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The application of telemedicine to college health at a four-year university and community college

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The application of telemedicine to college health at a four-year university and community college

By

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Abstract

WU, MATTHEW The application of telemedicine to college health at a four-year university and community college
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Telemedicine has been proposed as a mechanism to provide health care over a distance through telecommunication technologies. Through this platform, providers can deliver preventative, diagnostic, and therapeutic services, in addition to patient education and assistance with self-treatment. The most prevalent model in the industry is using telemedicine as a first-contact emergency medical service for acute illness. This study investigates the potential application of telemedicine in providing emergency medicine for college student populations in higher-level education settings. Based on prior review of the body of literature, college students are found to be generally healthy but face disparities in accessing health care largely depending upon socioeconomic background; however, little has been previously written about community college student health specifically. Interviews were conducted with three college health providers from a four-year college and a community college in the eastern United States to assess how telehealth services may address the health needs of their respective student populations. Additionally, interviews were conducted with two administrative staff from a regionally based telemedicine company to evaluate its telehealth models for college health. The qualitative data suggest telemedicine can be an effective tool for increasing access to care on college campuses, especially in addressing the ambulatory conditions that commonly define college populations. Telemedicine services can provide affordable supplemental services for four-year colleges that provide health services during the hours the health centers are closed. However, it is unclear if telemedicine would be able to function as a primary mechanism for a community college for the provision of healthcare due to financial barriers. Financial resources may need to be provided by the state to provide community college students with access to telemedicine. Further quantitative study is necessary to accurately characterize college student health needs beyond administrative reporting and to assess the potential factors influencing adoption of telemedicine

Chapter 1: Literature Review

1.1 Background and Introduction: Telemedicine is a relatively novel approach to providing health care over a distance through the use of communication technologies such as telephone, Internet two-way video conferencing, and remote diagnostic systems. Medical organizations increasingly have looked to utilize telemedicine to expand access to care for its patients as it eliminates barriers of travel and distance. Potential benefits include greater access to care for disadvantaged population groups (rural, low socioeconomic patients), cost savings in lowered administrative overhead, and improved health outcomes as result of enhanced continuity and immediacy of care (Damaerschalk et al. 2010). The rising prevalence of telemedicine in the health care system has been met with interest, resistance, and legal battles from stakeholders.

Telemedicine has been recently investigated as a viable solution to provide health care on college campuses. The college student population is generally healthy, primarily reporting acute conditions as result of injury or illness (Turner and Keller 2015). However, little is known about college student access to health care resources overall, especially for community college students who compose nearly 45% of the total undergraduate population nationally (American Association of Community Colleges 2013). Further, while many private colleges have accredited health centers on campus, the high majority of colleges do not offer medical services to its students. Students therefore must find medical care in the absence of college services or during the hours that the health centers are closed. Telemedicine may offer a mechanism for students to access health providers in these situations of medical deprivation.

The presented thesis researches the current characterization of college student health in both the four-year university and public community college populations through literature review and gathering of qualitative data. Subsequent sections will investigate available telemedical systems and its appropriateness for the college setting.

1.2 College Students

1.21 Introduction to college students as a demographic:

According to the United States Census, over 23 million adults are enrolled in a college or university (US Census 2013). Although the typical college student attends a four-year university, many also enroll at other secondary institutions like online, vocational, or community colleges. In fact, 45% of the current undergraduate population attends a community college (American Association of Community Colleges 2013). College enrollment numbers overall have increased for the past decade and are projected to increase in the future. This implies that the demographic of college students and according health needs will continue to diversify.

Unfortunately, the health profile of the nation's college students is poorly characterized. Most of the representative data characterizing the demographics of college students and college health services is gathered from research conducted in the 1990s, which saw dramatic increases in state and private funding for school-based health centers (Fingar 1989; Keaton and Brindis 2012). At the time, there was major interest on local and national levels to build a network of health centers dedicated to treating students of all ages, and research was needed. However, there is a lack of published articles from recent years that profile the health status and needs of the current college student population. The literature features studies that present clinical data that are limited to single schools or areas as isolated case studies (Boynton Health Service 2015; Dorman and Christmas 2002) or multi-site studies that only investigate a single condition (Blanco 2008). Further, response rates to national studies have been suboptimal from both college health centers and students (Giovenco 2016). Yet there is an explicit need for continuity and timeliness when analyzing this population. In the last twenty years, the health needs of college students expect to have shifted. For example, major reforms like the Affordable Care Act (ACA) has changed insurance coverage eligibility, expanding the

ability to be covered under a parent's employer insurance until the age of 26 (Giovenco 2016). Therefore, the current literature does not suffice in describing the state of the college population relying upon single case studies or summarizing single conditions. There is a need for more robust research that can characterize the health profile of college students.

