Spring 2017

# THE DOCTOR WILL SKYPE YOU NOW: COLLEGE STUDENT ATTITUDES TOWARDS THE INTEGRATION OF TELEMEDICINE (HEALTHSPOT® Kiosk) AT JOHN CARROLL UNIVERSITY

Kasey A. Foley
*John Carroll University*, kaseyannfoley@gmail.com

# THE DOCTOR WILL SKYPE YOU NOW: COLLEGE STUDENT ATTITUDES TOWARDS THE INTEGRATION OF TELEMEDICINE (HEALTHSPOT® Kiosk) AT JOHN CARROLL UNIVERSITY

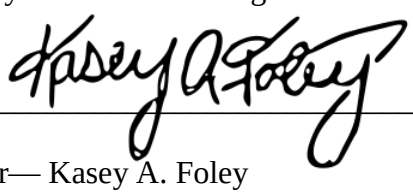
A Thesis Submitted to the
Office of Graduate Studies
College of Arts & Sciences of
John Carroll University
in Partial Fulfillment of the Requirements
for the Degree of Masters of Arts.

By
Kasey A. Foley
2016

The thesis of Kasey A. Foley is hereby accepted:

| | |
|---|---|
| _____ | _____ |
| Advisor- Douglas Bruce, Ph.D. | Date |

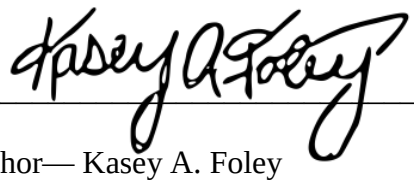
I certify that this is the original document

| | |
|---|---|
|  | |
| _____ | _____ |
| Author— Kasey A. Foley | Date |

The thesis of Kasey A. Foley is hereby accepted:

| | |
|---|---|
| _____ | _____ |
| Reader- Margaret Finucane, Ph.D. | Date |
| _____ | _____ |
| Reader- Jacqueline Schmidt, Ph.D. | Date |
| _____ | _____ |
| Advisor- Douglas Bruce, Ph.D. | Date |

I certify that this is the original document

| | |
|---|---|
|  | _____ |
| Author— Kasey A. Foley | Date |

**Acknowledgements**

There are several people I would like to thank for their encouragement and support throughout this project and my graduate studies at John Carroll University. I would like to thank Dr. Douglas Bruce for his advice and guidance throughout this process and Mary-Michelle Coleman for introducing me to the wonderful world of Health Communication and for her constant support over the past two years. I would also like to thank the two readers on my committee, Dr. Margaret Finucane and Dr. Jacqueline Schmidt. At the Student Health and Wellness Center, I would like to thank Director Jan Krevh, R.N., B.S.N. for generously giving me permission to study the HealthSpot® kiosk and kindly answering all of my questions.

I would like to thank the following people for their assistance during this project: Amy Wainwright, the Outreach and Student Engagement Librarian at Grasselli Library for teaching me helpful and creative approaches to searching the literature, James Miller, Graduate Assistant in the Mathematics Department, for his guiding my through my statistical analysis, and Carole Krus and the Institutional Review Board at John Carroll University for their kindness and for making the IRB remarkably quick and painless. I would also like to thank all the Resident Assistants, students, and faculty members who either participated in, forwarded, or created awareness about this study.

Most of all, I would like to than my mother, Janice A. Foley, for always supporting me and encouraging me to take my own path.

**Abstract**

There has been a spike in the nation's interest in telemedicine over the past decade. Mobile applications, remote-monitoring devices, and image-sharing software have been designed to provide patients convenient access to medical attention. One of these technologies, an enclosed medical booth called the HealthSpot® kiosk (HSK), was installed in the John Carroll University Student Health and Wellness Center in 2014. The HealthSpot® kiosk utilizes videoconferencing technology to simulate face-to-face communication between providers and patients. This new technology would seem to be a good fit for a small college campus, as college-aged students accept technology quickly, and small campuses often have limited access to physicians; however, only 32 students used the HSK during its 13-month tenure. The current study utilizes the Theory of Planned Behavior to identify barriers that prevented many students from trying the HSK. Students at John Carroll University ($n$ = 125) responded to a 25-item survey about their attitudes, subjective normative beliefs, perceived behavioral control, and intentions regarding using the HSK, as well as for face-to-face physician visits. Results revealed that intention to use the kiosk was significantly correlated with attitude and subjective norms. Participants who expressed positive opinions about the HealthSpot® kiosk and those who believed their close friends and family would express positive options about the HealthSpot® kiosk reported stronger intentions to use the HSK. Qualitative evidence suggest lack of knowledge and access may have also played a role in the limited use of the HSK. Findings from this study should inform future campaigns to promote the use of telemedicine technology on college campuses.

Keywords: *HealthSpot® kiosk, telemedicine, patient engagement*

# Table of Contents

## Introduction

There has been a spike in the interest and use of integrating telecommunication in the medical field, otherwise known as telemedicine, over the past decade (van den Berg et. al, 2012; Weinstein et al., 2014). Telemedicine, referred to broadly as telehealth, is the remote diagnosis and treatment of patients by means of telecommunications technology (van den Berg et. al, 2012). Telemedicine enables those who cannot access clinical locations, due to a number of potential obstacles (e.g. location or transportation, scheduling difficulties, physical limitations), to receive the care they need. Advances in telemedicine services, including mobile apps (Wilson et al., 2015), remote-monitoring devices (Julio, 2015), and image-sharing software (Qiao et al., 2015) have expanded the reach of medical care. One promising telemedicine technology, developed in 2013 by HealthSpot, Inc., is the HealthSpot® kiosk.

The HealthSpot® kiosk (HSK) is an enclosed medical booth that utilizes videoconferencing technology to simulate face-to-face communication between providers and patients. The HealthSpot® kiosk has been well received by the media (Hernandez, 2013; Townsend, 2013; Pledger, 2015) and has been the recipient of a number of large grants and awards (Baume 2012; Suchetka, 2012; Ghose, 2015; Pai, 2016), including a $18.3 million investment from BlueTree Allied Angels and the Cleveland Clinic in 2014 (CB Insights, 2015). The HealthSpot® kiosk was praised by health journalists and clinicians alike for its engaging technology (Glenn, 2012; Florida Blue, 2014) and anticipated application to a variety of patient contexts – from prisons and places of employment to schools and rural areas (HealthSpot®, 2015). Rainbow Babies and Children's Hospital, Kaiser Permanente, and Rite Aid Pharmacy are among the many

organizations that partnered with HealthSpot® to bring the kiosk into their locations (Hack, 2013; HealthSpot®, 2015; Sullivan, 2006). In November 2014, John Carroll University in Cleveland, Ohio became the first university in the nation to install a kiosk in their Student Health and Wellness Center (Higl, 2015). Despite the HSK's accolades and anticipated success, HealthSpot® Inc. filed Chapter 7 bankruptcy this past January (Ghose, 2016).

A number of factors could have led to ultimate HealthSpot®'s decline. Among these speculated causes are an ineffective business model (Madhok, 2016), required pre-appointments as a deterrent to patients (Versel, 2016), and the sluggish uptake of telemedicine as a whole over the past two decades (Moncrief, 2014). Overpayment of the HealthSpot®'s leadership team was also listed as a concern, as reports of a collective $1.46 million in wages to the seven senior officers of HealthSpot® were released in the months after the company closed (Ghose, 2016). However, the ultimate cause for the demise of the HealthSpot® kiosk has yet to be determined (Madhok, 2016; Salber, 2016; Versel, 2016).

More specifically, the HealthSpot® kiosk at John Carroll University may have failed due to low use by students. An underwhelming 32 students, or less than 1% of the student body, used the kiosk during its 13-month tenure at the Student Health and Wellness Center (J. Krevh, personal communication, February 10, 2016).

The present study aims to determine student attitudes, beliefs, and intentions to use the HealthSpot® at John Carroll University to identify barriers that contributed to the limited success of the HealthSpot®. Using the Theory of Planned Behavior (TPB), this study compares the contribution of each construct (i.e. attitudes, subjective norms, and

perceived behavioral control) to student intention to use the HealthSpot® kiosk. Student responses regarding HSK were also compared to TPB constructs to those about standard, in-person medical visits. Findings from this study should inform future campaigns to promote use of telemedicine technology on small college campuses.

# Chapter One: Telemedicine and the HealthSpot® kiosk

This chapter offers an overview of telemedicine and the HealthSpot® kiosk. This chapter provides a brief history of telemedicine and its advancements, followed by a description of the limitations and advantages of telemedicine technology and a detailed explanation of the HealthSpot® kiosk, its features, and John Carroll University's partnership with HealthSpot®.

## 1.1 The Evolution of Telemedicine

Although the history of telemedicine dates back to the invention of the telephone in 1849 (Krupinski, 2009), the history of telemedicine, as currently defined by the American Telemedicine Association (ATA), began approximately 50 years ago when radiology images were sent via telephone over a distance of 24 miles between two Pennsylvania towns in the 1940s (Whitten, Cook, & Corhacchione, 2011). In 1959, the first telemedicine application using interactive television communications executed a telepsychiatry consultation occurred between the Nebraska Psychiatric Institute and the Norfolk State Hospital (Whitten & Sypher, 2006). Since these exchanges, there has been a slow shift towards the acceptance of technological advances in telemedicine (Moncrief, 2014). Current telemedicine technology allows physicians to diagnose underserved populations in rural areas (Jhaveri, Larkins, & Sapesan, 2015), provide basic medical attention to travelers via smartphone applications (Dawes, 2016), and remotely perform surgeries, including laparoscopic cholecystectomy (gall-bladder removal) and hernia repairs (Marescaux, 2001; Eveleth, 2014).

### 1.2 Types of Telemedicine

The literature on telemedicine is organized using a several different criteria, including location, type of technology, and delivery method (Alverson et al., 2008; Verhoeven et al., 2010; Whitten, Cook, & Corhacchione, 2011). The most common classification is between synchronous and asynchronous telemedicine (Allely, 1995; Verhoeven et al., 2010). Asynchronous telemedicine, also referred to as store-and-forward, does not require the two participating parties (provider and patient) to be present at the same time (e.g. email, text messaging). One such example, teleradiology, enables radiologists in different countries to review X-rays and communicate diagnoses to patients across the world (Whitten, Cook, & Corhacchione, 2011). Synchronous telemedicine, in contrast, refers to real-time interactions where the provider and patient interact either over a videoconferencing system or via telephone (Alley, 2011). The HealthSpot® kiosk utilizes synchronous communication to simulate face-to-face communication using videoconferencing technology.

### 1.3 Advantages and Limitations of Telemedicine

Scholars have outlined several benefits and limitations of telemedicine (Whitten, Cook, & Corhacchione, 2011; Gardiner & Hartzell, 2012; Carter, 2014). Telemedicine allows those isolated by location (i.e. rural or underdeveloped areas) to obtain healthcare (Malasanos & Ramnitz, 2013), enables clinicians and patients to share information remotely (Siegal, 2012), and fosters provider-provider collaboration across large distances (Kamsu-Foguem et al, 2015). However, telemedicine's overall slow uptake by consumers and practitioners over the past two decades has indicated that there are also many other barriers to the new technology (Moncrief, 2014: L'Esperance & Perry, 2015).

