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Perceptions of Human Interactions in Adult Patients After Using Digital Therapeutic Mobile Applications

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This is to certify that the doctoral dissertation by

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Abstract

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MSN, Aspen University, 2015

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

While the use of technology in healthcare has been present for many years, the recent rise of digital therapeutics in healthcare has been understudied, specifically regarding the perceptions and experiences of patients using mobile applications. Traditional healthcare involves face-to-face human interactions, requiring scheduled check-ins and provides structured interventions. Conversely, Digital therapeutics is primarily comprised of human to machine interactions. Digital therapeutics allows the user to access intervention in their time of individual need. The decrease of human-to-human interaction and the rise of human-to-machine interaction was explored in this qualitative descriptive phenomenological study from the patient perspective. Watson's theory of human caring was used as a basis to understand patient's past and present perceptions of traditional healthcare practices in a conceptual manner. Locsin's theory of technology competency as caring in nursing provided a framework for the combination of caring and technology. Thematic coding of the data derived from semistructured interview questions from six participants over the age of 18 revealed four key themes: (a) needing something more, (b) help in my time, (c) one more thing, and (d) who is behind the curtain. These themes provide actionable evidence that supports positive social change through understanding of patient's expectations that led to satisfaction in their healthcare. Social change can be positively impacted through this research and findings to provide the patient perspectives to create meaningful healthcare experiences that align with current patient expectations and requirements.

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Dedication

This study and the entirety of my education is dedicated to the five most wonderful people on the planet, my children Ryan, Hayley, Payton, Sydney and Wesley. Without you all I would not have stived to be better, learn more and push harder. I love you all more then you will ever know and only hope someday you all come to realize that you are my greatest accomplishment.

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Chapter 1: Introduction to the Study

The use of technology in healthcare is not a new concept. There is evidence of its pervasiveness and beneficial impacts on patient care and healthcare administration. For example, researchers have found that use of electronic health records increases efficiencies in documentation (Abraham et al., 2019). Communication is also enhanced because electronic records can be viewed by other healthcare entities or providers (Abraham et al., 2019). Telehealth is another form of technology that has beneficial impacts for healthcare delivery, specifically in terms of expanding access to care. Telehealth has enabled patients in rural areas or other settings where accessing care requires travel or other arrangements to converse with providers who would otherwise be inaccessible to them (Gajarawala & Pelkowski, 2021). Patient portals and chart views accessible to the patient have changed the way in which patients obtain results and make decisions about their healthcare (Nost et al., 2021). These technologies have enhanced patient care and access and improved healthcare provider workflows and communication. Mobile applications represent an emerging form of healthcare technology.

Understanding patients' experiences and perceptions of mobile applications is essential as this technology is increasingly being used in society and in healthcare. One source reported that over 52% of smartphone users obtain health information on their phone, while 61% of smartphone users have downloaded a mobile health application (Referral MD, 2021). The staggering statistic aligns with trends in other fields where mobile applications are on the rise. According to literature, the mobile platform has been fused with many industries, healthcare being one (Aghayari et al., 2021; GuonBo, 2021).

The implications of this study for positive social change include providing knowledge that nurses can use to enhance patient satisfaction and quality from the patient's perspective regarding digital-based therapies. Findings clarified patients' preferences in regard to the use of mobile applications for healthcare delivery. Meeting healthcare needs is critical on a humanitarian level and is the foundation of nursing practice (Watson, 2019). Positive social change may be gained from exploring patients' experiences and perceptions and formulating care around those things that are identified as meaningful by the patient.

In Chapter 1, I provide an overview of the study, which includes background information, the problem statement, the purpose of the study, and the research question that I addressed. Additionally, I detail the theories used to support the study's theoretical foundation and describe the nature of the study. The chapter also includes definitions of concepts and terms used within the study and discussion of the assumptions, scope and delimitations, and limitations of the research. I also discuss the significance of the study to the nursing profession and its implications for positive social change. The chapter concludes with a summary of key points and a transition to Chapter 2.

Background of the Study

Research on technology in healthcare is primarily focused on telehealth, patient portals, electronic health records, and other technologies used to increase practice efficiencies (Aich et al., 2021; Dhinakaran et al., 2020; Evanski, 2020). Such technologies have proved beneficial within healthcare settings as adjunctive methods of promoting efficiencies and accuracy, research shows. In emphasizing healthcare

workflow efficiencies, researchers have not fully considered patient perceptions and experiences of these technologies despite the importance of such knowledge. Herbland & Lesieur (2017) revealed that patients identified behaviors of humanity and professionalism as important in their healthcare. Similarly, Garza-Hernandez et al (2020), in a study of over 150 surgical patients, found that patients found comfort in human connection and what they referred to as humanized behaviors, interpreted as providers being present with their patients. The literature shows that patients value human interaction and presence when facing illness, pain, or suffering (Leyva, 2015; Nwosu, 2019; Ryan, 2019).

This evidence is pertinent amid the increasing use of technology in healthcare settings, yet a gap remains in knowledge associated with the patient's experiences and perceptions of technology, specifically technology that can be used as primary interventions in their healthcare. The lack of evidence is heightened as many planned technologies are under development and not currently in the healthcare market. These gaps create an opportunity to proactively seek understanding of patient perceptions with groundbreaking on-the-market mobile applications designed to treat patients at their convenience. There is some research on healthcare workers' perceptions of using mobile technologies (Odendaal et al., 2020). As noted in Chapter 2, there are other insightful findings from the healthcare worker's perspective on why some technologies are more effective than others.

Research on patients' perceptions of technology, especially mobile applications, is lacking, according to my review of the literature. This lack of knowledge is concerning

because patients' perceptions of technology may be associated with their perceptions of care related to human-to-human interactions or changes they experience with increased human-to-machine interaction. Girmay et al, (2018) found that in a generalized nursing care context, patients' expectations were associated with their perceptions of nursing. Specifically, Girmay et al, found that attitudes of caring and responsiveness to their needs were expectations that the patients in the study (N = 281) had regarding their nursing care. Peirce (2019) elaborated on the construct of patient perceptions and the nurses' ability to navigate the expectations of patients by citing the need to incorporate new ways of knowing or being with the patient in context of heightened use of technology. These findings support that patient expectations regarding technology require further study. If attitudes of caring and responsiveness to individual need remain expectations, then nursing researchers need to understand how the technologies will fulfill these requirements.

The healthcare system and reimbursement are focused on patient satisfaction. Nursing is focused on positive patient outcomes; as such, the value that care provides to the patient from the patient's perspective may be connected with patient satisfaction. This study was needed because the patients' perspectives are essential to guiding patient-centered care that is meaningful and valuable to them as healthcare consumers. Understanding patient perspectives and experiences can be used to address current barriers that exist in implementing and facilitating the use of technologies that meet a patient's needs. The value of such understanding is to provide the patient with the care they need and in the patient's time frame.

Problem Statement

Evidence is lacking in relation to the patient experiences and perceptions of digital therapeutics in the form of mobile applications in healthcare. The social problem that prompted me to search the literature is the ever-changing healthcare landscape with infusion of technologies that are on the rise geared to both increase productivity and decrease costs (Digital Therapeutics Alliance, 2021). Research indicates that there are technologies being developed that nursing has not yet encountered; the Digital Therapeutic Alliance reports over 22 companies with devices and technologies either currently on the market or under development (Digital Therapeutic Alliance, 2021). The problem is current, relevant, and significant to the discipline of nursing. New technologies are being built and tested with healthcare providers and researchers but remain limited in regard to obtaining the patient's perspectives on using the technology. Literature is lacking that explores patients' experiences and perceptions of their care using digital therapeutic devices from the standpoint of interacting with a mobile application rather than interacting human-to-human. If patients value the interactions encountered during nursing care, knowing and being as supported by patient stories with correlations to positive outcomes and, the exploration of whether decreasing human interactions due to increased use of digital therapeutics and human-to-machine interactions from healthcare are essential to assuring patient satisfaction, safety, and outcomes (Dick et al., 2017; Leonard & Kalman, 2015; Newbanks, 2018; Siyanhian, 2020). Further detail is provided in Chapter 2 with the literature review.

Purpose of the Study

The purpose of this qualitative study was to explore the experiences and patients' perceptions of care when using human-to-machine interactions of digital therapeutics, specifically a mobile application. Nurses have unique perspectives of how technology might change person-to-person human interactions when compared to human-to-machine interactions. This phenomenon was compared to perceptions of traditional human-to-human nursing interactions based upon the reported experiences from patients who have recently used digital therapeutics in the form of a mobile application for biometric monitoring to provide in-time feedback of their health status. Evidence suggests that patient outcomes are positively impacted by human interactions, and face-to-face communication provided through traditional nursing care (Tetteh et al., 2021).

Research Question

In this qualitative research study, the main overarching research question was: What are the patient perceptions of human machine interactions when using a therapeutic mobile application?

Theoretical Foundation

The theories that ground this study included Locsin's 2005 theory of technology competency as caring in nursing and Watson's theory of human caring. The premise of Locsin's theory is the co-existence of technology and nursing, as an inevitable and growing occurrence (Locsin, 2005). The theory suggests altered ways of knowing in a modernized context that aligns with the continual rise of technology in healthcare (Locsin, 2005). Ways of knowing and concepts of care align with in-person open-ended

interviews in researching deeper meanings to explore the perceptions and experiences of care and significance of human interaction.