The most current representation of college health is the College Health Surveillance Network (CHSN), which offers patient clinical data from a sample made up of 23 schools. The data areis derived from de-identified electronic health records (EHRs) from student health services at 22 self-classified Research Universities – 7 are not-for-profit, 16 are public. All universities are members of the American College Health Association (ACHA), which is the leading professional organization for college health practitioners. From the available CHSN data, sixty percent of visits were for primary care issues, 13% for mental health, and 9% for vaccinations. Females were found to use the health services more than males, and students attending private institutions accessed the health center at a higher rate than those attending public institutions. Additionally, ethnic minority groups and those under 18 show higher rates of utilization of health services(Turner and Keller 2015). Yet the CHSN cannot be considered fully representative of the nation's college student population since the network does not include community college students, a significant portion of the population.

The National College Health Assessment (NHCA), which is managed by the American College Health Association (ACHA), is currently the most widely used survey by researchers. Though the reference group is not complete and does not include community college students, 16,000 respondents from 24 universities of diverse backgrounds provide valuable data for researchers. The responses are published yearly, with the most recent data corroborating data from the CHSN. The Spring 2016 survey reports that greatest proportion of college students seeking medical care at their respective on-campus health centers in the past year generally require primary care services (19% for

allergies, 16% for back pain, 15% for sinus infection, and 10% for urinary tract infection). Seven percent of students at these private universities sought mental health services for Attention Deficit and Hypersensitivity Disorder (ADHD) this past year, which had the greatest incidence of any mental health condition. The NHCA further corroborates that college students as a population experiences little chronic disease, with only 5% of the population reporting being diagnosed in the last year. Interestingly, college students reported in the NHCA sample have high rates of receiving vaccinations for conditions such as Hepatitis B, Influenza, and others (50-80% of the population), but accessed fewer screening tests such as gynecological or mammary exams (40% of the population).

While the NHCA is reported yearly and the CHSN is constantly being updated, , many trends most likely remain unchanged. College students still access healthcare on a different schedule than the usual consumer. With the onset of disease, a student may choose to delay visiting a health center until his/her study schedule is more permissible or will wait until the weekend is over because many health centers are only open during the week. Some childhood infectious diseases, like the Epstein-Barr virus and mononucleosis have delayed onset that arise during the college years. Infectious genitourinary system and sexually transmitted diseases (STDs) are common as well, with two-thirds of STDs occurring before the age of 25. Chronic diseases sometimes begin at the college stage. Asthma, a major cause of college abseentism, recurs commonly in at the college age (Turner and Keller 2015).

Moreover, the CHSN and NHCA confirm that these health themes described in the most recent comprehensive survey of college health from 1997 have been largely maintained. Grace (1997) found that the most common diagnostic categories of college health center visits were prevention related services (contraceptive management, STDs, physical examinations for athletics), respiratory conditions such as asthma, and then ICD-9 non-specific categories (skin disorders primarily). The fourth highest category comprised of non-sexually transmitted infections, like the flu. Mental health followed as

the fifth significant diagnostic category, with the highest number of visits per patient (average 4.9 a year). Taken in context, the high frequency in these categories may be expected in today's college setting as well, where living in close quarters continues to provide an environment for the spread of communicable disease. Further, given the age demographic, chronic disease (excluding respiratory conditions) most likely is still infrequent in this population (Grace 1997; Turner and Keller 2015).

Though there is a paucity of research summarizing college health status, the most current, nationally representative research primarily focuses on diagnosing health behaviors, which describes the conscious choices individuals make that impact their health. Perhaps this focus is prevalent because people this age are generally healthy (85% of students report that their health is good, very good, or excellent in the National College Health Assessment (NHCA) survey); and therefore, the incidence of acute illness or disease may be mostly self-inflicted by behaviors of drug use, sex, and lifestyle rather than infection. Indeed, many research studies focus on quantifying behaviors such as binge drinking, drug abuse, unsafe sex, and domestic violence, which can all require medical resources for this population. As such, the research approaches college health needs with a prevention mentality, aiming to curb health needs by addressing behavioral sources. There are three nationally representative studies that examine certain health behaviors. First, the Harvard School of Public Health's College Alcohol Study (CAS) administered its survey to 179 institutions with 15,000 student respondents to quantify alcohol use amongst college students. But the survey population was limited to traditional students attending four-year universities, excluding non-traditional students from the study. Second, the Centers for Disease Control administered the National College Risk Behavior Survey, which was conducted as a mail survey for 150 institutions. However, the NCRB survey has not been repeated since its debut in 1995. Third, the National College Health Assessment (NHCA), which is managed by the American College Health Association (ACHA), is currently the most widely used by researchers. Yet the ACHA recommends

that the respondent population be used as a "reference group" (AHCA 2016), since the institutions are self-reporting (Giovenco 2016)

1.22 Community College Students

Community college student demographics differ heavily from traditional four-year students, and the students thus have far different health needs.