The following section outlines both the major advantages and barriers of telemedicine, in addition to providing an assessment of the research gaps in the field.

**Advantages of telemedicine.** Telemedicine was developed with the intention of bridging gaps in healthcare access and increasing the efficiency of care delivery (American Telemedicine Association, 2012); and, by some measures, the field has achieved this (Jaswal & Suman, 2006; Holzman, 2009; Ramnitz & Toree, 2013). Advances in telemedicine have saved countless lives (Shore, 2006), cut medical care costs (Doolittle, Spaulding, & Williams, 2011), and decreased disparities between rural and urban health (Gray, Stamm, Toevs, Reischl, & Yarrington, 2006). For these reasons, there are many advantages to implementing telemedicine as an alternative or supplement to existing medical care. The most widely discussed advantages include: access, potential cost savings, and opportunities for physician collaboration (Bashur, 1997; Hailey, Roine, & Ohimaa, 2002; Qureshi et al., 2010).

Perhaps the greatest advantage of telemedicine is its ability to transcend both geographic and some socioeconomic barriers (Whitten, Cook, & Corhacchione, 2011). For populations that might not be able to obtain transportation to medical visits, telemedicine provides options for them to access care (Bashshur, 1997). Not only can telemedicine provide basic medical access, but it can connect medical experts to the patients with severe conditions (e.g. cancer, acute myocardial infarctions, etc.) who need them (Johansson & Wild, 2010). One study assessed potential cost-savings of telemedicine in rural Arkansas and found that without telemedicine, 94% of patients would travel more than 70 miles for medical visits. This is not a problem unique to Arkansas, as approximately 20% of Americans live in rural areas, according to a 2015

assessment by the American Hospital Association. Telemedicine has the power to continue to bridge the gap between rural and urban medicine.

Another major benefit to telemedicine is the potential economic savings (Gardiner & Harzell, 2012). Several economic analyses have compared telemedicine to standard medical consultations and found significant opportunities for cost reduction (Hailey, Roine, & Ohinmaa, 2002). For instance, the Geisinger Health Plan (GHP), a managed care organization serving patients in rural Pennsylvania, introduced a telemedicine program in March 2008. The program produced about 11% in cost savings over 6 years. GHP's estimated ROI after introducing the program returned $3.50 for every $1 spent to implement it (American Hospital Association, 2015). As the United States spent more than $3.0 trillion on healthcare in 2014, and approximately 20% of that spending went toward physician and clinical services, health executives, the government, and other stakeholders are looking for ways to reduce healthcare spending (CDC, 2015).

Finally, telemedicine encourages collaboration among health providers (Furlow, 2012), which potentially leads to decreased misdiagnoses and an increased standard of care (Burnett et al., 2016). With videoconferencing allowing teleconferences among large groups of providers, one-on-one teleconsultations, and convenient electronic messaging, there are more opportunities for inter-professional health collaboration than ever before.

**Barriers to telemedicine.** Unfortunately, more barriers than advantages to telemedicine exist in the literature. The national and global uptake of telemedicine has been surprisingly slow over the past twenty years (Moncrief, 2014), and scholars attribute this delay to a number of barriers, including: reimbursement, licensure, and concerns about patient privacy (Matusitz & Breen, 2007).

Although cost effectiveness is a leading advantage of telemedicine, reimbursement has been a major barrier to the implementation and sustainability of telemedicine programs nationwide (Whitten & Buis, 2007). Many insurance companies refuse to reimburse physicians for nontraditional consultations. New laws have eased this burden slightly, but there is still inconsistency among state policies. One helpful piece of legislation was the Balanced Budget Act (BBA) of 1997. BBA mandated reimbursement for select telemedicine consultations. Medicare coverage of telemedicine was expanded significantly in 2001 when several states added more flexible reimbursement policies and five states began mandating private insurance companies to cover telemedicine services (California, Kentucky, Texas, Louisiana and Oklahoma). Although there has been significant progress in the addition of telemedicine such policies to insurance companies, reimbursement still proves a central challenge to the growth of telemedicine (Whitten & Buis, 2007).

Issues with licensure are another barrier to telemedicine implementation. As physicians are licensed through individual states, providing teleconsultations across state borders creates unique policy challenges (Stanberry, 2006). Though transcending geographic distances is an asset to the case for telemedicine, issues with licensure create barriers that are equally detrimental to telemedicine. Second opinion companies that operate via telemedicine, of which there are many,

Finally, with the spread of electronic health records and the increasing number of non-health practitioners allowed to view them, the security of private health information is another concern for telemedicine (Matusitz & Breen, 2007).

### 1.4 The HealthSpot® kiosk

One telemedicine option that hit the market in 2013 is the HealthSpot kiosk. The HealthSpot kiosk utilizes synchronous communication to simulate face-to-face communication using videoconferencing technology. The following section provides an in-depth examination of the HealthSpot kiosk, its partnership with John Carroll University, and the implications of investigating barriers to HealthSpot® kiosk use.

**The HealthSpot® kiosk.** The HealthSpot® kiosk is an eight foot by five foot, fully enclosed medical booth, designed by the Eastman Kodak Company, that uses videoconferencing technology, touchscreen registration, and specially modified medical instruments, to communicate with and gain health information from patients (Hack, 2013). The HealthSpot® kiosk increases patient access to healthcare by bringing select physicians to patients in an elegant, cost-effective manner that, according to the manufacturer, does not diminish quality (HealthSpot®, 2015). Releasing its first Kiosk in 2013 HealthSpot® managed kiosks in nine locations nationwide. Locations included pharmacies, children's hospitals, colleges, and employer site in Ohio, Minnesota, and California (HealthSpot®, 2015). Rainbow Babies Children's Hospital, University Hospitals, Miami Children's Hospital, Kaiser Permanente, and Marc's Pharmacy each partnered with HealthSpot® to bring the kiosk into their locations (Hack, 2013; HealthSpot®, 2015; Sullivan, 2006). Rite Aid Pharmacy also recently signed a contract with HealthSpot®, adding twenty-five locations to select Ohio pharmacies in Summer 2015 (Ghose, 2016). Since the bankruptcy filing, the 54 operating kiosks were shut down, but left in place. Vital to an understanding of HealthSpot® Inc.'s decline is an explanation of the patient experience while using the kiosk.

When a user initiates the use of the HealthSpot® kiosk, a touch screen guides the patient through the intake process. Patients may enter their basic information (e.g., name, date of birth, address), log any symptoms they are experiencing, and provide insurance information. A card scanner provides the option of scanning insurance cards into the system for improved convenience. Users are charged a one-time $49.95 registration and appointment fee, which some insurance companies may cover (HealthSpot®, 2015).

Once patients enter the kiosk, they have the option to close the door behind them to increase privacy. While inside the kiosk, patients can select from a list of available physicians and quickly connect to a videoconference link with the chosen provider. The physician controls remotely monitored medical instruments provided in the kiosk to assess each patient (e.g. stethoscope, otoscope, pulse oximeter, magnifying camera, etc.). The patient operates the devices, for instance, by using the magnifying camera to point to a concerning mole or positioning the otoscope in the ear if they are experiencing inner ear pain. This added level of patient engagement creates a unique provider-physician dynamic (HealthSpot®, 2015). Photographs are generated of the affected areas, which are available to both the patient and the physician. The physician has the ability to take a screenshot and annotate the images generated by the instrument to be used for diagnostics and patient education.

An attending medical professional, generally a registered nurse (RN), state tested nursing assistant (STNA), or emergency medical technician (EMT) is available to assist patients with instrument operation or other questions, but remains outside of the kiosk unless notified by a call button. With the information provided by the patient assessment, the physician can recommend treatment options. If a prescription is necessary, the

physician can "e-script," or call in the prescription electronically, to the pharmacy of the patient's choice.

Though the HealthSpot® kiosk makes accessing a physician more convenient, videoconferencing limits the amount and type of care the physician can provide. For instance, if symptoms reported during intake require urgent medical attention, such as severe chest pain or coughing blood, the HealthSpot® will direct the patient to dial "911" or contact the nearest urgent care facility. For all other minor symptoms, such as mild headaches, sinus congestion, coughing, or mild abdominal pain, the kiosk will allow the physician on call to assist the patient (HealthSpot®, 2015).

**HealthSpot® kiosk at John Carroll University.** John Carroll University (JCU), a small university in Cleveland, Ohio, partnered with the HealthSpot® and physicians at the Cleveland Clinic in November 2014, becoming the first University to integrate the kiosk into their healthcare regimen (Higl, 2015). The HealthSpot® fits in a small area between exam rooms at the JCU Student Health & Wellness Center. Regardless of its apparent benefits, only thirty-two students used the kiosk. The intention of introducing telemedicine to the JCU Student Health and Wellness Center was to increase student access to physicians. Unlike student health centers at larger institutions (e.g. Pennsylvania State University, The Ohio State University), where physicians are on staff most weekdays, John Carroll University students may only schedule visits with a doctor two days per week (J. Krevh, personal communication, February 10, 2015). The HealthSpot® kiosk was marketed at John Carroll University primarily through campus-wide InsideJCU emails, word-of-mouth marketing, and flyers posted around campus (See Appendix A).

**The John Carroll University Student Health & Wellness Center.** The John Carroll University Student Health and Wellness Center, located on the John Carroll University campus, provides medical access to both graduate and undergraduate students. With two full-time and one part-time Registered Nurses on staff, the Student Health Center sees students from 9-5pm Monday-Friday, with the exception of University holidays. John Carroll University contracts with Cleveland Clinic for all physician campus visits. Until 2015, primary care physicians were only accessible on campus one day per week, usually on Fridays from 8:00 am- 12:00 pm. As of the 2015-16 academic year, the physician hours have increased to two days a week from 1:00-4:45 pm. All physician visits are billed as office visits through the student's health insurance (John Carroll University, 2016).

# Chapter 2: Review of Literature

This chapter provides a detailed explanation of the theoretical framework used in this study, the reasons why this framework was chosen, and a review of the current literature pertaining to college student adoption of certain health behaviors.

## 2.1 Theoretical Framework

Two theories were considered for this study— the theory of planned behavior (TPB) and the Technology Acceptance Model (TAM). TAM, a widely-accepted information systems model (Choi & Chung, 2013), has been used in a number of studies involving health behaviors (Mohamed, Tawfik, & Norton, 2011; Jeongeun & Hyeoun-Ae, 2012; Ahadzadeh, Pahlevan, & Ong, 2015). TAM was developed in 1989 by Fred Davis, and argues that an individual's attitude towards technology is a major factor in their decision to accept and use new technology (Davis, 1989). While TAM contends that behavioral intentions are the strongest predictors of behavior, it is limited in that it excludes social variables like subjective norms (Mathieson, 1991). Further, TAM is limited in its ability to capture both internal and external variables, such as characteristics of an individual and situational differences. TPB both accounts for individual differences in these variables and incorporates subjective norms as a measure of external social pressures. Due to the narrow scope of TAM, the theory of planned behavior was chosen as the theoretical framework for this study.