Watson's theory of human caring is based upon the premise that humans cannot be treated as objects. The theory has been used within earlier nursing practice work in exploration of technology in healthcare focused on patients' perceptions of nurses' caring. Clark examined these concepts through the lens of humanized behaviors such as being present, listening, and communicating with patients (Watson, 2019). The findings support the value that patient's report in the qualities of active listening and communication - being present with the patient in the nurse-to-patient relationship (Clark, 2015). The theory itself has evolved over the years since its 1975 origin to include carative factors and concepts providing additional alignment with human interaction and being present (Clark, 2015). Caring is a prime concept of nursing practice that nurses have held central to the discipline since the time of Florence Nightingale (Clark, 2015). As such, caring is the basis of the art of nursing and the holds significance in the healing process and well-being of patients; the means of providing positive patient outcomes (Baldursdottir et al., 2002). The 10 carative factors that are outlined by Watson, and further described in Chapter 2, promote the patient leading their care yet require the nurse-to-nurse or human-to-human interactions that are thought essential to well-being (Cossette et al., 2005).

The two theories above were used to develop the basic, open-ended research questions. The qualitative semistructured interview model as developed by Kallio et al., 2016, provides participants the ability to describe their individual perceptions and

experiences to enhance understanding of perceptions of human interactions in adult patients cared for using digital therapeutic mobile applications.

The logical connections between the frameworks presented and the nature of my study included exploring caring, technology, and perceptions and experiences of being cared for with minimal human interactions. The alignment of the theories with the study was to seek understanding of the concepts of caring and technology within the current digital age to promote positive social change for persons using digital therapeutics. Digital therapeutics may enhance the ability for certain populations to better access care in their time of need. The problem identified in this study was with use of digital therapeutics there may be a decrease in human-to-human interaction that may lead to negative patient outcomes.

Locsin's theoretical work aligns with the two main concepts of technology and caring (Locsin, 2005). The theory of technology competency as caring in nursing is a middle-range theory developed to provide better understanding between nursing and technology (Locsin, 2005). The theory of technology competency as caring in nursing established a basis for adaptations in nursing practice related to technologies such as heightened awareness of being present with patients. The relation of human interaction in terms of being with the patient and listening and communicating and caring with the use of digital therapeutics is an additional step in the competency that Locsin established.

Watson's theory of human caring provides the basis for caring and human interactions such as communication, being present and showing compassion that are historically fundamental to nursing practice. The purpose and nature of the study was to

explore the combination of the two theories and how they support the infusion of technology in healthcare with decreased human-to-human interactions.

The theories provided a basis for understanding the two vastly different realms of caring and technology, and yet provide insight into aligning the concepts to better understand patient expectations and needs. The theories support the development of open-ended interview questions and guide research by exploring the perceptions and experiences of patients who are using human-to-machine technologies as a means of treatment in a healthcare context. These key elements of the framework will be further described in Chapter 2 with alignment to the study.

Nature of the Study

To address the research questions in this qualitative study, the research design used a descriptive interpretive phenomenology approach (Pathak, 2017) to explore and describe adult patients' perceptions of the human interactions versus human-to-machine interactions when being cared for using a mobile application. The qualitative exploration aligned with the aim to understand the patients' definition, requirements, and expectations regarding interactions when being cared for through interviews with patients who have experienced human-to machine digital therapeutics in the form of a mobile application with minimal human interaction.

The research design included in-depth interviews that were conducted between a half hour to 1-hour time frame with each individual participant arranged per the participants availability. Open-ended questions were asked of all interviewees to facilitate responses that more accurately depicted their individual experience free from guiding or

presumptions. The data collected was the individual experiences and perceptions. The data included responses derived from patient interview questions regarding their perceptions of human-to-machine interactions when being cared for using digital therapeutics compared to traditional human-to-human interactions based on the patients' previous experiences with healthcare. Interviews are securely stored and managed. Participants were de-identified to maintain confidentiality.

Participants over the age of 18 were recruited through collaboration with the digital therapeutic application company to include adult patients who had used digital therapeutics in the form of a mobile applications. Sample size included the recruiting of nine participants initially as saturation cannot be predetermined. There were three volunteers who did not meet inclusion criteria and data saturation was reached with the six interviews. The extra participants accounted for attrition of those who subsequently chose to not participate in the interview process once informed consent was given. According to Creswell (2018), in phenomenological qualitative studies, a participant range is typically five to 25 participants

Recruiting was accomplished through flyers and emails that I designed and were approved by the Walden University's IRB. Flyers were distributed via companies that develop and use digital therapeutic mobile applications and via social media. Flyers were also posted to Walden's participant pool. Copies of materials used for recruiting were provided to the organizations after IRB approval for transparency. Materials containing any participant information will remain confidential indefinitely. Prior to informed

consent, the determination was made to determine if the recruited participant met the inclusion criteria.

Brief semistructured, open-ended questions were developed to address the problem and purpose of the study (Appendix A). The interviews included three open-ended questions minus demographic information based upon perceptions and experiences relevant to use with the mobile application as approved by the Walden University IRB using the consent form provided by Walden adapted by me to this study and approved by the IRB prior to use.

Inclusion criteria for the study included adult, English-speaking persons over the age of 18 years old who had used digital therapeutics in the form of a mobile application. Adding to the study's validity includes assurance that the patients have in fact used the mobile application (Patino, 2018). Selection criteria included demographic information in which the potential participant listed the technology they used, for which purpose it was used, and for what length of time it was used.

Exclusions included non-English speaking individuals, children, persons who had not used the mobile application, and those not wishing to consent to interview. Sample size was aimed at an initial 20 participants to account for those who may opt to not proceed with the interview or have scheduling conflicts that prohibit participation. The recruiting yielded nine initial volunteers, six of who met the inclusion criteria and saturation of data was reached. The range varied according to participation preferences and reaching saturation of data (Fusch & Ness,2015). The use of audio recordings was used upon participant consent using TapeAcall. Coding of interviews was conducted

through inductive coding and using NVivo software for organization of data also reviewed manually to ensure accuracy. Inductive coding was used to create codes and themes from the data itself which aligned with the aim to understand individual experience and perceptions (Lou et al., 2019).

The data comprised responses from in-depth patient interviews and participant demographics to include age range, race, gender, type of mobile application used, length of time using digital therapeutic mobile application, and primary language (Appendix B).

Definitions

Digital therapeutics (DTx): Include devices, applications or wearables that are intended to treat a diagnosis, ailment, or chronic disease (Siyahian, 2020).

Human–to-human interaction: Are defined as communicate, see and physically be in the presence of other humans (Walker, 2020).

Human-to-machine interaction: can be called human to computer interaction (HCI) or human to computer interface or human to machine interface or human to machine interaction but all refer to the way in which humans interact with technologies versus other humans (Reiner, 2017; Infineon Technologies, 2021).

Assumptions

Assumptions are necessary in research as the researcher attempts to clarify the value in studying a problem or population (Creswell, 2018). In this qualitative study, the epistemological assumption guided the study itself in the attempt to get as close to the participants to understand their perceptions and experiences as possible (Creswell, 2018). The primary assumption necessary to create a foundation for integrity of the data is that

the researcher has derived information from the qualitative one-on-one interviews void of bias or predetermined agenda (Walters, 2001). It was assumed that all participants truthfully and honestly reported their perceptions and experiences of using mobile applications. Furthermore, it was assumed that the infusion of technology in healthcare will be continual and span to all ages, races, genders, and groups of people. These assumptions are critical to the integrity and credibility of the study.

Scope and Delimitations

The study was delimited to patients 18 years or older who have used digital therapeutics in the form of mobile applications. The rationale for focus was the rising use of such modalities in non-healthcare-related settings that are now being explored from a cost-benefit approach by insurance and care delivery organizations to be used for healthcare purposes. The flexibility of use and benefits of access are creating attraction to both end users (who would, in this case, be patients) and health insurance providers. The theory of technology competency as caring in nursing (Locsin, 2005) is related in terms of caring for and helping patients learn, use and benefit from such technology in a nursing construct as patient advocators for providing care the patients want and need in their time of need. Additionally, through Watson's human caring, (Clark, 2015) the support of nurses comes in alignment with being and knowing patients in new ways that support their individual journey. With market excitement and the speed of development, the use in healthcare is becoming more common. Persons over the age of 18 were used to reduce the risks of any harm to vulnerable populations and ease the ability for interview and past experiences with human-to-human healthcare interactions. Potential

transferability then can be made to more vulnerable populations such as teens with depression or anxiety to treat their symptoms at home or in private without the stigma of seeking help or explaining their thoughts and fears that can exacerbate their condition. The failure to seek help for some may result in catastrophic outcomes.

Limitations

Limitations included the ability to perform an in-time interventional and comparative study to include a mixed-method approach in exploring all facets of the phenomena and inclusions of nurse's perspectives of the same technology used with the same population for the same need. The qualitative study is intended to understand the rich and thorough experiences and perspectives from patients' perspective. While I do believe this to be the best approach to answer the research question and provide a foundation for future inquiry, some may consider this a limitation in sufficient data as a stand-alone study requiring quantitative statistical support such as time of use of therapeutics, metrics associated with positive trends in symptoms, or other factors that inclusion of a mixed-method approach could have captured. These factors would provide even greater depth of understanding to aid in development of care modalities.

