12

Zuidgeest, M., Hendriks, M., Koopman, L., Spreeuwenberg, P., & Rademakers, J. (2011). A comparison of a postal survey and mixed-mode survey using a questionnaire on patients' experiences with breast care. *Journal of Medical Internet Research*, *13*(3), 1–13. http://doi.org/10.2196/jmir.1241
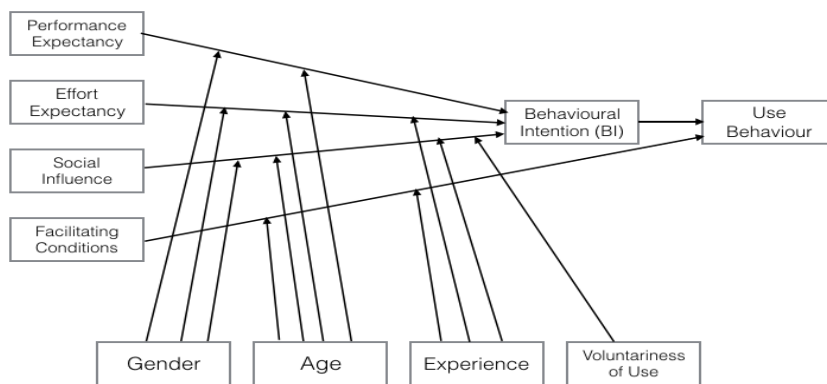
APPENDIX A

Theory of Reasoned Action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975)

Technology Adoption Model (Davis, 1986)

Unified Theory of Acceptance and Use of Technology (Venkatesh & Davis, 2000)

School of Public Health & Health Systems
University of Waterloo

PARTICIPANTS NEEDED FOR RESEARCH INTO SERVICE EXPERIENCE

We are looking for volunteers to take part in a study titled *SmartSurveys*: *Exploring the barriers to Patient Feedback using Smartphones*. You must own a smartphone.

As a participant in this study, you would be asked to answer a set of questions on paper and discuss your responses. These questions are related to your perceptions of risk when it comes to sharing information about your health care experiences using smartphones. The questionnaire and interview should take no more than an hour.

In appreciation for your time, you will receive $10 in cash.

For more information about this study, or to volunteer for this study, please contact:

Denise Ng
School of Public Health and Health Systems
at
d2ng@uwaterloo.ca

or

James Wallace
School of Public Health and Health Systems
at
519-888-4567 x 30184 or
james.wallace@uwaterloo.ca

This study has been reviewed by and received ethics clearance through a University of Waterloo Research Ethics Committee.

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SmartSurveys: Exploring Barriers to Patient Feedback Using Smartphones

Information Form & Informed Consent

This study is conducted on behalf of researchers at the University of Waterloo, and Wilfrid Laurier University. The principal investigators are Dr James Wallace from the School of Public Health and Health Systems at the University of Waterloo, and Dr. Josephine McMurray from the Lazaridis School of Business & Economics at Wilfrid Laurier University, assisted by Student Investigators, Denise Ng and Tina Chan.

The purpose of this study is to understand the barriers that prevent students from sharing information about their healthcare experiences. In this study, we will collect your feedback on how you share information about your healthcare experiences, and how this may change if that information is collected using a smartphone. It is expected that overall, this study will provide us with critical information on whether smartphones might be used to collect patients' opinions on their experiences in community level healthcare facilities. This work is an important first step in improving community healthcare services.

In order to participate in this study, you must own a smartphone. If you choose to participate in this research study, you will be asked to sign an informed consent. You will then be asked about your demographic information such as age, gender and field of study. Next, you will be asked to complete survey questions related to your attitudes towards online privacy and security practices. You will then be asked to think about the last time you visited a healthcare provider and then complete a survey about your perceptions of risk when using smartphones to provide patient feedback. You may be asked to explain your responses to some questions by the interviewer. You will then be interviewed about the use of smartphones for service feedback. Your responses will be audio recorded to allow the interviewer to accurately transcribe your responses.