The theory of planned behavior offers a guideline for predicting behavior and asserts that attitude toward a behavior, subjective normative beliefs, and perceived behavioral control collectively determine an individual's behavioral intentions (Ajzen,

1988). Further, TPB argues that behavioral intentions are the strongest predictor of behavior (Corcoran, 2011).

**Attitude.** Attitude describes an individual's positive or negative feelings about a particular behavior or behavior change (Corocoran, 2011). According to TPB, attitude is a reliable predictor of behavioral intention (Fishbein and Ajzen, 1975). Additionally, Riemenschneider, Leonard, & Manly (2011) found attitude to be an influential factor in college student's technology decisions regarding information technology (IT) use. Attitude has been researched as a part of TPB in several contexts involving college students and both health and IT decision-making (Godin & Kok, 1996; Albarracin et al., 2001; Teo, 2009; Dartt, 2011; Riemenschneider, Leonard, & Manly, 2011). Specifically, attitude has been shown to influence college student's health behavioral intentions in situations involving sleep habits (Lao, Tao, & Wu, 2015), alcohol consumption (Maguice, 2010), condom use (Albarracin et al., 2001), and mental health care-seeking (Abamecha, Godesso, & Grima, 2013). Attitude has also been found to influence technology acceptance in both college students (Tubaishat et al., 2016) and older adults (Mitzner et al., 2010). Based on the literature, a positive association between student's attitude and their intention to use the HealthSpot® kiosk is expected.

**Subjective Norms.** The second construct, subjective norms (SN), is separated into injunctive norms and descriptive norms. Injunctive norms describe the approval or disapproval of a particular behavior by important individuals in a person's life, while descriptive norm describes whether the behavior is performed by these significant others (Ajzen, 2011). TPB asserts that subjective norms influence behavioral intention, but that the degree of this influence depends on an individual's perception of these socially

normative pressures (i.e. normative beliefs). For instance, regardless of whether a parent approves of a particular behavior, the parent's beliefs will only influence their child's intention to perform that behavior if the child considers the parent's belief to be relevant and feels presser to conform to that belief.

Subjective norms have also been investigated as a part of TPB in relation to college student's health and technology decision-making (Teo, 2009; Choi & Chung, 2013; Hopp, 2013). A 2011 study, published in the *Journal of Information Systems Education*, used TPB to assess influences on college student behavioral intention towards academic IT services (Riemenschneider, Leonard, & Manly, 2011). The study found that subjective norms played a significant role in whether students intended to use the IT services (2011). Based on this study and other findings in the literature (Legris, Ingham, & Collerette, 2003; Schepers & Wetzels, 2006; Teo, 2011), a positive association between students' subjective normative beliefs and their intention to use the HealthSpot® kiosk is expected.

**Perceived Behavioral Control**. Finally, perceived behavioral control (PBC) signifies the degree to which an individual feels they can execute the behavior. TPB describes perceived behavioral control as having two parts: (a) perceived controllability and (b) perceived self-efficacy. Perceived controllability is an individual's level of access to the means of control. Perceived self-efficacy describes an individual's self-confidence for completing or engaging in a behavior (Ajzen, 2002). Research investigating perceived behavioral control suggests a direct relationship between on the behavioral health intentions of college students (Godin & Kok, 1996; Albarracin et al., 2001; Dartt 2011; Choi & Chung, 2013). A study by Agarwal (2014) assessed the psychological factors

contributing to college students' vaccine intentions and found self-efficacy to be among the strongest predictors of college students' intentions to obtain an A/H1N1 vaccines. Based on the literature, a positive association between students' perceived behavioral control and their intention to use the HealthSpot® kiosk is expected.

**2.2 College Student Health Behaviors**

In addition to discussing how TPB influence student behaviors, it is important to review college students' general attitudes towards and behaviors regarding health. As the HealthSpot kiosk was designed for handling basic medical situations, such as allergies, cold and flu symptoms, bronchitis and sore throats, a portion of this review will focus on these conditions and student's primary and preventative care behaviors.

Every three years, the American College Health Association (ACHA) conducts the National College Health Assessment (ACHA-NCHA) to aid college health providers, educators, counselors, and administrators in better understanding their students' health beliefs and practices. The 2015 ACHA-NCHA reported that only 13.5% of students believe that allergies impacted their academic performance and 4.7% of students reported that cold/flu symptoms (e.g. sinus infection, ear infection, bronchitis, strep throat) had impacted their academic performance in the past year (ACHA, 2015). Despite this small perceived impact, 56.9% of college students were treated by one or more of the listed conditions (including allergies, cold/flu symptoms, and strep throat) in the past 12 months, indicating an interest in health maintenance, whether preventative or reactive (2015). Also in the past year, nearly one quarter of students suffered from allergies (21.3%), with sinus infections (18.8%) and strep throat (12.1%) being among the next leading conditions reported (ACHA, 2015).

Several studies have assessed the contributing factors that lead to college student health behaviors (Wechsler & Nelson, 2008; Hummer, Napper, Ehret, & LaBrie, 2013). Of particular focus in this area of the literature are behaviors involving alcohol and tobacco use (Wechsler & Nelson, 2008; Maguire, 2010), as these are prevalent issues on college campuses (Patrick et al, 2013). It is important to note that although substance use and acceptance of telemedicine technology are different behavioral decisions, an understanding of college students' attitudes and intentions towards risky health behaviors can shed light on this population attitude towards health decisions. For instance, one study published in the *Journal of Advanced Nursing*, found that self-efficacy significantly predicted alcohol and smoking behavior, sun protection behavior, and physical activity (Von Ah, Ebert, Ngamvitroj, Park, & Kang, 2004). A second, more recent, study, published in the *Journal of Studies on Alcohol and Drugs*, found all three TPB constructs, particularly self-efficacy and attitude, to be predictors of increases in risky college drinking (Collins, Witkiewitz, & Larimer, 2011).

Although several studies have been conducted on college student health behaviors (Werch et al., 2007; Miller, Danner, & Staten, 2008; Wechsler & Nelson, 2008; ACHA, 2015) and several more on the barriers to innovative telemedicine technology (Herzlinger, 2006; Rogove et al., 2012; Hall et al., 2015), little research has been conducted on the implementation of telemedicine on college campuses (Stellefson et al., 2011; King, 2015). Research that has been conducted focuses mostly on mental health services (Khasanshina, Wolfe, emerson, & Stachura, 2008) and substance use interventions (Patrick et al., 2013). To date, no study has assessed the application of primary care telemedicine in the college student population. Thus study aims to identify

the barriers to synchronous primary care telemedicine at John Carroll University, with the intention of adding to the knowledge about telemedicine effectiveness in academic settings.

Based on a review of the literature, the following hypotheses are proposed:

H1: Attitude is positively associated with behavioral intention toward the HealthSpot® kiosk.

H2: Subjective norm is positively associated with behavioral intention forward the HealthSpot® kiosk.

H3: Perceived behavioral control is positively associated with behavioral intention toward the HealthSpot® kiosk.

# Chapter Three: Research Methodology

## 3.1 Ethics

This study was approved by the John Carroll University Institutional Review Board (IRB protocol number 2016-078). All researched was carried out in compliance with the Helsinki Declaration. Participants were notified at the beginning of the survey that participation is voluntary and that all data would be collected anonymously through Qualtrics. The purpose, benefits, and risks associated with this study were communicated to all participants.

## 3.2 Participants

All participants ($n$ = 125) were current graduate or undergraduate students of John Carroll University in University Heights, OH. An emailed link with an explanation of the purpose and overview of the questionnaire was sent to students via their JCU account. Although access to all student email addresses was not possible, the survey was sent to a portion of the JCU student population using convenience sampling.

The majority of participants were women ($n$ = 84, 79%), The rest of participants identified as male ($n$ = 21, 20%). and one participant identified as transgender ($n$ = 1, 1%). Although this survey was taken by both graduate and undergraduate students at John Carroll University, the majority of respondents were undergraduates ($n$ = 94, 89%) between the ages of 18 and 26 ($M$ = 19.58, $SD$ = 2.38). Of the eleven graduate students who completed the survey, two were over the age of 26 ($n$ = 2, 2%). Data from these two respondents were considered outliers and removed from analysis because they are each greater than 15 years older than the majority of respondents and, being above the age of 26, are the only two respondents that are ineligible for coverage under their parents'

health insurance.

### 3.3 Survey Design

A 25-item survey based on the theory of planned behavior (TPB; Appendix A) was developed to assess students' attitudes, perceived behavioral control, and behavioral intentions toward the HealthSpot® kiosk. Questions pertaining to TPB were split into statements about the HealthSpot® kiosk (HSK) and standard physician visits (SMV). For the purpose of this survey, SMV signifies any face-to-face visits with a physician or nurse practitioner without technology mediation. Measures related to TPB as follows: There were 6 items measuring attitudes (i.e. 3 HSK, 3 SMV), 4 items measuring subjective norms (i.e. 2 HSK, 2 SMV), 4 items measuring volitional control (i.e. 4 HSK), 2 items measuring behavioral intention (i.e. 1 HSK, 1 SMV) and 2 items measuring normative beliefs (Table 1, See Appendix B). Each of these constructs were assessed as potential barriers to HSK use.

**Measures of attitudes.** To measure student attitudes regarding the HealthSpot® kiosk, participants were asked to rate the degree to which they agree with statements about the kiosk. Responses were made on 5-point Likert scales (5 = *strongly agree*, 1 = *strongly disagree*). Three items measured attitude (*harmful/beneficial*, *unwise/wise*, *worthless/valuable*) towards the HealthSpot® kiosk (e.g. "I think that using the HealthSpot® kiosk is wise.") and three items measured attitude towards standard medical visits (e.g. "I think that visiting the doctor is wise.").

**Measures of perceived behavioral control.** Perceived behavioral control (i.e. perception of the ease or difficulty of a behavior) was measured using four items. Two items measured perceived controllability (i.e. access to the means of control; e.g. "I know

how to access the HealthSpot® kiosk.") and two items measured self-efficacy (i.e. self-confidence for engaging in behavior; e.g. "It am able to use the HealthSpot® kiosk if I want to"). Items that required a yes/no (e.g. "I know how to access the HealthSpot® kiosk"; "I know how to use the HealthSpot® kiosk) were presented as binary questions, while items requiring a scale of responses (e.g. "I am able to use the HealthSpot® kiosk if I want to"; "It would be easy for me to access the HealthSpot® kiosk if I wanted to.") were written as 5-point Likert scales.