Biases may include the fact that I am an RN of 26 years who has some fundamental beliefs that nurses do make a real and tangible difference in patient outcomes. Measures to address limitations and biases included that of setting the foundation for future research and establishment of connections with experts in digital therapeutics to continue explorations after the completion of this dissertation that can investigate the other concepts. Bias in this context is referring to the bias that may arise

from variances of traditional nursing that involves direct human-to-human interactions. A lack of prior exposure to digital therapeutics and full understanding of use and benefits may have resulted in bias and negative opinion of its value. Bias reduction is found also in such connections and learning how care can be enhanced and promote positive social change with increase access, decrease stigmas, and potential for decrease catastrophic outcomes in some populations (Penny et al., 2019). Such declines may be attributed to in-time care and intervention that digital therapeutics in the form of mobile applications may provide.

Significance of the Study

A study on patient perceptions and experiences with mobile applications has wide range and transferrable implications to study digital therapeutics that will be used in healthcare. The impacts may be significant to nursing practice, nursing theory, and social change. Patient satisfaction is a critical component of compliance and seeking care (Gavurova et al., 2021). Understanding of patients' experiences and perceptions can, therefore, guide the development of processes that meet current patient expectations and lead to higher satisfaction. The study fills the current gap in literature by establishing the foundational view into the subject of patients' perspectives and experiences with mobile applications.

Significance to Practice

The study is significant to nursing practice as it establishes a context by which nurses are able to adapt and formulate new ways of knowing and being with patients in a digital age. In nursing, the uniqueness of the mix of art and science of the profession

requires a proactive stance. Ways of knowing, understanding, and being with the patient must also advance to ensure the patients experiences are positive and meet their needs. The results of this study provide alignment with nursing practice and positive social change with substantial possibilities as digital therapeutics are being developed and entering the healthcare market. These positive changes include increased access to the care patients need in their time of need. In this, nurses are able to meet patient needs, requirements, and expectations, and provide care to patients that is meaningful to them. Documenting the experiences and perceptions of patients can aid research in developing meaningful interventions and care modalities. Research suggests that using patient's experiences to enhance care increases patient satisfaction (Miller et al., 2019).

Significance to Theory

The study has the potential to expand previous nursing theory by creating new ways of knowing and being with the patient communicated directly from the patient's voice and perceptions. By understanding the perceptions and experiences of patients who have used mobile applications, innovative and new concepts can inform theories and assumptions related to nursing which is essential to providing quality care for patients (Younas, 2019). Theories are developed and adapted through new evidence that is created by research. Nurses with terminal degrees have the unique honor of contributing to the practice by furthering the knowledge base through creating and seeking new evidence to inform theory and practice.

Significance to Social Change

The positive social change gained from this study can be significant in that it provides insight into patient perceptions of human interactions using digital therapeutics. Understanding patient's requirements and expectations that led to satisfaction and positive outcomes is essential to society in a humanitarian level. The contribution of patient experiences can inform nursing of current patient expectations of care and being cared for with digital therapeutics in the current age. Additionally, insights regarding how human-to-human interactions may provide different perceptions than those of human-to-machine interactions may provide positive social change in allowing patients to access the care they need in their individual time of need. The fact that technology will continue to advance and be used to enhance healthcare provides the basis for understanding patients' needs.

Summary and Transition

Positive social change can occur through incorporating patient perspectives and experiences into the development of new care modalities such as the use of mobile digital therapeutic applications. The implementation of new technologies also requires changes to workflows, policies, and nursing perspectives in order to advocate and support the patients in their use. Patients' needs are at the heart of nursing care and therefore essential to explore.

In Chapter 2, the theories that guide the study will be outlined in relation to the topic. Additionally, the current literature regarding the use of digital therapeutics and main concepts will be discussed with rationale and support of the gap identified. This gap

is the lack of patient experiences and perspectives of human interactions who have used a digital therapeutic in the form of mobile application.

Chapter 2: Literature Review

While the use of technology in healthcare has been present for many years, the recent rise of digital therapeutics in healthcare has been understudied. This is particularly true in relation to the patient perceptions and experiences with digital therapeutics as a means of intervention to individualized needs. Research has shown favorable response with digital technologies used adjunctively in the healthcare setting and examples include telehealth and devices that expedite care and results, patient portals, and automated vital signs machines, to name a few (Han & Lee, 2021). Use of technology as adjunction methods of caring out care-related practices has utility in many aspects and has been shown to improve nursing workflows that promote patient satisfaction in terms of getting to each patient in a timely manner (Fadahunsi et al., 2021). As the transformation from use as adjunctive methods of providing care transitions to the ability for patients to access digital therapeutics to self-treat, the transitions from human-to-human interaction to increased human-to-machine interactions presents an opportunity to explore the changes from the perspective of the end user (patients) which is unarguably the center of healthcare (Vogus & McClelland, 2016).

Chapter 2 encompasses what is presently known regarding the use of digital therapeutics, specifically in the form of digital applications. I begin the section with the literature search strategy and the key related concepts that included *patient perceptions*, *patient satisfaction, human-to-human interaction,* and *human-to-machine interaction*.

Literature Search Strategy

Aligning the research question with the literature search culminated in exploration of existing literature within Medline and CINHAL combined, Sage, PubMed, NHI, Medline, EBSCO, and ProQuest databases. The search was limited to the years 2016 to present with the exception of articles related to the theories that provided the study framework. Additionally, internet searches using Chrome and Microsoft Edge were conducted to explore digital therapeutic companies with technologies that are newly on the market; many without current associated research and, therefore, lack of articles. Keywords included: *patient perceptions, care, digital therapeutics, human-to-human interactions, human-to-machine interactions,* and *technology.*

Theoretical Foundation

A combination of theoretical frameworks was utilized to provide the foundation for the exploration of patient perceptions and experiences in the study. The vastly different realms of care and technology have been previously merged through the theory of technology competency as caring in nursing by Locsin (Locsin, 2005). Additionally, Watson's theory of human caring provides insights into human-to-human interactions and human-to-machine interactions and care concepts (Clark, 2015). The two theories are further described in the following paragraphs to outline the alignment within the study.

The Theory of Technology Competency as Caring in Nursing

The theory of technology competency as caring in nursing is a middle-range theory developed to provide better understanding between nursing and technology (Locsin, 2005). The theory of technology competency as caring in nursing established a

basis for adaptations in nursing practice related to technologies such as heightened awareness of being present with patients. The relation of human interaction in terms of being with the patient and listening, communicating, and caring with the use of digital therapeutics is an additional step in the competency that Locsin established. Locsin's theory of technology competency as caring in nursing defines competency as a means of expressing caring (Locsin, 2016). Locsin further explored these concepts in a way of knowing patients (Locsin, 2015). The complexities of the theory provide vast insights into knowing patients in a modern context that correlates to the ever -evolving infusion of technology within healthcare (Locsin, 2015). Paramount within the theory is the statement Locsin makes regarding the human dependency upon "increasingly sophisticated forms of technology" being reality (Locsin, 2016). The theory, which was first created in 2001, forecasted current events that are now unfolding with the rise of digital therapeutics. Locsin's work was poised to set the foundation for future explorations that sought to understand lived experiences of being 'cared for' (Garcia-Dia, 2020). The theory suggests altered ways of knowing in a modernized context that aligns with the continual rise of technology in healthcare (Locsin, 2005). Ways of knowing and concepts of care align with in-person open-ended interviews in researching deeper meanings to explore the perceptions and experiences of care and significance of human interaction. The assumptions of the theory are that persons are caring beings as humans, persons are whole in the moment, and that knowing is a process of nursing practice that allows for continuous appreciation of the person moment to moment (Locsin, 2005). The assumptions support the continuance of human-to-human interaction as valuable within

nursing while acknowledging the need to address and adapt to technology. Kongsuwan and Locsin (2011) utilized the theory of competency as caring in nursing in phenomenological study to explore nurse's experiences of caring for patients with life sustaining technology in an intensive care unit in Thailand. Their phenomenological study provided insight into the value of technology competency as a means of knowing and caring for the patients (Kongsuwan & Locsin, 2011). The similarity of qualitative inquiry in a phenomenological study to address patient perspectives aids to the support in alignment with the theory and the study methodology.

Watson's Theory of Human Caring

Watson's theory of human caring provides the basis for caring and human interactions such as communication, being present and showing compassion that are historically fundamental to nursing practice. Watson's theory of human caring and the premises that humans cannot be treated as objects. The theory found within earlier work in exploration of technology in healthcare focused on patients' perceptions of nurses caring. Clark examined these concepts through the lens of humanized behaviors such as being present, listening and communicating with patients (Clark, 2015). The theory itself has evolved over the years since its 1975 origin to include caritive factors and concepts providing additional alignment with human interaction and being present (Clark, 2015). The theory provides foundation to exploring the variances in human-to-human interactions versus those of human-to-machine interactions through its concepts of human being and object (Ozan et al., 2015). Watson's theory has been used with many studies and has transformed into a philosophy with her Caring Science Institute (Watson Caring

Science Institute, 2021). There are many graphic models used to depict the theory, with the majority placing the patient family at the center with values and goals supporting. The correlation being that the patient is at the center with a need to understand and explore the patient's experiences and perceptions supported by their values and goals in order to promote positive social change in the transition of increased human-to-machine interactions.

Watson describes core concepts of the theory of human caring as being a relational caring for self and others, caring moment or caring occasion that is developed when two people encounter one another in a "phenomenal field", transpersonal caring that are high spiritual nature derived from caring moments, multiple ways of knowing, and caring changes self, others, and the environment (Watson, 2019). The core concepts align with nursing practice where there are human-to-human interactions.

The theory of human caring has been used in research studies to provide a framework for caring in nursing practice (Geunen, 2021; Sefika, 2020; Safiye, 2021). The theory has also been used within education to provide understanding into how people respond and cope (Durgun et al., 2020; Goral et al., 2021).