This study will take about 60 minutes to complete. On completion, we will provide you with $10 in cash as a token of appreciation for participating in this study. The amount received is taxable. It is your responsibility to report this amount for income tax purposes.

Participation in this study is voluntary. Interviews will take place at Lyle Hallman North building. You may decline to answer any of the question(s) on questionnaires or posed by the interviewer if you wish. Further, you may decide to withdraw from this study at any time without any negative consequences by advising the researcher. With your permission, the entire session which contains

of answering questionnaires and the interview session will be audio recorded to facilitate collection of information, and later transcribed for analysis. All information you provide is considered completely confidential. Your name will not appear in any thesis or report resulting from this study, however, with your permission anonymous quotations may be used. Data collected during this study will be retained for 7 years in a locked office in my supervisor's lab (LHI 1707). Only researchers associated with this project will have access. There are no known or anticipated risks to you as a participant in this study.

If you have any questions regarding this study, or would like additional information to assist you in reaching a decision about participation, please contact me at 519-888-4567 x 32818 or by email at d2ng@uwaterloo.ca. You can also contact my supervisor, Professor James Wallace at 519-888-4567 x 30184 or email james.wallace@uwaterloo.ca.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE#21054) and the Wilfrid Laurier University Research Ethics Board. If you have questions for the Committees contact the Chief Ethics Officer, Office of Research Ethics, University of Waterloo at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca or Dr. Robert Basso, Wilfrid Laurier University Research Ethics Board Chair at 1-519-884-0710 ext. 4994 or rbasso@wlu.ca. For other questions, Professor James Wallace at 519-888-4567 x 30184 or email james.wallace@uwaterloo.ca.

I hope that the results of this study will be of benefit to those organizations directly involved in the study, other groups or associations not directly involved in the study, as well as to the broader research community.

I very much look forward to speaking with you and thank you in advance for your assistance in this project.

Yours Sincerely,

Denise Ng

Consent of Participant

By signing this consent form, you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities.

I have read the Information Letter regarding the study being conducted by James Wallace and Denise Ng of the School of Public Health and Health Systems at the University of Waterloo. I have had the opportunity to ask questions related to this study, to receive satisfactory answers to my questions, and any additional details I wanted.

I am aware that I have the option of allowing my interview to be audio recorded to ensure an accurate recording of my responses. I am also aware that excerpts from the interview may be included in the thesis and/or publications to come from this research, with the understanding that the quotations will be anonymous.

I was informed that I may withdraw my consent at any time without penalty by advising the researcher.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE#21054) and the Wilfrid Laurier University Research Ethics Board. If you have questions for the Committees contact the Chief Ethics Officer, Office of Research Ethics, University of Waterloo at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca or Dr. Robert Basso, Wilfrid Laurier University Research Ethics Board Chair at 1-519-884-0710 ext. 4994 or rbasso@wlu.ca. For other questions, Professor James Wallace at 519-888-4567 x 30184 or email james.wallace@uwaterloo.ca.

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.
☐YES ☐NO

I agree to have my interview audio recorded.
☐YES ☐NO

I agree to the use of anonymous quotations in any thesis or publication that comes of this research.
☐YES ☐NO

Participant Name: _____ (Please print)

Participant Signature: _____Date: _____

Witness Name: _____ (Please print)

Witness Signature: _____Date: _____

APPENDIX D

***SmartSurveys*: Exploring the Barriers to Patient Feedback Using Smartphones**

Thank you for your participation in this study. Before starting the questionnaire, please answer the following:

What is your gender?   F   M   Other: _____

What is your age?   _____ (in years)

What is your field of work?   _____

Please circle one response to the following set of statements about privacy and security practices.

Q1. Consumers have lost all control over how personal information is collected and used by companies.

> Strongly agree   Somewhat agree   Somewhat disagree   Strongly disagree

Q2. Most businesses handle the personal information they collect about consumers in a proper and confidential way.