**Measures of subjective norms and normative beliefs.** To measure subjective norms, injunctive norm (i.e. whether the behavior is approved by important others) measures were used. Although TPB calls for the measure of both injunctive and descriptive norms (i.e. whether the behavior is performed by important others), the friends and family of students likely have not used the HealthSpot® kiosk due to the "newness" of the technology and its limited placement in publicly-accessible locations. Therefore, measuring the performance of the behavior (i.e. use of the HealthSpot® kiosk) by student's friends and families would not be appropriate for this study. Four 5-point Likert scale items (2 HSK, 2 SMV) were used to measure injunctive norms (e.g. "My family members would think that using the HealthSpot® kiosk is beneficial."; "My close friends would think that using the HealthSpot® kiosk is beneficial"). Statements were worded hypothetically to account for the likely limited use of the kiosk by students' friends and families.

Normative beliefs (an individual's motivation to comply with what others think they should do) were measured using two 5-point Likert scale items. Items asked students to estimate how likely they are to do what their family or close friends think they should

do (e.g. “Generally speaking, I do what my family members think I should do.”).

In addition to TPB constructs, knowledge of the HealthSpot® kiosk (3 items) and use of the Student Health & Wellness Center (1 item) were measured as potential barriers. The survey also measured perceived level of health, health insurance coverage, and demographic information.

**Measures of knowledge.** To measure student knowledge of the HealthSpot® kiosk technology, and its presence on campus, participants were asked to respond to a series of three multiple choice items asking if they were aware of the HealthSpot® kiosk, if they knew that there is a HealthSpot® kiosk located on campus and, if so, where they had heard about this (e.g. visit to the Student Health and Wellness Center, reading a HealthSpot® kiosk flyer, or from a friend, class, or email). These items were included to assess knowledge as a potential barrier to HealthSpot® kiosk use.

**Measures of use.** To determine the number of participants who had used the HealthSpot® kiosk, one multiple-choice item inquired about student frequency of use in the past 12 months. Students who infrequently visit physicians in general might be less likely to use the HSK. Therefore, students were asked to report the number of times they had visited a physician over the past 12 months. Along the same line of reasoning, students who do not visit the Student Health and Wellness Center when they are ill have a lower chance of using the HealthSpot® kiosk. To assess this potential barrier, the students were asked their preferred source of medical care during the academic year. A matrix listed situations or symptoms (e.g. routine doctor’s visit, cold or flu symptoms, seasonal allergy care, etc.) vertically, sources of care horizontally (e.g. Student Health and Wellness Center, local clinic or doctor’s office, waiting until they returned home for

care, etc.), and asked students to check where they go for each service.

### 3.4 Data Collection

Students were recruited through emails sent to their John Carroll University student accounts. Recruitment emails were sent to all Residence Assistance on campus, encouraging them to forward the link and description to their residents. Multiple graduate and undergraduate classes, as well as several student-run organizations on campus were also sent the recruitment email, in addition to being posted on John Carroll University Peer Health Advocates Facebook page, curated by the Health Promotion & Wellness Department. Through collaboration with the John Carroll University Student Health and Wellness Center, the survey was also sent to the 32 students who used the HealthSpot® kiosk. An estimated 1,246 students received the email with the survey link.

Due to the preliminary nature of the study, a 3-week time frame was used to provide optimal predictive accuracy, given the dynamic nature of social cognitions and the TPB's tenets of time, context, target, and action (Corcoran, 2011). Data collection occurred between May 2-16, 2016, yielding 125 recorded responses and a 10.03% response rate. As Qualtrics records both complete and partial responses, this number is higher than the number of completed surveys (i.e. all questions answered; $n = 100$).

### 3.5 Statistical Analysis

Data collected in Qualtrics were entered into IBM SPSS Statistics (version 23, 2015). In addition to reviewing summary statistics, bivariate correlation tests and paired samples t-tests were conducted to compare (1) student responses about HealthSpot® kiosk to those about SMVs and (2) the constructs of TPB (i.e. attitudes, perceived behavioral control, and subjective norms) to behavioral intentions to use the HealthSpot®

kiosk.

# Chapter Four: Results

The results of this investigation supported two out of the three hypotheses related to the theory of planned behavior constructs. The first two hypotheses regarding attitude and subjective norms (H1: Attitude directly relates to behavioral intention toward the HealthSpot® kiosk; H2: Subjective norms directly relate to behavioral intention toward the HealthSpot® kiosk) were supported in this investigation. The third hypothesis (H3: Perceived behavioral control directly relates to behavioral intention toward the HealthSpot® kiosk.) was not supported by the analysis.

## 4.1 Student Population.

Participants varied by year in school: Freshmen (n = 24, 23.08%), Sophomore (n = 38, 36.54%), Junior (n = 20, 19.23%), Senior (n = 12, 11.54%), and Graduate Students (n = 10, 9.62%). Participants identified as White (n = 82, 79.61%), Black (n = 6, 5.83%), Hispanic (n = 5, 4.85%), Asian/Pacific Islander (n = 5, 4.85%), and Multiracial or Biracial (n = 4, 3.88%). One participant identified their ethnicity as not being listed in the options. Respondents also varied by place of residents, with most residing in John Carroll University Residence Halls (n = 68, 68.69%) and the remainder living in either non-Greek off-campus housing (n =19, 19.19%), a fraternity or sorority house (n = 7, 7.07%), or a parent/guardian's home (n = 5, 5.05%). Table 2 describes the respondent population relative to that of the full student body at John Carroll University (See Appendix C).

## 4.2 Student Health Practices.

The majority of students self-reported their health as being either Good (n = 64, 60%) or Very Good (n = 23, 21%); 19 reported Fair health and one student reported Poor

health (1%). Most respondents reported visiting a physician in the past 12 months (n = 87, 81.31%), many of them reporting one (n = 32, 29.91%), two (n =36, 33.64%) or three (n = 13, 12.15%) visits in the past 6 months.

With respect to the preferred source of care, the majority of students preferred waiting until they returned home (e.g., during the summer or other academic break) for routine doctor visits (n = 72, 67.92%), only 14.15% (n = 15) using the Student Health and Wellness Center for this purpose. Over half of students (n = 55, 51.89%) reported using the Student Health and Wellness Center for cold or flu symptom care. Local clinics were the second preference for this type of care among students (n = 22, 20.75%). Although few students reported obtaining care for allergies (n = 52, 49.06%), those who did used the Student Health and Wellness Center (n = 24, 22.64%) or local clinics (n = 24, 22.64%) most frequently.

In terms of health coverage, most students (n = 89, 89.90%) reported being covered under their parent's health insurance. Eight students (8.08%) reported being covered under "another plan" and one student (1.01%) reported being under a college/university sponsored plan.

**4.3 Student Opinions on HealthSpot® kiosk.**

Knowledge about the HealthSpot® kiosk was nearly split, with just under half of respondents having heard of the technology (n = 57, 47.11%) and just over half not having heard of the HealthSpot® kiosk (n = 64, 52.89%). Nearly the same number of students were aware that there is a HealthSpot® kiosk in the John Carroll University Student Health and Wellness Center (n = 58, 47.93% Aware of HSK; n = 63, 52.07% Unaware of HSK).

Of those who were aware of HealthSpot® kiosk'spresence on campus, the majority heard about the kiosk through a visit to the Student Health & Wellness Center (n = 32, 56.14%). Flyers and posters around campus (See Appendix A) were the second highest reported source of knowledge about the kiosk (n = 19, 33.33%). Other reported sources, in order of frequency, were discussions with a friend or peer (n = 13, 22.81%) and in a class (n = 3, 5.26%). One respondent reported hearing about the kiosk from an off-campus source not related to JCU (n = 1, 1.75%). Though many students knew about the presence of the kiosk on campus, nearly half (n = 53, 45.30%) reported not knowing how to access it and the majority (n = 103, 88.03%) reported not knowing or being unsure how to use it. The survey was emailed to the 32 JCU students who used the HealthSpot® kiosk while it was in service. Of those students, 6 responded.

Student opinions of the HealthSpot® kiosk were compared to reported opinions on standard medical visits using paired samples t-tests. There was a significant difference between intention to use the HealthSpot® kiosk and intention to visit the doctor ($t105 = -11.913$, $p \leq 0.01$). A Pearson's correlation analysis revealed that intention to use the HealthSpot® kiosk and intention to visit the doctor were weakly and positively correlated ($r = 0.235$; $n = 106$; $p = 0.02$). There was also a significant difference between HealthSpot® kiosk and standard medical visit measures for attitude (harmful/beneficial $t106 = -7.377$, $p < 0.01$; unwise/wise $t106 = -9.448$, $p < 0.01$; worthless/valuable $t106 = -7.571$, $p < 0.01$) and subjective norms (family thoughts $t105 = -7.405$, $p < 0.01$; friend thoughts $t105 = -7.091$, $p < 0.01$). This indicates that students feel differently (i.e. less positively) about using the HealthSpot® kiosk than they do about going to an in-person medical visit. It also indicates that students perceive that their friends and family

members would also hold less positive attitudes towards using the HealthSpot® kiosk as opposed to visiting a doctor face-to-face.

General thoughts about the HealthSpot® kiosk were inquired about in an optional free-text response question at the end of the survey. Responses are listed in Table 3. Although only a portion of participants chose to respond to this prompt (n = 22), those that did respond provided valuable feedback regarding their opinions and the potential barriers to use for the HSK. Responses were organized by the theme/barrier identified in the response. Fourteen students expressed positive attitudes towards the HealthSpot® kiosk — some using TPB terminology like "beneficial" and "wise." One student expressed negative attitudes, responding that they "do not see the value [in the HealthSpot® kiosk] when we have physicians visit campus." Over one-third of respondents (n = 8) reported knowledge as the major barrier to student use (e.g. "I would love that. I wish they would make it more well-known"; "Great idea- I wish it was marketed more."). Two students mentioned access as a barrier to use (e.g. "It's not accessible enough to students."); one student referenced a lengthy wait at the Student Health and Wellness Center as a part of the access problem. Two students expressed high intentions to use the kiosk (e.g. "I think it's a great resource for students and I definitely plan on using it if I need to in the future!"). Finally, it is important to note that two of the respondents reported having used the HealthSpot® kiosk before; both expressing positive attitudes towards the kiosk, but both also mentioning either an issue or barrier contributing to their decision not to use the kiosk a second time.

**4.4 Theory of Planned Behavior Constructs.**

Bivariate correlations revealed that intention to use the HealthSpot® kiosk was significantly correlated with all three attitude measures (harmful/beneficial $G = 0.470$; $n = 110$; $p < 0.001$; unwise/wise $G = 0.651$; $n = 110$; $p < 0.001$; worthless/valuable $G = 0.649$; $n = 110$; $p < 0.001$) and both subjective norms measures (family thoughts on kiosk $G = 0.411$; $n = 107$; $p < 0.001$; friends' thoughts on kiosk $G = 0.450$; $n = 109$; $p < 0.001$). Participants who expressed positive opinions about the HealthSpot® kiosk and those who believed their close friends and family would express positive opinions about the HealthSpot® kiosk reported stronger intentions to use it.