Community colleges are less expensive than universities and tend to have schedules that accommodate older students with full-time jobs or families. Moreover, younger or less-prepared students attend community colleges as result of less stringent admission requirements. Students with lower academic records and difficulties in earning a high school diploma often have spurious commitments, such as having children at a young age. When compared to traditional universities therefore, the community college demographic represents students from lower socioeconomic background, part or full-time employees, and individuals with dependents (Bailey et al. 2005). Forty percent of students are employed full time, most often in low-income jobs, and expectedly are older on average. There is also a higher representation of minorities in community colleges (Laanan 2000). These demographic traits of the population place this portion of students at higher risk for poor health outcomes (Bailey et al. 2005).

Additionally, research indicates that there are significant differences in health behaviors between community college students and students at four-year universities. There is evidence to suggest that community college students are more likely to be regular cigarette smokers, though community college students also self-report lower rates of binge drinking when compared to four-year university students (Heller and Sarmiento 2016). The latter may be explained by the absence of on-campus residences and fraternities on community college campuses. There is also disparity in nutrition between university students and community college students. Nelson et al. (2009) found that poorer nutrition and dietary intake was still significant for community college students even when

controlling for socioeconomic status, race/ethnicity, and living arrangements. There is also evidence of higher incidence of risky sexual behavior in community college student populations (Trieu et al. 2011).

There has been little research to fully characterize the health profile of community college students (Pokhrel et al. 2014). This mostly has to do with access to students, since most commute. Presumably, the best method would be to access present students in the classroom. But there are also operational difficulties with this tactic, mainly resistance from the professors who are unwilling to give up class time. Current methods of recruitment and data collection often use short surveys distributed by email, though the response rate is generally low. The paper-and-pencil method in class assures participation, but also faces the problem of convenience sampling. Further, a portion of community colleges do not offer on-campus health services and therefore have no method of being able to collect health data from its student body. This is contrast to four-year universities, which are able to quantify health data from health center records. Again, more research is needed to characterize the health profiles of community college students.

1.23 Student insurance

According to a recent national study conducted by the United States Governmental Accountability Office in 2008, around 20 percent of college students are uninsured (GAO 2008). Zelman (2014) explains the reasons for the uninsured status of young adults from 18-24. They have relatively low levels of employment, with many of those jobs being low wage. Many are full-time students. Also, because most college students do not have children, they cannot access Medicaid.

The Affordable Care Act (ACA) may provide opportunity to college-aged individuals to enroll in insurance. In fact, the enrollment of college students drives the success of universal healthcare, since without this population, insurance would be covering primarily the older and sicker. While recent government data indicate that the

United States uninsured population has fallen from 20.3% to 13.2% and that 3.6 million more college students are now covered (ASPE 2015), several million still are without health insurance (Young Invincibles Website 2016). Even for those that are able to stay under their parents' insurance plans until the age of 26, the family will incur greater costs through higher deductibles. This has led to a greater demand for school based health plans, which may offer a more affordable alternative for basic care. Yet even these may be insufficient, as four-year colleges offer these school-based insurance plans at a much higher rate than community colleges (Bailey 2005). It is unclear how students obtain medical services without adequate insurance coverage, and additional research is needed to accurately portray how this particular segment of the college student population behaves.

1.3 College Health Centers

1.31 Introduction to the College Health Center (CHC):

Eighty percent of four-year colleges offer direct healthcare to their students, often through an established college health center (CHC). The complexity of the care that CHCs offer varies but includes primary care services up to multidisciplinary services. The emphasis of the CHCs is on providing primary care and in the last ten years, offering preventative and reproductive services. The range of services is heavily influenced by whether they are 1) housed in a private or public institution, 2) part of a large or small campus community 3) located in an urban or rural setting, and 4) provided with resources from the campus administration (Brindis 1997). These described circumstances directly affect CHCs because each factor into the institution's resource allocation toward health services. Larger and private universities in urban areas are more likely to offer comprehensive services, while smaller, public institutions are less likely to provide similar services due to less school funding (Anderson et al 2010). Overall however, the

most common services revolve around ambulatory care, health education, sports medicine, and occupational and environmental health. At the community college level, the services are generally more limited in scope. This is possibly due to the majority of students commuting to community colleges and thus may not need to access care on-campus as eagerly. However, more research is needed to accurately assess the state of community college health centers (Katz and Davison 2014).