> Strongly agree   Somewhat agree   Somewhat disagree   Strongly disagree

Q3. Existing laws and organizational practices provide a reasonable level of protection for consumer privacy today.

> Strongly agree   Somewhat agree   Somewhat disagree   Strongly disagree

Q4. I have a good understanding of technical terms such as "cookies", "encryption", "certificate", "Firewall" and "WPA/2".

> Strongly agree   Somewhat agree   Somewhat disagree   Strongly disagree

Q5. I am familiar with the "Terms of Use" of the services I sign up for.

> Strongly agree   Somewhat agree   Somewhat disagree   Strongly disagree

Q6. I have a good understanding of how to use the basic functions on my smartphone.

> Strongly agree   Somewhat agree   Somewhat disagree   Strongly disagree

Take a look at the *SmartSurveys* mobile application. Imagine the last time you were at your healthcare facility. Following an appointment, you are asked to fill out a survey for patient feedback using this mobile app on your smartphone.

Q7. What are the chances that you stand to lose money if you use SmartSurveys (because it won't work at all, possibility of fraud or because it costs more than it should to keep it in good shape)?

> Very unlikely   Unlikely   Likely   Very likely

Q8. What is the likelihood that there will be something wrong with SmartSurveys, or that it will not work properly?

> Very unlikely   Unlikely   Likely   Very likely

Q9. What are the chances that SmartSurveys may not be safe; i.e., (may be or may become harmful or injurious to your health)?

> Very unlikely   Unlikely   Likely   Very likely

Q10. What are the chances that SmartSurveys will not fit in well with your self-image or self-concept (i.e., the way you think about yourself)?

> Very unlikely   Unlikely   Likely   Very likely

Q11. What are the chances that SmartSurveys application will affect the way others think of you?

> Very unlikely   Unlikely   Likely   Very likely

Q12. What are the chances of possible time loss from having to set-up and learn how to use SmartSurveys?

> Very unlikely   Unlikely   Likely   Very likely

Q13. On the whole, considering all sorts of factors combined, about how risky would you say it would be to sign up for and use SmartSurveys?

> Very risky   Somewhat risky   A little risky   Not risky at all

APPENDIX E

Interview Guide

Introduction Script:

Thank you for coming for the study today. My name is Denise and I'm a Masters student with Dr. James Wallace with the School of Public Health and Health Systems. This study is called SmartSurveys and it is a joint project between UWaterloo and Laurier University. This study has received ethics approval from the University of Waterloo and Wilfrid Laurier University. Let me give you more information about what the study entails.

Today, we're looking at the different attitudes towards sharing patient experience feedback using smartphones. Specifically, we are examining an application developed by a local Waterloo start-up. You'll be asked to fill out 3 surveys in total. The first is about demographic information, such as your age, gender and field of study. Next, you'll be asked to respond to another question consisting of questions about privacy and security practices of companies, as well as your own smartphone habits. Afterwards, I'll give you a chance to review the SmartSurveys application. After that, you'll be asked to complete a survey about the perceptions of risk you believe are associated with the use of the application. Then, we'll finish off with an interview.

Participation for this study is completely voluntary and will take about 30 – 1 hour to complete. With your consent, I would like to audio record the session and also use your quote in the thesis or future publications. If you feel uncomfortable answering a question or wish to leave the study, you may do so. There's no penalty for doing so. For appreciation of your time, you will be given $10 in cash.

Do you have any questions about the study? Do you agree to participate?

Questionnaire Script:

So, we will start our session now. I'm going to start recording.

As I mentioned, you will be filling out a few questionnaires. As you fill out the questionnaire, I encourage to verbalize the reasoning behind your answers so that we can have a deeper understanding of your perspectives.

Cognitive Walkthrough (Usability) Script:

As I mentioned before, we are looking at use of smartphones to share patient experience feedback information. Here is the SmartSurveys application which you will get a chance to use.