## Chapter Five: Discussion

Despite healthcare's fascination with telemedicine (van den Berg et. al, 2012; Weinstein et al., 2014), advances in telemedicine have been met with slow uptake nationally (Moncrief, 2014). The HealthSpot® kiosk (HSK), developed in 2013, received attention and accolades for its promising technology (Baume 2012; Suchetka, 2012; Ghose, 2015; Pai, 2016). A HealthSpot® kiosk was installed in the Student Health and Wellness Center of John Carroll University (JCU) in November 2014, but the kiosk received little attention from students during its 13-month tenure. This study used the theory of planned behavior to investigate the potential barriers to HealthSpot® kiosk use at JCU and found a significant correlation between students' intention to use the HealthSpot® kiosk and two TPB constructs— attitude and subjective norms. Although further research is needed to understand how these constructs affect student behaviors, these findings help to identify barriers to HealthSpot® kiosk that may inform future decisions to implement telemedicine on college campuses.

### 5.1 Analysis of Barriers

**Attitude.** Attitude was positively correlated with behavioral intention (harmful/beneficial $G = 0.470$; $n = 110$; $p < 0.001$; unwise/wise $G = 0.651$; $n = 110$; $p < 0.001$; worthless/valuable $G = 0.649$; $n = 110$; $p < 0.001$), indicating that students' opinions about the benefit and value of the HealthSpot® kiosk play an important role in their intention to use the technology. This finding supports and adds to past TPB research that suggests that college-aged students' acceptance of technology behaviors can be heavily influenced by their perception of the technology's value in their lives (Hsiao et al., 2015) and their overall approval or disapproval of its benefit (Khor, 2014). It may

stand to reason that a student who thinks positively about a behavior or technology would be more likely to adopt it (Tubaishat et al., 2016). However, changing a population's attitudes can be exceedingly difficult (Berkley, 2006; Gerras & Wong, 2013) due to a variety of factors, including biased processing, misinformation, and environmental influences (Chipeta, Chimwaza, & Kalilani-Phiri, 2010; Fransen, Smit, & Verlegh, 2015). With attitudes towards and use of synchronous telemedicine technology being mixed in the literature (Martinez, Chanda, & Smith, 2011; Saparova, 2012; Edwards et al., 2014), the issue of attitude may extend past the HealthSpot® kiosk and into a more general reservation about replacing face-to-face physician visits with a screen. There was a significant difference between student's attitudes, intentions, and subjective norms regarding the HealthSpot® kiosk vs those about standard medical visits. This supports the idea that, although the HealthSpot® kiosk attempts to simulate a standard, face-to-face physician visit, there is a gap in how students think about and treat the HealthSpot® kiosk and standard visits to the doctor's office. Students reported nearly a 30% greater intention to visit the doctor face-to-face (SMV) than intention to use the kiosk, with over a 1-point mean difference on a 5-point Likert scale (HSK $x = 2.97$; SMV $x = 4.22$). Student's low intention to use the kiosk aligns with the minimal use of the kiosk by students during its tenure and indicates that there may be perceived barriers to kiosk use that are not present when students engage in SMVs.

Free-text responses about HealthSpot® kiosk attitudes included statements that also support the claim that students feel differently about the HealthSpot® kiosk and face-to-face physicians, with a preference towards the latter. For example, "I can see why people would use it, but I would rather just have a Physician on campus". The response

may indicate that although some students see the value of the kiosk, they find more value in face-to-face visits with physicians. In fact, four of the fourteen responses where students' report positive attitudes about the kiosk also mention a preference for face-to-face physician visits, or SMVs. It is possible that instead of attitude about the kiosk itself being a barrier to use, attitude about the kiosk when compared to face-to-face visits may be a barrier. The students surveyed in the present study seemed to have positive attitudes about the kiosk, but seem to prefer face-to-face visits when available. In the absence of face-to-face visits, students' attitudes towards the kiosk may be more positive (Gardner et al., 2015) The HealthSpot® kiosk attempts to simulate the traditional, face-to-face medical visit, but cannot replicate it entirely. So it might not be an attitude "issue" in the sense that they despise the kiosk, they just don't prefer it to a doctor. In this particular telemedicine situation, students had the option to use the kiosk or wait 1-2 days to see a physician. Between the novel technology and the option to see the doctor in the near future, students may have comparatively preferred talking with a doctor face-to-face. If the in person doctor option was not there, there might have been a different set of attitudes and therefore a different outcome. Future research is required to understand the discrepancies between students' attitudes about the HealthSpot® kiosk and standard medical visits, and the psychological factors contributing to these attitudes.

**Subjective Norms.** Students' perceptions of their friends and family's opinions about the HealthSpot® kiosk were significantly and positively correlated with students' intentions to use the HealthSpot® kiosk. Students who perceived the HealthSpot® kiosk as a technology their friends and family members would find beneficial were significantly more likely to report high intentions of using the kiosk. This relationship

indicated that subjective norms may play a role in whether or not students intend to use the kiosk, which supports the literature on subjective norms and student behavioral intentions (Moss, O'Conner, & White, 2010; Hopp, 2013). As the friends and family members of participants likely have not used the kiosk, responses to these measures are based on students' perceptions of their close friends and family members' opinion, rather than opinions gathered from a conversation about the kiosk. Respondents perceived that their family have on average lower opinions about the kiosk than they do. There was also a significant difference between subjective norm measures regarding the HealthSpot® kiosk verses standard medical visits. Students reported thinking their friends and family had a significantly lower opinion about the HealthSpot® kiosk than about standard medical visits. This difference was consistent between close family members and friends, which supports the correlation analysis findings. Other studies about the influence of subjective norms on health behavior adoption align with these findings (Kim & Park, 2012; Murphy, Vernon, & Diamond, 2014) and suggest that it is imperative to consider subjective norms when designing and implementing health campaigns on college campuses (DeJong et al., 2006).

**Perceived Behavioral Control.** Although there was only a weak correlation between perceived behavioral control measures and behavioral intention, two written comments pointed to access as a potential barrier. One comment was vague, stating that "It's not accessible enough to students," which could indicate that the kiosk, which was located by the exam rooms of the Student Health and Wellness Center, should have been placed at a different location on campus outside of the health center, or that the Student Health and Wellness center is not located in a convenient or accessible spot. The second

comment pointed to speed of care at the Student Health and Wellness Center, rather than location, as the access concern. This student had used the HealthSpot® kiosk, and reported a two-and-a-half hour wait at the Student Health and Wellness Center as their major issue with the kiosk. Although these comments were not the majority in the free-text responses, and there was little correlation between PBC and intention to use the HSK, future research on telemedicine barriers should consider location and wait time as factors and potential barriers to telemedicine use and acceptance.

**Knowledge.** Although nearly half of students (n = 57, 47.93%) reported having heard about the HSK on campus, eight of the twenty-two free-text responses suggested that knowledge did act as a barrier while the kiosk was available. Comments such as, "I would love that. They should make it more well-known." and "I think it's a wonderful idea/device to have on campus. If only I had known about it earlier in the year." indicate that lack of knowledge, rather than attitude or subjective norms, acted as the primary barrier to these student's use of the kiosk. Other comments point directly to marketing as the major issue with HSK execution at John Carroll University (e.g. "Have received no information whatsoever about this kiosk, besides what is being given now.", "Great idea-wish it was marketed more). As the majority of students who knew about the kiosk found out about it through a visit to Student Health and Wellness Center (n = 32, 56.14%), external marketing, defined for this purpose as marketing that took place outside of the Student Health and Wellness Center, might have increased student knowledge and, consequently, kiosk use.

The three major forms of external marketing were used to increase awareness about the kiosk were flyers (See Appendix A), word-of-mouth marketing, and campus-

wide InsideJCU emails. Just over one-third (n = 19; 33.33%) of students found out about the kiosk from the flyer and nearly a quarter of students found out through word of mouth (n = 13; 22.81%) while only five students were made aware through InsideJCU emails (n = 5; 8.77%), indicating that word-of-mouth marketing and flyers might be the most effective forms of marketing for future telemedicine or health-related campaigns. However, further research to understand how students at JCU generally get their information is necessary to make this claim. Studies have assessed the effectiveness of different telemedicine marketing (LeRouge, Tulu, & Forducey, 2010; Dansky U Ajello, 2005) and their findings suggest a still limited understanding of which approaches create the most awareness. One content analysis (Dansky & Ajello, 2005) found brochures to be among the most common marketing tool in telemedicine campaigns, and those campaigns that targeted with messages about clinical excellence (i.e. the assumption that technology adopted by health organizations will meet the needs of the populations it serves) and technological preeminence (i.e. the assumption that health organizations adopt technologies to improve their care and their image as technological leaders) be the most effective. Small colleges implementing telemedicine might use these approaches to increase the effectiveness of future campaigns. Finally, a marketing audit was not conducted at John Carroll University, but is highly recommended in both health (Kolter, Shalowitz, & Stevens, 2011) and marketing literature (Fahad et al., 2015), and would be an essential first step in future college telemedicine campaigns to assess the marketing environment and develop marketing objectives and strategies.

**5.2 Limitations**

While the present study offers important insights to a new area of telemedicine, medical kiosks in college settings, it was limited in its scope for a number of reasons. First, the survey link and recruitment email was not seen by all possible participants. Due to a lack of to the complete list of student emails, snowball sampling was used to recruit participants. Although the survey received a 10.3 % response rate and population size was large enough to obtain a 10% acceptable error rate ($n \geq 100$), reaching a greater portion of the student population may have led to a greater sampling pool of the student body.

Second, freshman and sophomores were over-represented relative to upperclassmen and graduate students, with freshman making up nearly one-quarter of respondents ($n = 24$; 23.08%) and sophomores making up over one-third of respondents ($n = 38$; 36.54%). As the kiosk was available to students from November 2014-January 2016, freshmen only had one semester with the kiosk, during which the least marketing was implemented for the kiosk. This group of participants would, therefore, be less likely to have heard about the kiosk upon their arrival and first three months on campus. Sophomores, on the other hand, were entering college and learning about campus resources when the kiosk was being marketed most heavily and may have been more likely to know about the kiosk than any other group of respondents. For these reasons, an over-representation of underclassmen in this study may have skewed the results.

Third, the measure for student behavior (i.e. a multiple-choice question asking, "In the past 12 months, how many times have you used the HealthSpot® kiosk") was not statistically comparable to the measure for student behavioral intention (i.e. a 5-point

Likert scale item that read, “I intend to use the HealthSpot® kiosk”). Although the literature on the theory of planned behavior provides strong support for the correlation between behavioral intention and behavior (Ajzen, 1975; Guo, 2007; Karimy et al., 2015), adding this layer to the statistical analysis might have strengthened the study findings.

Finally, when testing for efficacy as a barrier to use, the statement “I know how to use the kiosk.” was given to respondents. The majority (n = 103, 88.03%) responded that the did not know or were unsure about how to use the kiosk. As many of the respondents have not used the kiosk before, they likely would have reported. Rather than knowledge of the kiosk’s instructions, the statement was intended to assess students perceived ability to learn how to use the kiosk. A better wording might have been, “I would be able to learn how to use the HealthSpot® kiosk®.”