The campus CHC has been looked to as a model for providing comprehensive care, acting as a convenient location for primary care that encourages preventative and holistic health. In fact, these health centers often pioneer pilot programs that aim to increase health literacy and participation (Fulop 1996). CHCs are also at the forefront of creating education programs that addresses alcohol or tobacco abuse, unsafe sexual behavior, and mental illness. This is largely a result of the unique placement of CHCs. Health centers are able to simultaneously reach students, the overall campus community, and the broader medical community of local hospitals and providers. Further, the college setting provides a favorable setting to conduct preventative health research. Since college students demonstrate a high frequency of risky health behaviors and are also easily accessible, public health researchers have looked to employ programs that may extrapolate to the larger community. Additionally, since this age group is relatively adept with technology, many Internet-based solutions have been attempted in the college setting (Ickes and Cottrell 2010). These intervention programs coincide with a general movement by college campuses toward encouraging holistic and healthy lifestyles for its students, evidenced by the increase in auxiliary services like mental health or dietary programs (Pedrelli et al 2015). Thus, college health provides an ideal setting for experimenting with primary care delivery and promoting preventative health.

1.32 Staffing

It is common for CHCs to employ nurse practitioners as the licensed medical professional. In fact, in 1991, the American Nurses Credentialing Center (ANCC) recognized college nursing as a professional subspecialty thereby acknowledging the importance of nurses working with college students. In addition, many college health nurses have residents complete rotations in higher institution settings (Crihfield 2011). Yet, some centers also employ physicians, physician assistants, psychiatrists, and therapists to offer mental health and specialty services. As many as 27,000 individuals, including approximately 3,000 physicians, work in CHCs across the nation - though these statistics are not recent (Patrick 1988). The variation in staff size largely corresponds to the size, location, and type of college. For example, the average staff of a small, rural state-related institution was found to be around two professionals. In contrast, a large public institution will employ an average of 99 professionals in its health center (Christmas 1995). The role of medical professionals in the college health network is not limited to providing care however. With a focus on promoting healthy lifestyles, CHC medical professionals also innovate education strategies and health programs for their students. These health programs can be shaped specifically to address the student demographic of the college. It should be noted, however, that much of the evidence summarizing the current college health professional workforce is not from a recent time period. Additional research is needed to document the state and makeup of college health professionals.

1.33 CHC Financing

Approximately 10 million students make 20 to 25 million visits to CHCs a year, at a cost of $1.4 billion, though this total cost has most likely increased significantly over the last twenty years (Brindis 1997). CHCs struggle with limited resources, especially those whose parent institutions are financially strained. These institutions are most often

smaller, rural, and public colleges, which expectedly struggle because of lower financial revenue, providing support to students from poorer socioeconomic backgrounds, and less support from their respective states. Another obstacle for the financial health of CHCS is that of the current managed care marketplace: CHCs compete against student managed care plans. Since many students remain under their parents' health plans, CHCs are limited when students must find outside health providers. Further, there exists a philosophical difference between CHCs and managed care plans. CHCs aim to encourage ample access to holistic well-being and health promotion, which requires frequent points of contact and screenings. Managed care plans, on the other hand, must remain efficient and focus on minimizing costs, though historically they have aimed to emphasize prevention services as well to meet this end. 1991 survey indicates that 85% of the funding for college health services was prepaid, with 46% of college general funds and 39% from separate student fees. The remaining was made up from service fees from clinic visits and grant funding or donations (Blue Cross Blue Shield Southeastern Institute of Research, 1991). Yet, in recent years, student fee revenues have increased, since many common services like injections for allergies, vaccinations, or minor procedures are now charged to the student. In contrast to 4-year universities, community colleges rely almost exclusively on student health fees. Thus, the number of students enrolled in the college health plan directly dictates what services can be offered. Average health fees vary depending on the type of school and location. Health fees can range from $40 to $2,500 a year (Robinson 2014).

In the modern era of health reform, CHCs must create strategies to finance against other managed care plans. The first problem of financing relates directly to an increase in the prevalence of HMO and managed care plans. CHCs must create contractual relationships with outside care plans since most college students primarily use parental, spousal, or third party insurance. CHCs must use managed care if they are to qualify as healthcare providers for these plans. Further, medical organizations as a whole are

aligning themselves into large conglomerates to remain fiscally competitive. Since the CHC acts most often only as a first-contact clinic offering basic ambulatory care and do not offer specialty services, they must begin to create medical networks of their own with outside providers. Doing so may also allow CHCs to carve a niche in providing first level basic ambulatory services and then referring to an external medical network. However, for this strategy to be successful, CHCs must develop their services to be increasingly accessible to students. Finally, another expected solution to financing college health is the use of mid-level providers more prevalently in order to minimize staffing costs (Christmas 1995).