The purpose and nature of the study is the explore the combination of the two theories and how they support the infusion of technology in healthcare with decreased human-to-human interactions. These two theories will be used to develop the basic, open-ended research questions. The qualitative semistructured interview model provides participants the ability to describe their individual perceptions and experiences to

enhance understanding of perceptions of human interactions in adult patients cared for using digital therapeutic mobile applications.

Literature Review

This literature review explored the key concepts directly related to the study that include patient perceptions of care, digital therapeutics, human-to-human interactions, human-to-machine interactions, and technology in healthcare. The concepts were found through thematic review of current literature on the topic of technology in healthcare. Currently, there is insufficient literature on the patient perceptions and experiences of human-to-human interactions with the use of digital therapeutics The key concepts are essential to the exploration of the identified problem and the gap in literature.

Patient Perceptions of Care

Patient perceptions of care in the context of technology has been scarcely explored. In a board search, patient perceptions of care are often associated with safety and quality of the care they are provided (Mert et al., 2021; Ozsaker et al., 2021; Tsogbadrakh et al., 2020). When perceptions are associated with healthcare and technology, results yielded are majority focused on telehealth and use of technology as adjunctive care in nursing practice settings (Evanski, 2020; Garza-Hernandez, 2020; Nwosu, 2019). One article reviewed provided tremendous evidence on the topic (Waidley, 2019). In this qualitative study, Waidley conducted a semi-structured interview of eight hospitalized patients (2019). The acute care setting differs from the current study focusing on the use of digital therapeutics, however, the primary objective in Waidley's work concentrated on the importance of patient perspectives of technology used in their

care. Waidley defined technology as equipment or electronic devices (Waidley, 2019). The correlations to current study are found in the quest to explore how technology impacts the nurse-to-patient dynamic, thus, influencing patient outcomes and satisfaction with their care (Waidley, 2019). Furthermore, Waidley highlights that nursing practice is founded upon the concept of caring (Waidley, 2019). The alignment correlates with the use of Watson's Theory of Human Caring and premise that the caring profession of nursing maintains a focus on human-to-human interaction and being present with the patient. Johnson draws upon this basis to explore the contrasts in nursing, a caring and compassionate oriented profession, to the demand of high-tech tasks citing a surge of reliance on medicine and machines (technology) to deliver care (Johnson, 2015). In this regard, the exploration of patient perspectives is vital to the development of future theory and practice to consider how compassionate care maybe overshadowed by the science of technology (Johnson, 2015). The patient voice, experience, and perceptions are essential to the exploration.

Leyva (2015) explored a globalized view of perceptions of caring in the context of healthcare finding that there is significance in the nurse-to-patient relationship and supports positive healthcare outcomes. This finding would suggest advocacy of human-to-human interaction, although was not compared to human-to-machine interaction in this study.

Ryan (2019) found that patient's expectations and perceptions of patient centered care reflected a traditional nursing care of knowing and being with the patient that also supported human-to-human interactions as fundamental for healing and patient

satisfaction. Patient perceptions and experiences with digital therapeutics regarding human-to-human and human-to-machine interaction has not been well-explored in published literature.

Digital Therapeutics

Literature ranging from 2019 to current has been prolific in regard to digital therapeutics. A search of one database resulted in nearly 2,000 articles in this date range produced evidence related to relevancy and innovative nature digital therapeutics. There are distinctions noted with prescribed digital therapeutics and those that are available for independent use (Wiecek et al., 2020). Literature is lacking to support any variances in user experience or perception between the prescribed modalities and those that are available over the counter.

The use of digital therapeutics is on the rise to treat several diagnosis and clinical problems (Rudin et al., 2020; Yong et al., 2021; Luderer et al., 2020; Brewer, 2021). Digital therapeutics differ from other forms of technology in that they are coming on the market as interventional tools and modalities to provide in time treatment to patients. According to Hong (2021), the market is quickly expanding globally for digital therapeutics to meet market demands. A key selling feature to the consumer is the easily accessible nature of the treatment modalities (Hong et al., 2021). Digital therapeutics is often abbreviated by DTx (Dang et al., 2020). Dang cites that patients are now more than ever able to control their own healthcare (2020).

A critical distinction in the study is to differentiate the term digital therapeutics from technology. Technology is a broad term used to encompass a variety of machinery

that is found within a healthcare setting to include computer hardware, software, electronic medical records, vital sign machines, and more. Digital therapeutics (DTx) conversely are devices, applications or wearables that are intended to treat a diagnosis, ailment, or chronic disease (Siyahian, 2020). Research is underway to explore applications that can treat obesity, anxiety, depression, pain and much more (Thompson, 2021; Siyahian, 2020; Kamat, 2020; Tahseen et al., 2021). According to the Canadian Medical Association (CMA), the engagement with patients through digital therapeutics such as mobile applications is both a process of gathering data and clinical metrics, but also one of interactive healthcare that is meeting in time needs (CMA, 2019). Current literature cites the benefits of digital therapeutics for the healthcare system and the end-user but has not explored the perceptions of patients and experiences with the technologies.

Human-to-Human Interactions

Evidence suggests that patient outcomes are positively impacted by human interactions, and face-to-face communication provided through traditional nursing care (Tetteh et al., 2021; Gonya, et al., 2018). Walker cites that humans are, by nature, social beings and that people desire to talk to someone, see someone, and communicate with other people (2020). Human interactions can be therapeutic and have positive impacts on health (Keegan et al., 2019). Nash elaborates on the vital nature of maintaining the human component of caring that is delivered nurse-to-patient, stating that we as nurses must embrace technology as it is both inevitable and valuable to practice but not lose sight of the humanness (Nash, 2014). Emphasis in Nash's work was placed on the need to

integrate into practice and education for the next generation of nurses who have only known the digital age in their own lives, interpersonal skills and critical thinking; and not reliance upon machines (technologies) (Nash, 2014). The art of caring in nursing practice is defined by many in the literature in terms of presence, listening to the patient, assuring safety, providing for physical needs (bathing, providing medications and food, water), communicating with the patient; all aspects that require human-to-human interaction (Fernandez Trinidad et al., 2019; Beate et al., 2020; Gaza-Hernandez, 2020; Johnson, 2015; Leyva, 2015; Newbanks, 2018). Arcega et al. describe the significance of human touch, specifically nursing touch to the healing process (2020). Furthering that human touch and human interaction are the art of nursing practice (Arcega et al., 2020). The use of touch as a mechanism for physical and emotional healing is emphasized in nursing practice supported by other literature that requires the direct human-to-human interaction (Leonard & Kalman, 2015; Anderson et al., 2017; Brown, 2019; Dean et al., 2017).

Human-to-Machine Interactions

Reiner notes that when humans interact with other humans, there are exchanges of information on an unconscious level (2017). These exchanges may be lost or ill translated in a human-machine context. Tran et al. (2020) cited that misinformation can be catastrophic and whereas technology is advancing to include indictors of stress or intent in voice, the risks for miscommunication remain. Literature supports using digital therapeutics to obtain quantitative in time data from its users (Xiong et al., 2021; Joo et al., 2019). Found in the previously noted literature, there is significance of human-to-human interactions and- suspected cautions identified in replacing the art or caring in

nursing with leaving the science in the form of technology as the prime component of healthcare and the unknown impact that may have to patient outcomes (Arcega et al., 2020; Brown, 2019; Dean et al., 2017; Johnson, 2015). There is no published direct evidence to support the human-machine interactions on health outcomes in relation to the use of digital therapeutics specifically mobile applications

Summary and Conclusions

Evidence supports favorably the use of technology in healthcare as an adjunctive means of efficiently and effectively providing care and the tasks of care delivery (Aich, 2021; Evenski 2020; Garza-Hernandez, 2020; Nwosu, 2019). Evidence is lacking, however, regarding patient perspectives and experiences with the use the digital therapeutics, specifically in the form of a mobile application. The use of a mobile application would involve a decreased amount of human-to-human interaction and increase of human-to-machine interaction. Whereas evidence exists to show a positive relation to human-to-human interaction and positive patient outcomes, there is lacking evidence to show variance of human-to-machine interaction and patient outcomes. The study fills this gap by providing the perspectives and experiences of patents who have used mobile applications and sets a foundation for transferability of exploring perspectives of varied applications and with varied diagnoses.

In Chapter 3, the study will be outlined to describe the research design and rationale. The central concepts within the study will be defined. The role of the researcher will be described with discussion of biases and ethical considerations. The methodology of the study will be identified with description of participant selection and data gathering

methods outlined to include recruitment, consenting process, data analysis, trustworthiness, and validity.

Chapter 3: Research Method

The purpose of this qualitative study is to explore the experiences and perceptions of patient care using human-to-machine interactions of digital therapeutics through a mobile application. Chapter 3 provides an overview of the research design and rationale for the chosen methodology. The role of the researcher is also outlined, which includes biases and ethical considerations. The methodology discussion includes participant selection criteria and rationale. Recruitment and data collection and analysis are also discussed in context of IRB approvals and participant consenting. Finally, trustworthiness and ethical procedures are summarized to lead into the study results found in Chapter 4.

Research Design and Rationale

A qualitative design is most applicable to answer the research question: What are the patient perceptions of human machine interactions when using a therapeutic mobile application? The central concepts of the study include patient perceptions of care, digital therapeutics, human-to-human interaction, and human-to-to machine interaction. Digital therapeutics are wearable devices or mobile applications that allow the user to self-treat for a variety of symptoms and conditions (Hong, 2021). This technology decreases the need to rely on interactions with nurses in person and physical assessments in a health care setting (Tetteh et al., 2019). Digital therapeutics increases human-to-machine interactions, where the patient is now interacting with a device (Xiong et al., 2021). My research design included a descriptive, interpretive phenomenology approach to explore and describe adult patients' perceptions of the human interactions versus human-to-machine interactions when being cared for using a mobile application (Pathak, 2017).