### 5.3 Future Research

Although this study provides valuable insight into students’ health behaviors and decision-making, further research is required to assess the barriers to telemedicine use. In the case of the HSK, a qualitative analysis of each of the barriers assessed in the study (e.g. attitude, subjective norms, perceived behavioral control, knowledge) would provide more detailed information as to why students felt more comfortable engaging in a face-to-face visit with a physician over a visit to a videoconferencing kiosk. Combining qualitative and quantitative methods would also yield better insight about the psychological factors behind student health behaviors and technology acceptance in health settings. Finally, future studies might incorporate cost of telemedicine services as a potential barrier to use. In this particular study, nearly all students were covered under

their parent's' health insurance, however the upfront cost of $49.95 per visit may have deterred students.

### 5.4 Conclusion

Telemedicine provides an invaluable opportunity to bridge gaps in healthcare access. It will, however, take time, strategic planning, and further research to design effective telemedicine technology that minimizes barriers and engages patients of a variety of demographics and geographic locations. Attitude and the influence of friends and family play particularly important roles in the adoption of some telemedicine technology, with easy access and awareness also playing significant roles in behavioral intention. If health innovators and clinicians can implement telemedicine solutions that decrease major barriers, these technologies can have meaningful and beneficial impacts on health care and the patients that engage that use them.

## References

Abamecha, F., Godesso, A., & Girma, E. (2013). Intention to voluntary HIV counseling and testing (VCT) among health professionals in Jimma zone, Ethiopia: The theory of planned behavior (TPB) perspective. *BMC Public Health*, 13(1), 140.

Agarwal, V. (2014). A/H1N1 vaccine intentions in college students: An application of the theory of planned behavior. *Journal of American College Health*, 62(6), 416–424.

Ahadzadeh, A. S., Pahlevan Sharif, S., Ong, F. S., & Khong, K. W. (2015). Integrating health belief model and technology acceptance model: An investigation of health-related internet use. *Journal of Medical Internet Research*, 17(2), 1–17.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179–211.

Albarracín, D., Johnson, B. T., Fishbein, M., & Muellerleile, P. A. (2001). Theories of reasoned action and planned behavior as models of condom use: A meta-analysis. *Psychol Bull*, 127(1), 142–161.

Aldrich, R. S. (2015). Using the theory of planned behavior to predict college students' intention to intervene with a suicidal individual. *Crisis*, 36(5), 332–337.

Allely, E. B. (1995). Synchronous and Asynchronous. *Journal of Medical Systems*, 19(3), 207-212.

Alverson, D. C., Holtz, B., D'iorio, J., Devany, M., Simmons, S., & Poropatich, R. K. (2008). One size doesn't fit all: Bringing telehealth services to special populations. *Telemedicine and e-Health*, 14(9), 957–963.

Baum, S. (2014, November 12). Xerox makes big push into telemedicine with HealthSpot® strategic partnership. Med City News. Retrieved from http://medcitynews.com/2014/11/xerox-makes-big-push-telemedicine-HealthSpot®-strategic-partnership/.

Berkley, D. S. (2006, January 30). We're running out of time; it's been difficult to persuade the private sector to invest in vaccines. unlike a drug that patients may have to take for a lifetime, an effective vaccine is a 'one-shot' deal. *Newsweek* (International ed.).

Burnett, A. E., Bowles, H., Borrego, M. E., Montoya, T. N., Garcia, D. A., & Mahan, C. (2016). Heparin-induced thrombocytopenia: Reducing misdiagnosis via collaboration between an inpatient anticoagulation pharmacy service and hospital reference laboratory. *Journal of Thrombosis and Thrombolysis*, *42*(4), 471-478.

Cantech letter: Doctor-on-demand app akira launches in ontario. (2016). Chatham: Newstex.

Carter, B. (2014). Technology adoption in health care: International barriers and opportunities to telemedicine. *Journal of Child Health Care*, 18(4), 299–301.

CDC. (2015). Health Expenditures. Retrieved from http://www.cdc.gov/nchs/fastats/health-expenditures.htm.

Chen, C.-C. (2013). The exploration on network behaviors by using the models of theory of planned behaviors (TPB), Technology acceptance model (TAM) and C-TAM-TPB. *African Journal of Business Management,* 7(30), 2976–2984.

Chipeta, E. K., Chimwaza, W., & Kalilani-Phiri, L. (2010). Contraceptive knowledge, beliefs and attitudes in rural Malawi: Misinformation, misbeliefs and misperceptions. *Malawi Medical Journal*, 22(2), 38-41.

Choi, G., & Chung, H. (2013). Applying the technology acceptance model to social networking sites (SNS): Impact of subjective norm and social capital on the acceptance of SNS. *International Journal of Human-Computer Interaction*, 29(10), 619–628.

Clemmensen, P., Loumann-Nielsen, S., & Sejersten, M. (2010). Telemedicine fighting acute coronary syndromes. *Journal of Electrocardiology*, 43(6), 615-618.

CB Insights (2015). Cleveland Clinic Foundation: Investments and acquisitions. Retrieved from https://www.cbinsights.com/i5c16b0d099fd16c49462.

Collins, S. E., Witkiewitz, K., & Larimer, M. E. (2011). The theory of planned behavior as a predictor of growth in risky college drinking. *Journal of Studies on Alcohol and Drugs*, 72(2), 322-332.

Dansky, K. H., & Ajello, J. (2005). Marketing telehealth to align with strategy. *Journal of Healthcare Management*, 50(1), 19.

Dartt, M. D. (2011). The impact of teacher attitudes on technology use during instruction (Doctoral Dissertation). Liberty University, Lynchburg, VA.

DeJong, W., Schneider, S. K., Towvim, L. G., Murphy, M. J., Doerr, E. E., Simonsen, N. R.. . Scribner, R. A. (2006). A multisite randomized trial of social norms marketing campaigns to reduce college student drinking. *Journal of Studies on Alcohol,* 67(6), 868-879.

Doolittle, G. C., Spaulding, A. O., & Williams, A. R. (2011). The decreasing cost of telemedicine and telehealth. *Telemedicine and e-Health,* 17(9), 671–5.

Edwards, L., Thomas, C., Gregory, A., Yardley, L., O'Cathain, A., Montgomery, A. A., & Salisbury, C. (2014). Are people with chronic diseases interested in using telehealth? A cross-sectional postal survey. *Journal of Medical Internet Research*, 16(5), e123.

Eveleth, R. (2014, May 16). The surgeon who operates from 400km away. Is this the future of surgery? Retrieved from http://www.bbc.com/future/story/20140516-i-operate-on-people-400km-away.

Fahad, A. A., Abdur Rahman Al Mahmud, Miah, R., & Islam, U. H. (2015). Marketing audit: A systematic and comprehensive marketing examination. *International Journal of Scientific & Technology Research*, 4(7), 215-221.

Florida Blue. (2014). Florida Blue and Miami Children's Hospital unveil HealthSpot® innovative telehealth technology. Retrieved from http://www.prnewswire.com/news-releases/florida-blue-and-miami-childrens-hospital-unveil-HealthSpot®-innovative-telehealth-technology-283494461.html

Fransen, M. L., Smit, E. G., & Verlegh, P. W. J. (2015). Strategies and motives for resistance to persuasion: An integrative framework. *Frontiers in Psychology*, 6, 1201.

Gardiner, S., & Hartzell, T. L. (2012). Telemedicine and plastic surgery: A review of its applications, limitations and legal pitfalls. *British Journal of Plastic Surgery*, 65, e47–e53.

Gerend, M. A., & Shepherd, J. E. (2012). Predicting human papillomavirus vaccine uptake in young adult women: Comparing the health belief model and theory of planned behavior. *Annals of Behavioral Medicine,* 44(2), 171-180.

Gerras, S. J. & Wong, L. (2013). *Changing minds in the army: Why it is so difficult and what to do about it*. Carlisle, PA: Strategic Studies Institute and U.S. Army War College Press.

Ghose, Carrie (2015). HealthSpot® raises another $20M for health care kiosks. Retrieved from http://www.bizjournals.com/columbus/news/2015/03/09/atm-of-health-care-healthspot-expanding-amid.html.

Ghose, 2016. (2016). HealthSpot® CEO, executive team salaries outstripped revenue. Retrieved from http://www.bizjournals.com/columbus/blog/2016/01/HealthSpot-ceo-executive-team-salaries-outstripped.html.

Ghose, C. (2016). HealthSpot® files for chapter 7 liquidation. Retrieved from http://www.bizjournals.com/columbus/news/2016/01/14/healthspot-files-for-chapter-7-bankruptcy.html.

Glenn, B. (2012, March 5). Barrier to telemedicine? Many states restrict prescriptions authority. Retrieved from http://medcitynews.com/2012/03/barrier-to-telemedicine-many-states-restrict-doctors-prescription-authority/?trendmd-shared=0

Godin, G., & Kok, G. (1996). The theory of planned behavior: A review. *American Journal of Health Promotion*, 11(2), 87–98.

Guo, Q., Johnson, C. A., Unger, J. B., Lee, L., Xie, B., Chou, C.. . Pentz, M. (2007). Utility of the theory of reasoned action and theory of planned behavior for predicting Chinese adolescent smoking. *Addictive Behaviors*, 32(5), 1066-1081.

Gray, G. A., Stamm, B. H., Toevs, S., Reischl, U., & Yarrington, D. (2006). Study of participating and nonparticipating states' telemedicine reimbursement status: Its impact on Idaho's policymaking status. *Telemedicine and e-Health,* 12, 681-690.

Hall, R. W., Dehnel, P. J., Alexander, J. J., Bell, D. M., Bunik, M., Burke, B. L., ... & Kile, J. R.(2015). Telemedicine. *Pediatrics*, 136(1), e293-e308.

HealthSpot® (2015). HealthSpot® kiosk. Retrieved from https://healthspot.net/about http://mobihealthnews.com/content/despite-deals-cleveland-clinic-and-rite-aid-telemedicine-kiosk-company-healthspot-closes.

Hernandez, D. (2013). HealthSpot® wants to be the apple app store of robo-medicine. Retrieved from http://www.wired.com/2013/01/ces-2013-healthspot/.

Herzlinger, R. E. (2006). Why innovation in health care is so hard. *Harvard Business Review*, 84(5), 58.

Higl, A. (2015, February 5). "Telemedicine" comes to JCU: Cleveland Clinic HealthSpot® station. Retrieved from http://www.jcunews.com/2015/02/05/telemedicine-comes-to-jcu-cleveland-clinic-healthspot-station/.

Hopp, T. M. (2013). Subjective Norms as a Driver of Mass Communication Students' Intentions to Adopt New Media Production Technologies. *Journalism & Mass Communication Educator*, 68(4), 348–364.

Hsiao, C., Tang, K., & Lin, C. (2015). Exploring college students' intention to adopt e-textbooks: A modified technology acceptance model. *Libri*, 65(2), 119-128.

Hummer, J. F., Napper, L. E., Ehret, P. E., & LaBrie, J. W. (2013). Event-specific risk and ecological factors associated with prepartying among heavier drinking college students. *Addictive Behaviors*, 38(3), 1620-1628.

Icek Ajzen. (2002). Perceived Behavioral Control, Self-Efficacy, Locus of Control, and the Theory of Planned Behavior1. *Journal of Applied Social Psychology*, 80(6), 2918–2940.