1.34 Community College CHCs:

Historically, community colleges provided education for students coming from lower socioeconomic backgrounds. Community college students also differ heavily from students that attend universities in the distance that they live from campus, as well as being older on average (Lindenbaum et al. 1981). Most community colleges do not have established college health centers on-site, and offer even less for mental health services. Unfortuately, data for the precise proportion of community colleges that have on-campus health centers is unavailable. The American College Counseling Association Community College Task Force (2010) found that 95% of community colleges do not offer on-site psychiatric services. Very little is known about the health needs of community college students, especially since they have a diverse set of locations (rural vs. urban), local medical care options, and student demographics. This is partly due to a lack of self-reporting, as traditional university students were found to be much more willing to report health problems than community college students (Katz and Davison 2014). Further, community colleges also are unequally funded. With diminished access to resources relative to university counterparts and a lack of research characterizing their students, minimizing the amount of health services provided has commonly been a choice made by

community colleges (Lindenbaum et al. 1981). This trend may not continue in the future, as community college enrollment has increased over the past ten years, and is projected to continue increasing (Katz and Davison 2014). Increased enrollment generates revenue for community colleges, allowing them to have more flexibility in spending for student services.

1.4 College Health Centers and Mental Health:

Mental health problems are common in college students. This may be due to the characteristics of the group, who are young and are in a stressful environment. Almost 75% of those who will have a mental health disorder have their first onset under the age of 25 (Kessler 2005). Anxiety disorder is the most prevalent psychiatric problems, with 11.9% of college students. 7-9% of the population is diagnosed with depression. Additionally, suicide is the third leading cause of death amongst young people. Downs and Elsenberg (2012) conducted surveys of students at 26 campuses, and found that 6.7% of students reported suicidal ideation. Moreover, Eisenberg (2011) also finds that amongst students with mental health problems (32% of the sample), only 36% received any treatment in the past year. Encouragingly, research has increasingly focused on the issue of mental health in colleges, and has incurred many new programs (Blanco, 2008).

However, there is still a paucity of mental health research that focuses on community college students specifically, despite authors identifying community college underrepresentation in the literature (Cohen 2008). The existing literature suggests that the differences in demographic traits – lower SES, older, ethnic minorities – are associated with an increase of stress and adversity (Dohrenwend 1998). The most comprehensive study to date is the national survey administered by the Community College Task Force and American College Counseling Association in 2010. Counselors reported the primary

problems were stress, depression, anxiety disorders, academic disorders (<80%), crisis intervention (60.6%), loss/grief (57.6%), bipolar disorder (43.9%), substance related disorders (30.9%), sexual abuse (28.8%), ADHD (27.3%) and non-suicidal self-injury (25.8%), and addiction (15.2%). Percentages indicate the proportion of counselors believing the mental health condition to be a primary problem for college students. The survey also noted that a significant difference in mental health resources between universities and community colleges. Almost 95% of community colleges do not have contracted on-site psychiatry services when compared to 58% of universities.

Katz and Davison (2014) note that based on the ACHA-NCHA sample, community college students were less likely to report diagnosis of or treatment of depression or anxiety. However, community college students were more likely to report diagnosis or treatment for schizophrenia, substance abuse, and addiction. The authors note that these differences may be due to reporting variation or differential access to mental health resources. A conclusion that may be drawn from preliminary data is that community college students may be less likely to seek and receive help with mental health problems, though a much higher proportion may meet the criteria for depression and anxiety (Stuber and Otto 1995). The lower rates of seeking mental health services are particularly understandable for community college students that often have to seek outside services external to the college. Yet, community college students were more likely to report severe concerns, including schizophrenia, bipolar disorder, substance abuse and addiction, in contrast to university students. This is consistent with the literature that the more severe mental health issues correlates with the lower socioeconomic demographic. An explanation for these conflicting reporting rates may be that the incidence of mental health conditions are relatively constant when comparing community college students and university students, but barriers of travel prevent poorer students from seeking help for less severe conditions. Experiencing more severe conditions may supersede these barriers

and force community college students to finally access health care, though a high proportion of these students may meet criteria for anxiety and depression anyways.

The first dedicated mental health services on a college campus began at Princeton University in 1910. This initiative was in response to observations of students taking time off from school due to mental issues. During that century, college campuses began to recognize and develop programs to keep students from withdrawing and preventing worsening symptoms (Kraft 2011). However, mental health services on college campuses are still largely inadequate. A lack of diagnosis, acknowledgement of mental health symptoms, and necessary treatment is extremely common in college health settings. Zivin et al (2009) reports that less than half of all college students that demonstrate mental health problems persisting over two years received any form of treatment. Similarly, the Healthy Minds Survey provided consistent findings. The online survey showed that only half of the college student population received adequate treatment for depression (Eisenberg 2011). This gap in mental health services can be attributed to a severe lack of mental health services found on campuses. In fact, only 16% of CHCs have integrated mental health counseling centers into the on-site (Brindis 1997).