The qualitative exploration aligns with the aim to understand the patients' definitions, requirements, and expectations related to digital therapeutics through interviews.

Research Methodology

Qualitative research is aimed at exploring the world through the participant's view (Jorgensen, 2015). In this phenomenological study, the aim was to explore patients' views with the goal of understanding the unique experiences and perceptions of using a mobile application for a need that would otherwise require a health care visit or discussion or go untreated. Descriptive phenomenology made it possible to explore why a patient would use the technology and the value they perceive in the use of a mobile application, which can help understand how nurses can support individualized care. Nursing has used phenomenology broadly to explore patient perspectives (Touhy et al., 2013). The methodology allows deep understanding of the phenomena (Giogi et al., 2017; Pathak, 2017), providing better insight through a lived perspective and intimate view.

Role of the Researcher

The role of the researcher in qualitative research to is to explore the perceptions and experiences of the participant in relation to the phenomena (Sutton & Austin, 2015). Therefore, in a qualitative study, the researcher is the instrument and serves the role of the observer-participant to actively engage in dialogue with the participant (Rubin, 2012). The observer role was evident in the observation of body language and mannerisms while the participant recounts their experiences and perceptions of the digital therapeutic mobile application.

Power and Bias

There were no personal and professional relationships that I had with the participants nor was there any supervisory power over any of the participants. Due to the longevity of practice as a registered nurse (RN) in traditional face-to-face environments with human-to-human interaction, there were inherent risks of bias with limited exposure to the use of digital therapeutics and increased human-to-machine interactions. As such, I spent hours researching the benefits of digital therapeutics in healthcare with an open mind. I also networked with fellow nurses who work for digital therapeutic companies to understand their perspectives and value for potential patient use. To further limit bias, I selected participants whom I had no previous contact with and were recruited using my study marketing materials distributed by the partnering company.

Ethics

Ethical conduct is essential for safe, efficient patient care and to the reliability and trustworthiness of research (Resnik, 2020). There were no conflicts of interest in the study; the study was not conducted in my place of employment nor with any previously known associates. There were no contractually obligating connections between the recruiting site and me. There were no monetary or other incentives provided apart from the opportunity to contribute to the study in the form of personal, de-identified experience with the use of digital therapeutic technology. There were no associations between me and the digital therapeutic company. The connection was self-initiated to access participants who had used a mobile application for the purpose of interviewing to

understand their perspectives and experiences. There was no exchange of proprietary or other research information or data.

Methodology

Upon Walden University IRB approval (01-12-22-0759604), in-depth, semistructured, open-ended interviews were conducted in an approximate one-hour time frame with each individual participant arranged based on their availability. Open-ended, semistructured questions were asked of all interviewees to facilitate responses that depict their individual experiences free from guiding or presumptions. The data included responses derived from patient interview questions regarding their perceptions of human-to-machine interactions when being cared for using digital therapeutics compared to traditional human-to-human interactions based on the patient's previous experiences with healthcare. Interviews are securely stored in a locked cabinet kept by myself and managed until the completion of the research study. Participants were de-identified to maintain confidentiality using a sequential random numbering system.

Participant Selection Logic

Participants over the age of 18 who have used digital therapeutics in the form of a mobile applications were recruited through collaboration with the digital therapeutic application company, social media posting, and Walden's participant pool. Exclusions included those who do not speak English, children, persons who have not used the mobile application, and those not wishing to consent to interview. Recruiting was accomplished through flyers and emails that are designed by myself and approved by the Walden University's IRB. Copies of materials used for recruiting were provided to any

cooperating entities after IRB approval for transparency. Materials containing any participant information will remain confidential. Upon informed consent, the determination was made if the recruited participant meets the inclusion criteria.

The sample size included approximately 20 participants initially, as saturation cannot be predetermined. The extra participants account for attrition of those who may choose to not participate in the interview process once informed consent is given. In phenomenological qualitative studies, a participant range is typically five–25 participants (Creswell, 2018). The range varies according to participation preferences and reaching saturation of data (Fusch et al., 2015). Content validity is established through data saturation in a qualitative study to respond to the research question (Salkind, 2010). In the event that data saturation is not reached with the initial recruitment efforts, subsequent recruitment will follow the initial recruitment process through flyers and emails that are designed by myself and approved by the Walden University's IRB.

Instrumentation

Semistructured Interview

The researcher is the primary instrument in the qualitative interviews (Rubin & Rubin, 2012). Interviews were scheduled with participants to allow for half hour to one hour of their time in exploring perceptions and experiences with digital therapeutics through a mobile application. The interviews were conducted one-on-one in person or over the phone to facilitate ease of participation. The interview is one-time only participation in the study. The open-ended interview questions are contained in the Interview Guide (Appendix B) for note taking and generalized outline for the interview

but not strictly adhered to and altered based on the participants response (Creswell & Creswell, 2018; Rubin & Rubin, 2012). The semi structured interviews allowed for open-ended exploration guided by the participants' responses free from structured direction or pre-determined outcome (Jamshed, 2014).

Audio Recording

TapeAcall is a mobile application that can be used on a smartphone to record a call and then download the transcript for review or keep stored for audio playback of the call (TapeACall, 2021). This audio recording plan allowed the ability to transfer transcripts for review without additional costs and time. Phone recordings were limited to those who consent to the recording of the interview. Recordings started after introductions, and the participant instructed to not provide their name or any identifiers on the recording. The recording, transcript, and any researcher notes were de-identified and labeled with only a participant identification number.

Interview Guide

The interview guide (Appendix B) was developed by me and used after obtaining approval by the Walden IRB for taking notes and referencing during the interview, though it is not intended to guide or predict the responses (Rubin & Rubin, 2012). The interview guide contains three open-ended questions and one follow up question. Demographic information were collected apart from the open-ended interview upon informed consent. The questions included:

1. Please describe the setting in which you used the digital therapeutic mobile application. (Based on the response, I may probe further as to why they chose that method or route.)
2. What was your experience with the mobile application? (Based on the reply, I may probe further as to more context or clarification of the experience.)
3. How did this experience compare to other experiences you have had? (I may probe further for more information or clarifications.)
4. The final question will be guided by the other responses and may entail asking if there is anything else they would like to share regarding the experience or their perceptions of the mobile application.

Procedures for Recruitment, Participation, and Data Collection

Upon IRB approval, recruitment flyers and emails were sent to potential participants—those who are 18 and older who have experience with digital therapeutics through a mobile application—by the mobile application company(s), posted by me using social media and through Walden's participant pool. Copies of materials used for recruiting were provided to any participating entities after Walden IRB approval for transparency. Materials containing any participant information will remain confidential.

Brief semistructured, open-ended questions were developed to address the problem and purpose of the study. The interviews included three semistructured, open-ended questions minus demographic information as approved by the Walden University IRB. The use of audio recordings were conducted upon participant consent using TapeAcall.

Data Analysis Plan

Careful examination of the interviews is required to assure accuracy and coding (Adu 2016). Coding of interviews were performed manually by myself through inductive coding and NVivo software to organize the data. Inductive coding was used to create codes and themes from the data itself, which aligns with the aim to understand individual experience and perceptions (Lou et al., 2019). NVivo were used to store and organize the data of the interviews. Nvivo software has been used in qualitative research as a user friendly and cost-effective means of organizing data in order to derive themes and subthemes from the i interviews (NVivo, 2021).

Issues of Trustworthiness

Credibility

Establishing credibility is founded on the researcher not influencing the interviews with their personal lens or bias (Haven, 2019). Examining personal judgements or beliefs is essential to reflexivity in the study and supporting the credibility of the study (Dodgson, 2019). Prolonged contact in the one-on-one interview process can also support credibility of the study by allowing a relationship between the two parties necessary to open and deep communications thus enhancing the richness and rigor of the data (Rubin, 2012). I will ensure biases that are overcome through the alignment of exploring the participants' perspectives and experiences (Noble & Heale, 2019). Further, peer review is a process by which others in the field of nursing will evaluate the study. This is accomplished through experts in the field reviewing and approving the study under Walden University faculty and dissertation committee.

Transferability

Thick description and rich detail are provided in the data collection and interview phase to enable greater depth of understanding and replicability (Creswell & Creswell, 2018). Transferability was additionally aided by descriptive information used throughout the study and outlining of all recruitment, demographic, and setting information (Baumgart et al., 2021).

Dependability

Strategies used to ensure the data was consistent and repeatable (i.e., dependable) include journaling of each phase of the dissertation work (Nowell et al., 2017; Pathnak, 2017).

Confirmability

Confirmability is established by assurance that the participants perspective is represented and not that of the researcher (Trochim, 2021). Validation of findings were conducted through thorough review of interview transcripts and my journal notes.

Ethical Procedures

Ethical conduct is essential to research for the safety and protection of participants (Creswell & Creswell, 2018). IRB approval was obtained prior to any recruitment or interviewing activities. Participants were recruited for the purpose of interviewing to understand their unique perspectives and experiences with using mobile applications. Ethical principles were upheld and further discussed to include informed consent, participant privacy, treatment of the data, and confidentiality. There are no conflicts of interest or prior relationships with the mobile application company(s) nor with my work

environment. If persons were recruited via social media and were known to the researcher, the participant may elect to not participate without any reprisal based on any discomfort that personal discussions with a known interviewer may create.