Jaswal, Aparna A & Suman, B. (11/01/2006). Exploiting telemedicine to bridge the knowledge gap-the new "mantra" for Indian medicine. *Indian Heart Journal*, 58 (6), p. 381.

Jhaveri, D., Larkins, S., & Sapesan (2015). A systematic review to analyse the outcomes of active medical therapies delivered with telemedicine support to rural and remote populations. *Internal Medicine Journal,* 45, 12-13.

Julio, Y. E. R. (2015). Development of a Prototype Arduino-Mobile in Area of Telemedicine for Remote Monitoring Diabetic. *Asia-Pacific Conference on Computer-Aided System Engineering*, IEEE(May), 36–40.

Kamsu-Foguem, B., Tiako, P. F., Fotso, L. P., & Foguem, C. (2015). Modeling for effective collaboration in telemedicine. *Telematics and Informatics*, 32, 776–786.

Karimy, M., Zareban, I., Araban, M., & Montazeri, A. (2015). An extended theory of planned behavior (TPB) used to predict smoking behavior among a sample of

Iranian medical students. *International Journal of High Risk Behaviors & Addiction,* 4(3), e24715.

Kasper, J., Köpke, S., Fischer, K., Schäffler, N., Backhus, I., Solari, A., & Heesen, C. (2012). Applying the theory of planned behaviour to multiple sclerosis patients' decisions on disease modifying therapy – questionnaire concept and validation. *BMC Medical Informatics and Decision Making*, 12(1), 60.

Khasanshina, E. V., Wolfe, W. L., Emerson, E. N., & Stachura, M. E. (2008). Counseling center-based tele-mental health for students at a rural university. *Telemedicine and e-Health*, 14(1), 35-41.

Khor, E. T. (2014). An analysis of ODL student perception and adoption behavior using the technology acceptance model. *International Review of Research in Open and Distance Learning*, 15(6), 275-288.

Kim, J., & Park, H.-A. a. (2012). Development of a health information technology acceptance model using consumers' health behavior intention. *Journal of Medical Internet Research,* 14(5), e133.

King, S. C. (2015). A comparison between telehealth and face-to-face brief alcohol interventions for college students (Doctoral Dissertation). University of Nebraska Lincoln, Lincoln, NE.

Kolter, P., Shalowitz, J., & Stevens, R. J. (2011. *Strategic marketing for health care organizations: Building a customer-driven health system*. New York: John Wiley & Sons.

Krevh, J. (2016, February 8). Personal interview.

Krupinski, E. A. (2009). History of telemedicine: Evolution, context, and transformation. *Telemedicine and e-Health,* 15(8), 804-805.

L'Esperance, S. T., & Perry, D. J. (2015). Assessing advantages and barriers to telemedicine adoption in the practice setting: A MyCareTeamTM exemplar. *Journal of the American Association of Nurse Practitioners*, 28(6), 311-319.

LeRouge, C., Tulu, B., & Forducey, P. (2010). The business of telemedicine: Strategy primer. Telemedicine Journal and e-Health. *Journal of the American Telemedicine Association*, 16(8), 898-909.

Lao, H. C. F., Tao, V. Y. K., & Wu, A. M. S. (2015). Theory of planned behaviour and healthy sleep of college students. *Australian Journal of Psychology*, 68(1), 20–28.

Legris, P., Ingham, J., & Collerette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. *Information & Management*, 40(3), 191–204.

Lenhart, A., Purcell, K., Smith, A., & Zickuhr, K. (2010). Social media & young adults: mobile internet use among teens and young adults. *Pew internet & American life project*. Retrieved from http://www.pewinternet.org/2010/02/03/social-media-and-young-adults/

Lu, Y., Zhou, T., & Wang, B. (2009). Exploring Chinese users' acceptance of instant messaging using the theory of planned behavior, the technology acceptance model, and the flow theory. *Computers in Human Behavior*, 25(1), 29–39.

Madhok M.D., R. (2016). Postmortem: HealthSpot®. Retrieved from http://doi.org/http://www.telemedmag.com/startups/2016/3/23/postmortem-healthspot

Maguire, C. P. (2010). Intentions to drink to intoxication among college students mandated to alcohol intervention: An application and extension of the theory of planned behavior (Doctoral dissertation). University of Akron, Akron, Ohio.

Maheu, M. M., Whitten, P., & Allen, A. (2001). *E-Health, telehealth, and telemedicine: A guide to start-up and success*. San Fancistco: Jossey-Bass.

Marescaux, J., Leroy, J., Gagner, M., Rubino, F., Mutter, D., Vix, M., … Smith, M. K. (2001). *Transatlantic Robot-assisted Telesurgery*, 413(September), 379–381.

Martínez Álvarez, M., Chanda, R., & Smith, R. D. (2011). How is telemedicine perceived? A qualitative study of perspectives from the UK and India. *Globalization and Health*, 7(1), 17-17.

Mathieson, K. (1991). Predicting user intentions: Comparing the technology acceptance model with the theory of planned behavior. *Information Systems Research*, 2(3), 173–191.

Matuzitz, J., & Breen, G. (2007). Telemedicine: Its effects on health communication. *Health Communication, 21,* 73-83.

Miller, K., Danner, F., & Staten, R. (2008). Relationship of work hours with selected health behaviors and academic progress among a college student cohort. *Journal of American College Health*, 56(6), 675-679.

Mitzner, T. L., Boron, J. B., Fausset, C. B., Adams, A. E., Charness, N., Czaja, S. J., & Sharit, J. (2010). Older adults talk technology: Technology usage and attitudes. *Computers in Human Behavior*, 26(6), 1710–1721.

Mohamed, A. H. H. M., Tawfik, H., Norton, L., & Al-Jumeily, D. (2011). e-HTAM: A Technology Acceptance Model for electronic health. *International Conference on Innovations in Information Technology*, 14(3), 134–138.

Moncrief, J. W. (2014). Telemedicine: The Slow Revolution. Advances in Peritoneal Dialysis, 30.

Munro Cullum, C., Hynan, L. S., Grosch, M., Parikh, M., & Weiner, M. F. (2014). Teleneuropsychology: evidence for video teleconference-based neuropsychological assessment. *Journal of the International Neuropsychological Society*, 20(10), 1028–33.

Murphy, C. C., Vernon, S. W., Diamond, P. M., & Tiro, J. A. (2014). Competitive testing of health behavior theories: How do benefits, barriers, subjective norm, and intention influence mammography behavior? *Annals of Behavioral Medicine*, 47(1), 120-129.

Patrick, M. E., Singer, E., Boyd, C. J., Cranford, J. A., & McCabe, S. E. (2013). Incentives for college student participation in web-based substance use surveys. *Addictive Behaviors*, 38(3), 1710-1714.

Pelling, E. L., & White, K. M. (2009). The theory of planned behaviour applied to young people's use of social networking websites. *Cyberpsychlogy & Behavior*, 12, 755–759.

Pledger, M. (2015). First 25 Ohio-developed telemedicine kiosks open in northeast Ohio RiteAids: HealthSpot®. Retrieved from http://www.cleveland.com/business/index.ssf/2015/07/the_first_25_ohio-developed_te.html

Qiao, L., Li, Y., Chen, X., Yang, S., Gao, P., Liu, H., Qiu, M. (2015). Medical high-resolution image sharing and electronic whiteboard system: A pure-web-based system for accessing and discussing lossless original images in telemedicine. *Computer Methods and Programs in Biomedicine*, 121(2), 77–91.

Qureshi, A., Shih, E., Fan, I., Carlisle, J., Brezinski, D., Kleinman, M., & Guttag, J. (2010). Improving patient care by unshackling telemedicine: adaptively aggregating wireless networks to facilitate continuous collaboration. In *AMIA Annual Symposium Proceedings* (Vol. 2010, p. 662). American Medical Informatics Association.

Riemenschneider, C. K., Leonard, L. N. K., & Manly, T. S. (2011). Students' ethical decision-making in an information technology context: A theory of planned behavior approach. *Journal of Information Systems Education*, 22(3), 203–215.

Rogove, H. J., McArthur, D., Demaerschalk, B. M., & Vespa, P. M. (2012). Barriers to telemedicine: survey of current users in acute care units. *Telemedicine and e-Health*, 18(1), 48-53.

Salber, P. (2015). HealthSpot®: Kiosk care powered by Xerox. Retrieved from https://thedoctorweighsin.com/healthspot-kiosk-care-powered-xerox/.

Saparova, D. (2012, Summer). Motivating, influencing, and persuading patients through personal health records: A scoping review. *Perspectives in Health*

*Information Management / AHIMA, American Health Information Management Association*, 9, 1f.

Schepers, J., & Wetzels, M. (2007). A meta-analysis of the technology acceptance model: Investigating subjective norm and moderation effects. *Information and Management*, 44(1), 90–103.

Sentosa, I., & Mat, N. K. N. (2012). Examining a theory of planned behavior (TPB) and technology acceptance model (TAM) in internet purchasing using structural equation modeling. *Journal of Arts, Science & Commerce*, 2(2), 62–77.

Shore, J. (2006). A dose of telemedicine saves lives, cuts costs. *Network World*, 23(7), 53–55.

Suchetcka, D. (2012). Ohio company HealthSpot® creates the doctor's visit of the future with the Care Station. Retrieved from http://www.cleveland.com/healthfit/index.ssf/2012/07/ohio_company_creates_the_docto.html.

Stanberry, B. (2016). Legal and ethical aspects of telemedicine. *Journal of Telemedicine and Telecare, 12,* 166-175.

Student Health and Wellness Center (2016). Student health and wellness center: Clinics and programs. Retrieved from http://sites.jcu.edu/healthcenter/pages/clinics-and-programs/.

American Hospital Association (2015, January). The promise of telehealth for hospitals, health systems and their communities. Trend Watch. Retrieved from http://www.aha.org/research/reports/tw/15jan-tw-telehealth.pdf.

Stellefson, M., Hanik, B., Chaney, B., Chaney, D., Tennant, B., & Chavarria, E. A. (2011). eHealth literacy among college students: a systematic review with implications for eHealth education. *Journal of Medical Internet Research*, 13(4), e102.

Teo, T. (2010). Examining the influence of subjective norm and facilitating conditions on the intention to use technology among pre-service teachers: A structural equation modeling of an extended technology acceptance model. *Asia Pacific Education Review*, 11(2), 253–262.

Teo, T. (2009). The impact of subjective norm and facilitating conditions on pre-service teachers' attitude toward computer use: A structural equation modeling of an extended technology acceptance model. *Journal of Educational Computing Research*, 40(1), 89–109.

Townsend, A. (2013). New UH Rainbow HealthSpot® station opens for pediatric care in Cleveland. Retrieved from http://www.cleveland.com/healthfit/index.ssf/2013/10/new_uh_rainbow_healthspot_station_opens_for_pediatric_care_in_cleveland.html

Tubaishat, A., Aljezawi, M., Al-Rawajfah, O. M., Habiballah, L., & Akhu-Zaheya, L. M. (2016). Exploring changes in nursing students' attitudes towards the use of technology: A four-wave longitudinal panel study. *Nurse Education Today*, 38, 101–6.