A secondary reason for the lack of mental health treatment is student illiteracy about the services a college may provide. Some studies report that even for the campuses with mental health counseling, only 5% to 25% of students take advantage of the available services during their time attending the college (Brindis 1997). Yorgason (2008) reports that 30-60% of students are unsure of the counseling services offered by their campuses, with 14% mistaking mental health services for career guidance counseling. The primary reasons that students have not used mental counseling services were 1) not having enough time 2) lack of knowledge about counseling services 3) embarrassment in using services 4) lack of belief that services would help. (Yorgason, 2008).

However, a significant trend during the last 40 years that has influenced the mental health field has been the growth and sophistication of health education. Medical

professionals have increasingly partnered with health education specialists to reach college communities through various means. Thus in response to health illiteracy, CHC medical professionals and education specialists has increasingly used Internet and web-based resources to spread awareness. This is especially important in reaching students that do not live on-campus. There is little consistency across programs, but each aim to increase contact with students. An example of such a program might be sending health reminders through the student's school account, or sending relevant health information through email.

1.5 Telemedicine

1.51 Introduction of Telemedicine:

Recent advances in information and communication technologies have created unprecedented opportunities for delivering healthcare overall. Telemedicine is broadly defined as providing health care over a distance by the use of communication technologies, such as phones, video conferencing, or remote diagnostic systems. While the integration of health technology into organizational systems has been a slow process, the World Health Organization has stated that its member states should "integrate the appropriate use of telematics in overall policy and strategy for the attainment of health for all in the 21st century...so that public health development are made equitably available to all people everywhere. " (WHO 2016). Though global development of telemedicine is still in infancy, international and domestic cases provide examples of telemedicine benefits.

European countries, like the United Kingdom, have demonstrated strategies to incorporate information technology into its healthcare delivery, setting precedent for other industrialized countries. The National Health Service (NHS) responded to its increase in population and its growing elderly population by shifting resources to more efficient delivery by moving to virtual platforms. In fact, according to UK Health

Minister Andrew Lansley, 80% of the face-to-face consultations occurring throughout the NHS are unnecessary. He estimates that moving just 1% of face-to-face meetings, which are most often simply basic checkups, would save the NHS over 250 million pounds a year (Hall 2011). For the past few years, the NHS developed initiatives and programs for its subunit trusts to encourage adoption of telemedicine.

Other countries with greater rural populations, such as those in South America and Africa, have also examined the use of technology to supplement undersupplied healthcare. At the moment, these telemedical interactions are largely doctor-to-doctor; for example, a pilot study had specialized physicians provide opinions for local practitioners on particularly complex cases via video monitor (Wamala and Augustine 2013). As retaining adequate levels of medical specialists in rural and underdeveloped areas is extremely difficult, telemedicine may be able provide these areas with greater access to specialty care. In fact, Doctors Without Borders estimates that telemedicine application to rural areas can help serve as many as four billion people around the world (Jarudi 2013). Interestingly, the NHS strategy to systematically integrate telemedicine into its care organizations derives from the United States Veterans Health Administration (VHA). As the largest publicly funded health system in the US, the VHA provides comprehensive care to over 23 million veterans a year. Facing similar issues as the NHS with a rapidly increasing elderly population, the VHA implemented the Care Coordination/Home Telehealth (CCHT) project in 2003. Its purpose was to coordinate the care of veteran patients with chronic conditions and to avoid unnecessary readmissions by use of telemedicine. The VA has trained over 5,000 staff to provide the CCHT, with an annual census of approximately 39,000 patients (Darkins 2008).

These recent attempts at integrating telemedicine demonstrate benefits for public health. Early returns of the CCHT program show a 25% reduction in number of hospitalization days, 19% reduction in readmissions, and a mean satisfaction score of 86% after enrollment into the program (Darkins 2008). The CCHT program also

demonstrates benefits for specialty care, especially in chronic disease treatment, by reducing hospitalization days and increasing prevention services (Chumbler et al. 2007). Out of these indicators, the most important performance improvement goal for the VHA is reducing the amount of readmissions within 30 days. Higher readmission rates within the VA have been associated with patients living a greater distance from an admitting facility, who also experience much higher comorbidity scores (Broderick 2013). The VHA CCHT program has provided a strong domestic example of the potential benefits telemedicine has to offer the US healthcare system.

In addition to the VHA system, many small specialty organizations have investigated potential telemedical benefits that can benefit their practices. A well-documented pilot study in Arizona, called STRokE DOC, described the use of video communication and remote diagnostic tools for rural acute stroke care. Results of the pilot reported that correct diagnosis was given for 87% of the consultations, with no statistically significant differences in mortality or intracerebral hemorrhage (Damaerschalk et al. 2010). Similarly, many other small case studies have reported that the there was no difference between face-to-face consultations when measuring correct diagnosis rates (Kahn et al. 2016; Zanaboni et al. 2012), quality of care provided (Kahn et al. 2016; Eron et al. 2004), or resulting health outcomes (Bashshur et al. 2014).