Participant Protections

Harm in qualitative research can manifest in coercion of participation or reliving of traumatic events (Kostovicova & Knott, 2020). Reprisal for non-participation or withdrawal can likewise result in emotional harm (Kostovicova & Knott, 2020). Protections are established for the study through IRB and institutional oversight. Informed consent were obtained prior to interviewing. Informed consent involves the explanation of the purpose of gathering information for the study, the intended use of the information, the disclosure of any researcher relationships or conflicts of interest, the length of interview, the inclusion and exclusion criteria, the use of audio recording and the rights of the participant (Sullivan, 2021). The participant rights include the right to end the interview or not respond to any question that they do not wish to answer without any fear of reprisal. The participant also has the right to privacy and anonymity (Creswell & Creswell, 2012). Data on interview notes were stored in a locked cabinet for the length of the study when not in use that only I have a key to open. Audio recordings do not contain participant names or personal identifiers and are stored on my smartphone requiring double identification to open the phone. Computer files containing data are stored in a de-identified manner on my private computer.

Summary

In Chapter 3, I described the research design and study methodology. The chapter also included the role of the researcher, the plan for conducting the study, and the safeguards to ensure the quality and accuracy of the study with participant considerations. In Chapter 4, the setting, demographics, data collection, data analysis, and evidence of trustworthiness in the study will be detailed along with the results.

Chapter 4: Results

The purpose of this qualitative study was to explore the experiences and perceptions of patient care using human-to-machine interactions via digital therapeutics, specifically a mobile application. The overarching research question that the study was designed to respond to was: What are the patient perceptions of human machine interactions when using a therapeutic mobile application? Subquestions were derived using an interview guide to semistructure the interview and elicit the rich descriptive experiences and perceptions of the users. The subquestions (SQ) consisted of:

SQ1: What was the setting in which you used the digital therapeutic mobile application?

SQ2: What was your experience with the mobile application?

SQ3: How did this experience compare to other experiences you have had?

A final exploratory question was asked at the end of the interview: Is there anything else that you like to add about your experience or perceptions associated with the use of digital therapeutic applications? The interview guide is found in Appendix A.

Chapter 4 describes the research setting, the demographic information of the participants, data collection, and data analysis. The evidence of trustworthiness is addressed through the specific measures implemented during the study. Chapter 4 outlines the results of the study. Finally, chapter 4 provides a summary of the findings and transition to Chapter 5.

Research Setting

Upon Walden IRB approval, I began to recruit volunteers to participate in the study between January 2022 and February 2022. Recruiting was achieved through Walden IRB approved methods to include social media postings, Walden participant pool, and through a digital therapeutic company distributing the recruitment flyer on behalf of myself, the researcher. Response to the recruitment efforts of all sources resulted in initial interest from nine participants. One of the participants did not respond to efforts in scheduling an interview. Two other interested volunteers did not meet criteria as they had no experience with digital therapeutics and had responded as having used telehealth rather than a mobile application. A total of six participants met criteria and successfully completed the interview. Due to geographic location of participants and myself, and the continued pandemic, all participates opted for a phone interview as opposed to in person. The interviews were conducted in my home office with my personal cell phone. Prior to the interview, the consent and time of expected participation of up to an hour were reviewed with participants. Participants were reminded that they could end the interview at any point without repercussion. Participants were given the opportunity to ask any questions or voice any concerns prior to conducting the interview.

Demographics

I interviewed six participants for this study. All six participants had used a digital therapeutic mobile application in the past 6 months. The six participants were citizens of the United States; however, specific location was not collected in the demographic survey. Four of the participants were male and two were female. The six participants

were all English speaking as required by inclusion criteria. The age range of participants was between 30 and 45+ years of age. Four of the participants were White, one identified in the demographic survey as two or more races, and one as African American. The demographic survey template is found in Appendix B. The reasons that persons seek digital therapeutic mobile applications are variable. By collecting and analyzing the demographic information in conjunction with the disease or condition and rational such as management of disease or preventative treatment, additional insights may prove beneficial in subsequent research. The study was not based on a particular diagnosis. The reasons the six participants used a mobile application included two participants with posttraumatic stress disorder (PTSD), one with depression, one participant with a diagnosis of anxiety, one with diabetes, and one with hypertension. Table 1 depicts the participants' demographics.

Table 1

*Demographic Survey Results (*N = *6)*

Demographic	*n*	Percentage
Gender		
Male	4	66.67%
Female	2	33.33%
Age (in years)		
Under 18	0	0%
19-30	0	0%
30-45	4	66.67%
45+	2	33.33%
Treatment use		
PTSD	2	33.33%
Depression	1	16.6%
Anxiety	1	16.6%
Diabetes	1	16.6%
Hypertension	1	16.6%

Data Collection

Interviews were conducted with six participants who have used digital therapeutic mobile applications in the past six months. The length of use ranged from less than six months to over a year and half. The participants contacted me via my Walden email address found on the recruitment flyer. After expressing initial interest via email, a consent form and link to the demographic survey were provided to the participant. Participants meeting the inclusion criteria of English speaking, adults over the age of 18 years old, persons who have used a digital therapeutic mobile application in the past six

months were again contacted for interview scheduling and answering of any questions or concerns prior to the interview participation. Those not meeting the inclusion criteria that submitted responses to the demographic survey included two persons; both of which had not used a mobile application were contacted and thanked for their interest and provided with rationale for why their interview would not be scheduled for this study. The six participants who met the criteria were contacted either via email or phone as indicated on their demographic survey response to schedule their interview. Interviews for the six participants were completed between January 26, 2022, and February 1, 2022.

The flexibility of myself as the researcher to accommodate time zones and open dates for interviews due to a recent job transition enabled the expedited time between initial contact and interview. Additionally, the use of a digital therapeutic company enabled access to a wide range of participants who had recently used their mobile application. The interest beyond the initial nine participants continued although saturation of data was established with the six participants. The interviews of the six provided rich response and insight into the participants experiences and perceptions in which themes were derived that were both unique to the experiencer but contained commonalities across the interviews. There were no variations or unusual circumstances that were accounted during data collection that would vary from the plan presented in Chapter 3. Data saturation cannot be predetermined and varies with each study; saturation is reached when no new information is provided by the respondents (Creswell & Creswell, 2018). In this study, it was determined that saturation was reached with the interviews of the six

participants, and it is the ethical responsibility of the researcher to not use excessive resources.

At the start of each phone call, the consent was reviewed with a brief description of the study purpose as provided on the recruitment flyer. The participants were again provided with the opportunity to ask questions or express any concerns prior to starting the interview. Verbal consent for taping of the call was again provided as the participants were made aware of the use of the transcripts and basic process of coding for themes to respond to the overarching research question.

The interviews were conducted by telephone. The interview lengths varied between thirty-eight minutes to an hour and three minutes. The interviews were recorded using the researchers cell phone and TapeAcall. Transcripts were downloaded from the TapeAcall application for coding and iterative review. During the call, notes were captured on the interview guide. Additional notes were taken immediately following the phone call to ensure accuracy of recollection.

Data Analysis

Adu (2016) identifies the need to carefully examine the interviews to assure accuracy of coding. Coding of interviews was performed manually by me through inductive coding and NVivo software to organize the data. Inductive coding is an iterative process used to create codes and themes from the transcripts aligning with the aim to understand individual experience and perceptions (Lou et al., 2019). The iterative process of inductive coding began with highlighting excerpts of participant transcripts by using different colors over sentences and sections. Once the transcript was highlighted

accordingly, the transcript and notes were again reviewed for accuracy of meaning from each participant and progressed to the next sequentially. In the first phase, each interview transcript was coded independent of the others to ensure accuracy of representing the individual perceptions and experiences of each participant. The process transitioned to larger representation of categories and themes emerging from each transcript and the commonalities of the transcripts of the six interviews.

The codes were organized by use of Nvivo software to categorize the qualitative data for ease of reference. The iterative nature required relistening to the recordings, ensuring each transcript was properly coded, ensuring that themes were accurately identified without altering of individual meaning and finally that determination of similarities and no additional information was identified and meeting of saturation. Initially, the themes were each placed on a spreadsheet and then again reviewed with the merging of similar themes as established with analysis of direct participant quotes verifying the commonality between related concepts identified in participant transcripts. Through the exhaustive analysis, four major themes were derived as illustrated in Table 2 and further described in study results.

One discrepant case identified the use of the mobile application as void of value to their healthcare. The participant stated “maybe I need to give it more of a try…. I just don’t see it becoming a habit”. In this situation, the participant did not see a value in the mobile application during their time of use. Whereas the concern of developing healthy habitual use was identified with all participants under the theme of One more thing (see

Table 1), this participant's perceptions varied from the others as they did not identify with the themes of needing something more or help in 'my' time (Table 2).