Verhoeven, F., Tanja-Dijkstra, K., Nijland, N., Eysenbach, G., & van Gemert-Pijnen, L. (2010). Asynchronous and synchronous teleconsultation for diabetes care: A

systematic literature review. *Journal of Diabetes Science and Technology J Diabetes Sci Technol*, 4(3), 666-684.

Versel, N. (2016). Why did HealthSpot® fail? The telemedicine industry weighs in. Retrieved from from http://medcitynews.com/2016/01/healthspot-fail-telemedicine

Von Ah, D., Ebert, S., Ngamvitroj, A., Park, N., & Kang, D. (2004). Predictors of health behaviours in college students. *Journal of Advanced Nursing*, 48(5), 463-474.

Werch, C. E. C., Bian, H., Moore, M. J., Ames, S., DiClemente, C. C., & Weiler, R. M. (2007). Brief multiple behavior interventions in a college student health care clinic. *Journal of Adolescent Health*, 41(6), 577-585.

Wechsler, H., & Nelson, T. F. (2008). What we have learned from the Harvard School of Public Health College Alcohol Study: Focusing attention on college student alcohol consumption and the environmental conditions that promote it. *Journal of Studies on alcohol and Drugs*, 69(4), 481-490.

Weinstein, R. S., Lopez, A. M., Joseph, B. A., Erps, K. A., Holcomb, M., Barker, G. P., & Krupinski, E. A. (2014). Telemedicine, telehealth, and mobile health applications that work: Opportunities and barriers. *American Journal of Medicine*, 127(3), 183-187.

Wilson, L. S., & Maeder, A. J. (2015). Recent directions in telemedicine: Review of trends in research and practice. Healthcare Informatics Research, 21(4), 213–222.

American Telemedicine Association (2012). *What is Telemedicine?* Retrieved from http://www.americantelemed.org/main/about/about-telemedicine/telemedicine-faqs.

Whitten, B., & Buis, L. (2008). Use of telemedicine for hemodialysis: Perceptions of patients and health-care providers, and clinical effects. *Journal of Telemedicine and Telecare, 14,* 75-78.

Whitten, P., & Sypher, B. (2006). Evolution of telemedicine from an applied communication perspective in the United States. *Telemedicine and e-Health*, *12,* 590-600.

Whitten, P., Cook, D., & Cornacchione, J. (2011). Telemedicine: Reviewing the past, looking toward the future. In Theresa, T. L., Parrott, R., & Nussbaum, J. F. (Ed.). In *The Routledge handbook of health communication* (pp. 84-99). New York, NY: Routledge.

Appendix A


Figure 1. HealthSpot® kiosk Promotional Flyer**.**

Appendix B

Table 1

*Theory of Planned Behavior Survey Items for HealthSpot® Kiosk Use*

| Construct | Medium | Item |
|---|---|---|
| Knowledge | HealthSpot® | Have you heard about the HealthSpot® kiosk? |
| | | Are you aware that there is a HealthSpot® kiosk in the JCU Health & Wellness Center? |
| | | How did you hear about the HealthSpot® kiosk? |
| Use | HealthSpot® | In the past 12 months, how many times have you used the HealthSpot® kiosk®? |
| | Face-to-Face | In the past 12 months, how many times have you visited a physician? |
| Attitudes | HealthSpot® | I think the HealthSpot® kiosk is a beneficial resource. |
| | | I think that using the HealthSpot® kiosk is wise. |
| | | I feel that using the HealthSpot® kiosk is valuable. |
| | Face-to-Face | I feel that visiting the doctor is beneficial. |
| | | I think that visiting the doctor is wise. |
| | | I feel that visiting the doctor is valuable. |
| Intention | HealthSpot® | I intend to use the HealthSpot® kiosk. |
| | Face-to-Face | I intend to visit the doctor regularly. |
| Subjective Norms | HealthSpot® | My family members would think using the HealthSpot® kiosk is beneficial. |
| | | My close friends would think that using the HealthSpot® kiosk is beneficial. |
| | Face-to-Face | My family members think that visiting the doctor is beneficial. |
| | | My close friends think that visiting the doctor is beneficial. |
| Perceived Behavioral Control | HealthSpot® | I know how to access the HealthSpot® kiosk. |
| | | It would be easy for me to access the HealthSpot® kiosk if I wanted to. |
| | | I know how to use the HealthSpot® kiosk. |
| | | I am able to use the HealthSpot® kiosk if I want to. |
| Normative Beliefs | | Generally speaking, I do what my family members think I should do. |
| | | Generally speaking, I do what my close friends think I should do. |

*Note.* HealthSpot® delineates items soliciting thoughts about the HealthSpot® kiosk. Face-to-Face indicates items asking about traditional in-person healthcare visits.

Appendix C

Table 2

*Demographic Characteristics*

| | Sample Population | | JCU Population | |
|---|---|---|---|---|
| Ethnicity | *n* | % | *n* | % |
| Asian | 5 | 4.85% | 60 | 1.63% |
| Black or African American | 6 | 5.83% | 192 | 5.23% |
| Hispanic | 5 | 4.85% | 108 | 2.94% |
| Multi-racial | 4 | 3.88% | 77 | 2.10% |
| White or Caucasian | 82 | 79.61% | 3083 | 83.94% |
| No response | 1 | 0.97% | 54 | 1.47% |
| Total | 125 | 100.00% | 3673 | 97.30% |

*Note.* Remaining 2.70% (n = 99) of JCU population consists of "Non-resident Aliens." This was not included as an option in the survey and, therefore, was not included for comparison.

Appendix D

Table 3

*Free-Text Responses to Question "What are your thoughts about the HealthSpot® kiosk®? (n = 25)*

| Barrier/Theme | Response |
|---|---|
| Attitude (+); Knowledge AB | Great idea- wish it was marketed more |
| Attitude (+); Knowledge AB | I would love that. They should make it more well-known. |
| Attitude (+); Knowledge AB | I did not know about it, but it seems like a great resource for students who have not established local care. |
| Intention (+); Knowledge AB | I have not seen it at JCU, but if the situation arose I would probably use it. I have seen something similar to the HealthSpot® kiosk at the Cleveland Clinic. |
| Knowledge AB | I don't know what it is |
| Knowledge AB | Have received not information whatsoever about this kiosk, besides what was given now |
| Knowledge AB | I think it's a wonderful idea/device to have on campus. If only I had known more about it earlier in the year… |
| Knowledge AB | Unsure if its results/information |
| Attitude (+); Prefer SMV | I think it's a great option but would prefer to actually see the doctor. |
| Attitude (+); Prefer SMV | Beneficial for somethings but not necessarily to replace in-person visits for all health concerns. |
| Attitude (+); Prefer SMV | I can see why people would use it but I would rather just have a Physician on campus |
| Attitude (-); Prefer SMV | I do not see the value when we have physicians visit campus. I think the funds that pay for the kiosk would be better served by increasing the hours the physicians are on campus. |
| Attitude (+) ; Access AB | I used it once and really liked it. The only issue in general with the health center is the insane wait. I think I went like 2.5 hours there. |
| Access AB | It's not accessible enough to students. |
| Attitude (+) ; Intention (+) | I think it's a great resource for students and I definitely plan on using it if I need to in the future! |
| Attitude (+) | I think it is beneficial and wise. It is the way of the future. |
| Attitude (+) | I think it's great for students who do not have a transportation to get to a doctor! |
| Attitude (+) | Haven't need to use it this year, think it is beneficial though |
| Attitude (+) | Have done it once last year. Was pretty helpful for the situation but have not been since |
| Attitude (+) | Good idea but I don't think the technology would be that evolved yet |

| | |
|---|---|
| Attitude (+) | I think it's a great idea/resource in theory, but I don't know how many college students would realistically use it. |

*Note.* (+) Denotes positively valenced comment. (-) Denotes negatively valenced comment. Prefer SMV indicates that the comment showed a preference for standard medical visits (SMV), or face-to-face interactions with healthcare providers, over the HeathSpot® kiosk. AB stands for "as barrier."

Appendix E

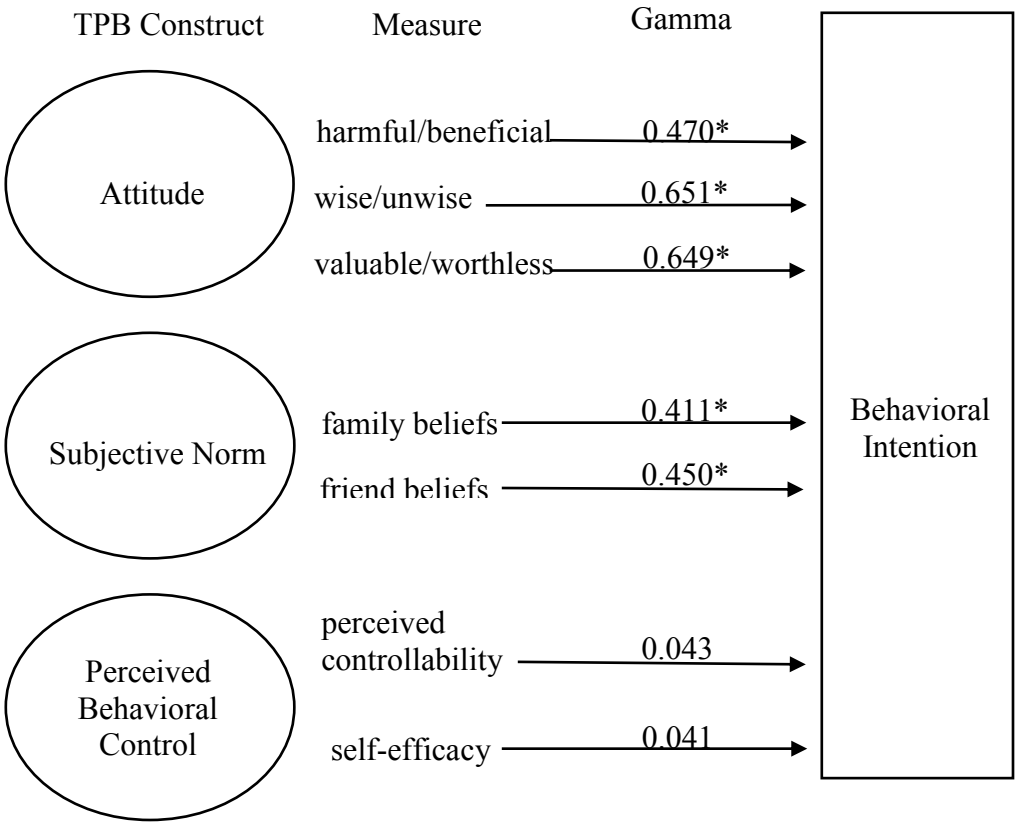



Figure 2. Theory of Planned Behavior Model. Results of correlation analysis. * Indicates significant association between variable and behavioral intention with $p < 0.01$.