It was developed by a local Waterloo start-up, Metric Wire. The application is a data collection tool and it's used mainly in research, clinical and educational settings. Service providers, such as your doctor, can sign up with MetricWire. Then they can format questions to be multiple choice, scale-type answers, comments… etc.

As a user, you would need to download the application from the Apples iTunes Store or Google Playstore, sign up for an account and then you will have access to the surveys. You can be prompted to complete the survey after a certain time period or by passing through or leaving certain locations via geofencing. The use of GPS is also one of the interesting features for this application.

Right now, I want you to imagine the last time you were at a doctor's office and were asked to complete a patient experience feedback survey. Specifically, you will be filling out the WATLX rehabilitation survey so you will notice that some of the questions are geared towards rehabilitative treatments. Have a look of the application and share your thoughts about it.

Q: What do you think about the application so far? Are there things you like, things you dislike, things you want improved? Do you have any questions about the application?

Interview Questions:

Q14. Have you ever used your smartphone to complete a survey before? (either SMS, voice-based, app, browser)

Follow-up: What kind of survey was it? What were some reasons that you decided to/not to use your smartphone? Is providing feedback to service providers something that is important to you? Why or why not? Are there certain surveys that you prefer to use paper for?

Q15. What are some examples of things that you wouldn't want to share using your smartphone?

Follow-up: Are you willing to share your location if it was for service quality improvement? Other scenarios: health promotion, entering a draw, participate in research study? (benefits)

Q16. Have you ever been concerned about who might be receiving your patient feedback information?

Follow-up: What types of security measures should be put in place either by yourself or service providers?

Q17. "There are no bad outcomes when it comes to sharing patient feedback using my smartphone" – do you agree or disagree with this statement?

Follow-up: What is your definition of "bad outcomes" when it comes to providing patient feedback using your smartphone?

Q18. What is the bigger risk concern for you when using *SmartSurveys*? (scenarios)
-Hackers trying to get into your patient feedback information vs. Third Party trying to get into your patient feedback information
-service providers looking at your feedback information vs. Third Party looking at your feedback information
-providing feedback in a public place (restaurant) vs. providing feedback at home

//

Follow-up on Q5: Do you usually read the Terms of Use? If there are Terms of Use that you disagree with, would you still choose to "Agree"? Why or why not?

Follow-up on Q6: What kind of cellphone do you have? What apps do you use the most often?

APPENDIX F

WatLX© Outpatient Rehabilitative Care Patient Experience Survey

Site Identification Code_____

Thank you for completing our survey. Your feedback will help us improve care. Please take a moment to think about the service you received in the [clinic name here] _____ **ONLY**, then start to answer the questions.

	Not Applicable	Strongly Disagree				Strongly Agree
1. I was always treated with courtesy.	☐	1	2	3	4	5
2. I participated <u>as much as I wanted</u> in decisions about my care in this clinic.	☐	1	2	3	4	5
3. My chosen family/friends were given the information they needed about my care.	☐	1	2	3	4	5
4. The place where I received rehab had a positive impact on my experience.	☐	1	2	3	4	5
5. I achieved my treatment goals.	☐	1	2	3	4	5
6. My physical pain was controlled as well as possible.	☐	1	2	3	4	5
7. My care providers had the information they needed to treat me without delay.	☐	1	2	3	4	5
8. I always felt safe when taking part in treatment activities.	☐	1	2	3	4	5

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WatLX© Outpatient Rehabilitative Care Patient Experience Survey

Site Identification Code_____

	Not Applicable	Strongly Disagree				Strongly Agree
9. From now on I know what to expect about my care.	☐	1	2	3	4	5
10. I am likely to recommend this clinic to friends and family if they need the same care.	☐	1	2	3	4	5

What is your date of birth?   _____-____-_____
                                    Year-Month-Day

What is your gender?   M_____ F_____

I completed this survey   ☐ By myself

                               ☐ With assistance

Primary condition for which you received care? _____

Do you have any other comments you want to share about your experience in this clinic or this survey?

_____
_____
_____

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