While telemedicine services can be reimbursed both from public and private insurances, the current payment systems make it difficult for organizations and providers to receive full returns on their investment. Telemedicine services are currently reimbursed by the Centers for Medicare and Medicaid. Medicare payment is established in Section 1834(m) of the Social Security Act as part of the Medicare fee-for-service payment program. Few states demonstrate parity in its health laws. Full parity in this context is classified as comparable coverage and reimbursement for telemedicine-provided services to that of in-person services (Thomas and Capistrant 2015). Only 23 states have enacted full parity laws, though many of these states have language that

restricts services or conditions that are covered by telemedicine. The lack of parity laws diminishes any financial incentive for providers to adopt telemedicine, since in-person visits are still more highly reimbursed. Furthermore, very few private insurance companies have reimbursement programs for telehealth services. Only 21 states require telehealth coverage by private insurances, and only a few large insurance companies pay for telehealth in some way (Thomas and Capistrant 2015). Moreover, the plans that do reimburse for telemedical services – both Medicaid/Medicare and private – base coverage on a limited set of health conditions, place restrictions on the settings of care provision, or exclude services of certain medical professionals (Thomas and Capistrant 2015). The eligibility restrictions and lack of parity creates financial barriers for any healthcare organizations, which constantly struggle with maintaining financial solvency. As health technology must compete with other capital expenditures, providers hesitate at committing resources to expensive technology. Moreover, telemedicine systems also require spending by the organization for maintenance and technical assistance. Thus, low reimbursement for physicians and health organizations for the use of telemedicine and exorbitant start up costs impedes the adoption of this technology.

Another significant barrier to adopting telemedicine is the lack of technical support for the technology's infrastructure. The healthcare industry attracts few individuals with the technical and clinical expertise to maintain an operational telemedical network. With scarcity of people able to lead, implement, and stabilize health technology, providers are crippled in their efforts to adopt telemedicine (Agency for Healthcare Research and Quality 2016). As result, staff turnover can be particularly damaging for the retention of continuity. Staff members versed in technology often assume multiple roles and develop broad expertise for their respective organizations, which can be extremely difficult to replace. The internal and external revolving door for technical experience significantly delays projects.

Lastly, a major but underreported issue slowing the advancement health technology is the prerequisite of having adequate broadband access. The entire range of telemedicine technologies depend on stable and functional broadband. And in many places, broadband remains expensive and unreliable at the speed needed for telemedicine operation. Researchers estimate that this "connectivity gap" – the unavailability of adequate broadband access by health professionals – exists for 7% of rural areas (Kaushal et al., 2015). Though Federal subsidies are available to medical organizations in purchasing Dedicated Internet Access options through the Rural Health Care Program (RHCP), which was established in the Telecommunication Act of 1996, the resources have been heavily underused (USAC 2015). Researchers suspect that the primary reason for the lack of utilization is the barriers of paperwork and selectivity of eligible providers. Further, the recent recommendations made in the 2010 National Broadband plan that proposed actions to ease the onerous application process and expand eligibility for the RHCP have yet to be implemented effectively (Kaushal et al. 2015). Therefore, the connectivity gap still prohibits any consideration of implementing high-speed telemedical services.

1.52 Telemedicine on College Campuses

The implementation of telemedicine on college campuses is currently driven by the private industry contracting with pioneering colleges (Children's Partnership, 2015). These programs are still in the initial stages and accordingly, research on their efficacy is not available. However, the potential of these telemedicine programs is attractive, particularly in providing timely medical access to students. Telemedicine is seen as a natural complement to existing college services, filling in when the health center is closed in the evenings and on weekends. Physician providers are able to be reached by virtual means 24/7 and are able to diagnose, treat, refer, and order prescriptions when necessary

(Rosato, 2015). Furthermore, telemedicine providers can help in preventative medicine as well as management of chronic disease (Children's Partnership, 2016). Students also seek convenience in accessing medical care without missing class or taking the time to visit a clinic. There may also be financial benefits to colleges, since hiring a physician would cost upwards around $300,000 and a nurse practitioner upwards of $120,000, while a telemedicine program may be in the range of $65,000 altogether (Wicklund, 2015). However, the cost of a program may vary by model. Some telemedicine programs are offered as private subscription services directly to families, while some are offered as part of the student's campus health bill. Other forms of telemedicine services may also include providing health information via Internet resources (Escoffery 2005) or screening students for their mood problems in order to anticipate anxiety or depression. A pilot program at the Massachusetts General Hospital used web-based resources to help students with mental problems access relevant information or to speak with a counselor. The program showed some cost-saving effects and improved outcomes in treatment seeking (Youn et al. 2013).