Table 2

Major Themes and Codes

Theme	Codes
Theme 1: Needing something more	Event Treatments Effectiveness Searching for more
Theme 2: Help in 'my' time	Access Helplessness Assurance
Theme 3: One more thing	Ease of use Habit/lifestyle Priorities Change
Theme 4: Who is behind the curtain?	Unknown communicator Personalization Meant for me Intimacy Confidentiality

Evidence of Trustworthiness

Credibility

Haven (2019) asserts that establishing credibility is founded on the researcher not influencing the interviews with their personal lens or bias. In achieving a limited bias and not imposing personal ideas or believes in the interview, I did not counsel or make suggestions to the participants based upon my nursing experience and education. I

listened openly and maintained focus on the questions, asking for clarification and participant perspective rather than introjections that may have altered the intended meaning of the experiencer; to not influence them or make them think of or consider alternatives. The examination of personal judgements or beliefs is essential to reflexivity in the study and supports the credibility of the study (Dodgson, 2019). Prolonged contact in the one-on-one interview process can also support credibility of the study by allowing a relationship between the two parties necessary to open and deep communications thus enhancing the richness and rigor of the data (Rubin, 2012). The participants were provided ample time to respond to each question and to recall their experiences without pressure or suggestions. Further, peer review is a process by which others in the field of nursing will evaluate the study. This is accomplished through experts in the field reviewing and approving the study under Walden University faculty and dissertation committee.

Implementation of credibility strategies was accomplished through concentrated efforts to listen to the experiences and perspectives of the participants and to not voice any opinions or personal views or beliefs. The participants were provided with the opportunity to provide additional information that may not have followed the three guiding questions established for the purpose of eliciting information. In each of the 6 interviews, participants freely added additional commentary not relevant specific to the mobile applications to include personal history of the event or diagnosis that precluded seeking intervention. The open and transparent communication indicated a level of comfort in sharing personal experiences and perspectives (Rubin, 2012).

Transferability

The participants experiences and perspectives were relayed during the interviews in thick description and rich detail to enable greater depth of understanding and replicability (Creswell & Creswell, 2018). Transferability was additionally aided by descriptive information in the form of direct quotes, derived codes and themes inductively found within the transcripts. In alignment with the theoretical underpinning and outlining of all recruitment, demographic, and setting information the detailed approach was described (Baumgart et al., 2021).

Dependability

Strategies used to ensure the data was consistent and repeatable (i.e., dependable) included journaling of each phase (Nowell et al., 2017; Pathnak, 2017). Notes were taken during the interviews on the interview guide, the interviews were recorded for unlimited review during analysis and notes were taken immediately following the interview to ensure accuracy of recall.

Confirmability

Confirmability is established by assurance that the participants perspective is represented and not that of the researcher (Trochim, 2021). Strategies to ensure validation of findings was achieved through thorough review of interview transcripts and my journal notes. An iterative approach was taken to review and re-review findings.

Study Results

Transcripts and notes were reviewed thoroughly and manually coded by the researcher. Each transcript was reviewed independently to initially code with different

colors to signify perspectives and experiences. The transcripts were then reviewed as a whole to assess commonalities and examine any discrepancies. Saturation was identified through review of transcripts signifying no new information was represented beyond the derived themes. The four major themes surmise the essence of the participants experiences and perceptions.

Theme 1: Needing Something More

Five of the participants identified the need for more in their treatment plan. Except for one discrepant case, each identified that they were either not pleased in their current state or they were not properly managing their disease or condition as optimally desired. One participant stated that his provider felt that he needed 'more' and that it was not initiated by his feelings. Participant 3 expressed that "I had tried a lot of things to get healthy…. nothing was really working. I would have to wait to have an appointment to check my progress and then seemed like I started over". All the participants stated that the digital therapeutic mobile application was added to their treatment plan as they weren't at the place, they or their provider in one case felt they should be for optimal health. Participant 4 stated "I was not really sure where to find the answers I needed, it is hard because you search online and things, but you aren't sure if you are finding information that fits with your situation exactly or not". In some situations, the introductions to the mobile applications were spurred by the global pandemic and need for non-emergent care, intervention, or monitoring. For the six participants, however, the mobile applications were planned for additional support for unmet needs in a general sense, regardless of the pandemic and shut down of regular and preventative services.

Theme 2: Help In 'My' Time

Having access to help or intervention at the time of need was stated as a comfort and benefit by five of the participants. Participant 1 stated ". It was a good thing for me as I wouldn't have gotten the help I needed otherwise." Additionally, participant 1 added "Without mobile applications as a component, I wouldn't be ok, I need because you can't get help on weekends or after hours unless you are so bad you get admitted to the hospital but I am not going to drive two hours in the middle of the night to a hospital every time I need help, If I had to do that I would just go back to self-medicating". Participant 2 stated that they had a "sense of security" and that "It was a nice to have in case". Participant 3 stated that "I feel like I am more aware", stating that it may them more cognizant; "keep it more at the forefront, not something I only think of when I am at the doctor's office". Participant 5 stated "it is nice to do your own status checks whenever you have time or are thinking about it. It makes me more motivated I think to stay healthy and on track. I don't have to wait for my appointment and then make decisions, I can do it when I want to". Participant 6 expressed "I do not think I would have received the care I needed all the time without it."

Theme 3: One More Thing

Habitual use and remembering to the use the application was a factor raised by the participants. The participants described that they had to check in or update their status or log in to ensure proper monitoring and access. One user stated that the application was solely used in a time of need or crisis so that there was not a risk of trying to remember updates, however, they stated that ensuring their device was charged and had service was

a concern. Participant 1 “with spotty service sometimes that lasts for hours it is unsettling to worry about a trigger (PTSD) and wonder if I can get help.... It may sound childish, but it is a real fear”. Participant 4 stated “I can’t use my phone at work, my work is very hands on and if I have to check in or log things I probably will forget later on. I think it is good maybe if you don’t have to do things here or there, just whenever. Who has the time to update your status all the time?” The theme of one more thing signifies the task-oriented perception of the devices that the participants expressed. The cumulative perception was that of having responsibly to keep up with the mobile application in manually logging in, checking in and entering data or responses.

Theme 4: Who is Behind the Curtain

Not knowing who is on the other end, receiving and responding was a theme discussed by the six participants. Participant 1 stated “there is a lack of intimacy in not really knowing who you are conversing with. Is it even the same person or thing each time?” Participant 2 stated “I am not sure where my information is going?” Participant 3 stated “Is it like a sophisticated algorithm that generates responses from what I text in? You can make anything sound like a person now.” Participant 4 expressed concern over confidentiality “I wonder who all sees my notes. I know even when you go to the doctor a nurse may have your chart open and other people see it. Seems like it is that much easier with throwing it all out there.” Participant 5 stated that they were unsure how the information contained in the application gets to their provider “I wonder does the doctor or his nurse see what I am asking or saying, or does it summarize things to fit in a category and that is what they see? Like how much information should I put?” Participant

6 stated “is there a cloud of all my sorrows, like cyber cloud that may erupt if I fill it too full?”

Summary

The overarching question that the study was designed to respond to was: what are the patient perceptions of human machine interactions when using a therapeutic mobile application? Through rich, descriptive responses of the participants, themes were derived from their unique experiences and perceptions. Participants described the use of digital therapeutic mobile applications as beneficial in providing them the care or intervention they needed and in the time of their need. Concerns were identified as to the ability to form and sustain healthy habitual use of the application and confidentiality risks related to the use or knowledge of personal information.

In Chapter 4, I described the research setting, participant demographics, data collection methods, data analysis, provided evidence of trustworthiness and summarized the four major themes that responded to the overarching question. Chapter 5 will provide the interpretation of findings, discussion, limitations of the study, recommendations, and implications.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this qualitative study was to explore the experiences and perceptions of patient care using human-to-machine interactions using digital therapeutics, specifically a mobile application. Nurses have unique perspectives of how technology might change person-to-person human interactions when compared to human-to-machine interactions. This phenomenon was explored and compared to perceptions of traditional human-to-human nursing interactions based upon the reported experiences from patients who have recently used digital therapeutics in the form of a mobile application to provide in-time feedback of their health status. Evidence suggests that patient outcomes are positively impacted by human interactions and face-to-face communication provided through traditional nursing care (Tetteh et al., 2021). Through semistructured interviews, the participants cumulatively revealed four main themes through recollection of their unique and descriptive experiences: needing something more, help in 'my' time, one more thing, and who is behind the curtain. The four major themes are further interpreted in this chapter to compare them with prior evidence and findings described in the literature and initially presented in Chapter 2.

Interpretation of Findings

The unique experiences as relayed through interviews with each of the participants offered rich detailed information that conformed to previous literature relevant to digital healthcare, previously in the analyzed context of telehealth. Digital therapeutics in the form of a mobile applications, where a user interacts with a device, differs from telehealth. Telehealth involves a camera and visual and audible exchanges

between a provider or healthcare professional and the patient or user (Siyanhian,2020). Digital therapeutic mobile applications can involve texting with a healthcare professional or entering of personal data into the system with results or recommendations following automated algorithms or capturing of biometric data without manual input and without interaction or exchanges between the user and device with response from artificial intelligence (Digital Therapeutic Alliance, 2021). At the time of data collection for this dissertation, limited published and peer-reviewed literature existed to describe patient experiences and perceptions of using digital therapeutic mobile applications. For these reasons, direct comparisons with previous findings cannot be established in this work. In Chapter 2, the literature provided insights of patient perceptions of care, the current body of knowledge of digital therapeutics, human-to-human interactions and human-to-machine interaction, and the formulating of evidence and extension of knowledge in relation to digital therapeutics. The current literature is discussed in relation to the interpreted results of this study within the scope of data and significant findings.

Needing Something More

The semistructured interviews allowed participants to describe their experiences with deep and rich detail. The rise of digital therapeutics is attributed in literature to offer additional support in treatment and monitoring of disease and clinical problems (Brewer, 2021; Luderer et al., 2020; Rudin et al., 2020; Yong et al., 2021;). In alignment with the literature, participants relayed that either by self-initiation or provider order, the digital therapy was sought to provide additional support or treatment. In alignment with the literature, quality of care is established though meeting of the need for which patients

seek the intervention (Mert et al., 2021; Ozsaker et al., 2021; Tsogbadrakh et al., 2020). When a need is not met, patients' satisfaction or perceptions of being cared for may also be impacted (Garcia-Dia, 2020). The use of the digital therapeutic mobile application was introduced for these participants as a means of meeting the need and filing gaps or limitations to their current treatment or plan of care.

Help In 'My' Time

According to the Canadian Medical Association (CMA), the engagement with patients through digital therapeutics, such as mobile applications, is both a process of gathering data and clinical metrics, but also one of interactive healthcare that is meeting in time needs (CMA, 2019). The implications of such benefits in meeting in-time needs was reflected in the participants interviews to confirm that access through the mobile application was meaningful in their care. Statements aligned further with the sentiment that the use of a digital therapeutic mobile applications was a necessary addition in the perceptions of the users but as adjunctive means to support their care. Similarly, adjunctive benefit was found with the use of telehealth (Evanski, 2020; Garza-Hernandez, 2020; Nwosu, 2019).

One More Thing

The use of digital therapeutic mobile applications relies on the user to have the device, have the application loaded to their device, and to use the application as ordered or intended. Compliance and adherence are not new concepts to nursing but were not previously discussed in this dissertation. These components are additional considerations to the body of knowledge relevant to perceptions and experiences of the users. The

theme of one more thing was defined by statements of forgetting to use or to check in or the ability to access at a given time due to factors of reception or conveniences.

Who is Behind the Curtain?

Waidley's (2019) work focused on the caring being the foundation of nursing practice. Leyva (2015) expounded on a globalized view of perceptions of caring in the context of healthcare finding that there is significance in the nurse-to-patient relationship and supports positive healthcare outcomes. Ryan (2019) found that patient's expectations and perceptions of patient centered care reflected a traditional nursing care of knowing and being with the patient. The study further highlights these concepts in participants citing lack of intimacy and not knowing who or what they are interacting with.

Implications Based on Theory

The theories that ground this study include Locsin's 2005 theory of technology competency as caring in nursing and Watson's theory of human caring. The logical connections between the frameworks presented and the nature of my study include exploring caring, technology, perceptions, and experiences of being cared for with minimal human interactions. The findings suggest greater inquiry is needed to explore caring as a prime concept as it was not clearly identified in the participant interviews. Whereas participants did relay the experiences of benefits as adjunctive treatment and reported a difference in mobile application use from in person visits, they did not clearly identify a feeling or perception of being cared for or lack thereof. The participants described their interactions as being temporary or in between in person visits rather than replacing human to human interaction.

Findings of the study in relation to Locsin's 2005 theory of technology competency as caring in nursing suggest that patient education to the use of the technology and what is expected of the patient in optimal use should be clearly identified and communicated. In the study, the participants were not able to identify the full intention of the digital therapeutic mobile application to include how long they should use it or how often they should or should not seek in person care and in one instance, what the intention was. Furthermore, the participants relayed concerns with not knowing who or what they were interacting with and how information was being received and or interpreted and then relayed back to them. The implication suggests a lack of patient education which may be result of nursing education and full understanding and competency with the technology to teach and inform patients of proper use.

Limitations of the Study

Several limitations are present with my study. Foremost, the broad inquiry limit's ability to focus on generating evidence for a particular disease or condition that can result in targeted intervention and comparisons. The various lengths of time that the participants used the digital therapeutic mobile applications is another limitation as again comparisons cannot be made. Outcome data is limited; the extent of efficacy cannot be determined. A focus on caring is essential but is limited in the present study as participants did not perceive the use of the mobile application as replacing care or replacing human interactions that may be identified as care. Finally, the small number of participants, despite meeting saturation of data for this dissertation, may not fully represent the experiences and perceptions of digital therapeutic mobile application users.

Recommendations

The strengths of the study provide insight into current perceptions and experiences with digital therapeutic mobile applications. Further research is indicated in exploring disease or condition specific use and treatment outcomes. In this study, participants using the application for PTSD and anxiety which comprised half of the participants, provided greater detail and had a longer and more consistent use of the technology as opposed to the other three participants who used their application as more of a monitoring system and data repository. Such variances may be significant in establishing appropriate care and treatment plans. Exploration of demographic, disease and condition specific group variances were not an objective of this study. This study may be used to provide a basis for future explorations. Future explorations are meaningful and necessary to the quest to provide patient-centered care by understanding how the changes in technology and care delivery impact patient perceptions and ultimately long-term outcomes. In alignment with the National Association of Healthcare Quality as identified as critical to quality patient outcomes, care needs to be focused on patient needs and preferences (2021). Care that is timely and reduces risk for the patient must be aligned with future exploration to ensure such quality aims are met.

Based upon participant experiences and perceptions, it is recommended that a stronger focus be place on the concept of caring. Caring is a broad and difficult to define concept and yet one that is central to nursing practice and patient outcomes. A comparison study to explore patients receiving care from in person, face to face nurses versus a group of patients with the same diagnosis receiving all or most of the care from a

digital therapeutic mobile application may provide greater insights related to the phenomenon of care and the changes in human to human versus human to machine interactions. Variances in the mobile applications themselves also bear exploration. The scope of this study was not to evaluate a particular application or digital therapeutic company.

The pandemic has required remote means or alterations in care schedules with limitations on provider visits and risks of seeing patients in a face-to-face setting. The use of digital therapeutics was not intended for pandemic intervention although considerations should be accounted for in future research as intentions for, prescription and use may be impacted by the progression or resolve of the global pandemic.

As use of digital therapeutic mobile applications rises and both consumers and providers gain comfort with the technologies, additional perceptions and user experiences should be explored as once more the risk for increased human to machine interaction will subsequently rise. Incremental changes can lead to significant cultural disruption without cognizant upheaval. Effectually, small incremental changes can lead to monumental transformation in the healthcare system without recognition or thought to the consequences in a system where constant change is a norm. There is need to be continually vigilant in ensuring patient safety, outcomes and satisfaction.

Implications

The findings of my study were supported in previous literature and nursing theory to explore, at the time, an understudied realm of patient experiences and perceptions of human interactions with the use of digital therapeutic mobile applications. The study

provided insight into this growing field of mobile applications to establish a foundation for further exploration. The positive social change implications may benefit nursing practice, nursing theory and society.

Society is impacted by the healthcare system on a plethora of ways. The positive changes that nursing and this study seek to impact is documenting patient experiences and thoroughly understanding what is important and meaningful to patients to appropriately and effectively care for those we serve. Significant to social change, the rich and descriptive experiences provided in participant interviews can provide information that is essential to finding such meaning; for developing nursing education and practice that incorporates new ways of knowing and being with patients, to expand upon nursing theory and ways of knowing to ultimately enhance patient satisfaction and outcomes.

Conclusions

My study explored the perceptions of human interactions in adult patients cared for using digital therapeutic mobile applications. The study provides a foundation during a critical time where the use of digital therapeutics is on the rise and rapidly infusing the healthcare industry. Understanding the experiences and perceptions of the patients can aid in formulating new ways of knowing and being with the patients and provide patients with satisfaction in their healthcare by allowing them to receive the care they need in their time of need as an adjunctive therapeutic modality both during and post pandemic.

The findings of the study are consistent with previous literature related to the benefits of adjunctive treatment for a disease or condition as similarly found with

telehealth use. The foundation of nursing theory, specifically, the theory of technology competency as caring foreshadows the need for continual competency and adaptation of nurses to understand and help patients navigate the digital platforms (Locsin, 2005). Watson further postulates that caring and knowing is essential to patients' well-being and outcomes and in alignment with findings that patients' perceptions in this study did not conclude that any in person interaction would or should be eliminated (Watson, 2019).

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Appendix A: Interview Guide

Interview Guide

Study: Perceptions of Human Interactions in Adult Patients Cared for Using Digital Therapeutic Mobile Applications
Researcher: Traci Brakefield PhD student Walden University

Participant #	Time of Interview:
Date:	Location of Interview:

Questions	Response	Notes
1. please describe the setting in which you used the digital therapeutic mobile application?		
2. What was your experience with the mobile application?		
3. How did this experience compare to other experiences you have had?		

The final question will be guided by the other responses and may entail asking if there is anything else they would like to share regarding the experience or their perceptions of the mobile application.

Appendix B: Demographic Participant Survey

Participant Demographic Voluntary Survey

Study: Perceptions of Human Interactions in Adult Patients Cared for Using Digital Therapeutic Mobile Applications

Researcher: Traci Brakefield PhD student Walden University

Participant ID #_____ Date of Completion: _____

1. What gender do you identify as?
    a. Male
    b. Female
    c. Other _____
    d. Prefer to not answer
2. What is your age?
    a. Under 18
    b. 18-30 years old
    c. 30-45 years old
    d. 45+
    e. Prefer to not answer
3. How long have you used a mobile application digital therapeutic?
    a. Never
    b. 0-6 months
    c. 6 months or longer
    d. Other_____
4. Please specify what type of mobile application(s) you have used currently or in the past?
    a. _____
    b. _____
5. For what purpose did you utilize the mobile application?
    a. Treatment of depression
    b. Treatment of anxiety
    c. Treatment of Hypertension
    d. Treatment of Diabetes
    e. Other _____
6. Please specify your ethnicity
    a. Caucasian
    b. African American
    c. Latino or Hispanic
    d. Asian
    e. Two or more
    f. Other _____

   g. Prefer to not answer
7. What is your primary language?
   a. English
   b. Spanish
   c. Other_____
   d. Prefer to not answer