The national players in the industry are American Well and CampusMD. These companies have developed similar programs that employ physicians throughout the country. However, local companies have also engaged with nearby colleges. Local companies may be better positioned to effectively engage with school communities since they are able to refer to providers in the community, thus enhancing the continuity and familiarity of care. Yet, overall, research must be performed to assess the need, establish an implementation process, and evaluate the outcomes of these programs.

1.6 Research Question: There is opportunity to research the needs of college students, in both a four-year university and community college. First, there is a lack of knowledge of this population, especially since college students are extremely diverse in demographic characteristics. This is also due to limited opportunity to contact students who are immersed in busy schedules. Second, there are known gaps in college health provision. Although many four-year universities offer health services through on-campus college health centers, most community colleges offer only partial services. Even four-year universities' CHCs are closed in the evenings on and on weekends. Thus, students may not have access to medical care in these settings. Thirdly, available data characterizing college health is either outdated or focused on behaviors, rather than the health profile.

Telemedicine may offer supplementary services for college health. Its ability to provide timely and convenient access to care can fill in the gaps that currently exist. However, though the potential of telemedicine is attractive, the need for such services ought to be quantified. The research at hand must address the current needs of college students and identify if telemedicine services may be appropriate to address them. Further, there ought to be a comparison of student needs between four-year universities and community colleges as well. This thesis will examine whether telemedicine services can address the health needs of college students at a four-year university and community college.

The following chapter will provide qualitative data via interviews to characterize health needs in these college settings. Additionally, it will be investigated if telemedicine is an appropriate intervention for colleges.

Chapter 2
Methods

Two academic institutions and one telemedicine company in the eastern United States were selected for study. One institution is a four-year college with a health center that offers both ambulatory and mental health services on weekdays. The second institution is a community college. The community college does not currently offer health services to its students. Both are in close proximity to a tertiary hospital, urgent care center, and specialty services. Interviews were requested via email from health professionals employed at these institutions. The purpose of the project was explained and it was clearly stressed that participation was voluntary and confidential. Two of the three interviewees were affiliated with the four-year college. Interviews were also requested via email of health providers and administrative staff of a telemedicine company. Interviews were conducted with one provider and one administrative staff member.

Confidentiality was preserved by suppressing identifying characteristics in written and oral reports and using pseudonyms at all times. Interviewees were identified through number system with a guide on a private computer protected by passcode. Interviews were transcribed from original audio recording, if permission was granted to record the interview.

Interview questions aimed to discuss college student health needs and the potential application of telemedicine. Interview questions can be found in Appendix A (health providers) and Appendix B (telemedicine providers). Follow up questions were asked if necessary for clarification, but are not shown in the appendix. The Human Subjects committee at Union College approved the project.

Chapter 3
Results

3.1 Telemedicine

Two interviews were conducted with a telemedicine provider and administrative staff member from a telemedicine company that has been serving a regional area in the eastern United States. The staff member described the mission of the company to provide "Virtual primary care, virtual emergency care, and a virtual health center." The operational model functions as a first-contact medical service that can be accessed through electronic platforms at all hours of the day, all days of the year. Employers can purchase a yearly subscription for its employees and their families. Individuals who sign up independently pay a monthly subscription fee that provides access for the entire family. The service begins with a patient phone call to the phone line, which is returned in an average wait time of three minutes. The patient can choose to use phone or video camera to speak with a board-certified medical provider. Currently, the company employs licensed physicians, physician-assistants, and registered nurses.

Upon establishing contact, the provider will run through a typical emergency care check. One provider described this process this way, "let's say someone called with a cough. But then we ask if they have any other symptoms, and they are not short of breath and are able to speak in full sentences, their temperature is not above 98.6 degrees. So we can determine that the cough is non-productive." From an assessment of symptoms, the provider can pursue a few options. The first option, which is the most common, is to diagnose and treat the illness outright. The administrative staff member stated that almost 80% of the illnesses they see could be directly treated, for example, "a rash, UTI symptoms, the flu, pink eye, or strep throat. These are things that we can give you great advice for self-treatment or prescribe medications to your local pharmacy." Indeed, research has shown that most emergency room visits are unnecessary. Blue Cross Blue Shield conducted a study this past year that confirmed that 90% of emergency room visits were unnecessary with conditions that should be treated in other medical settings

(Macdonald, 2016), though other studies show statistics that range between 10%-40% (Honigman et al., 2013).

In the case of receiving a case that is considered too complicated for simple diagnosis, the telemedicine providers can order certain tests like XRays or urine samples to the local hospital, or direct you to appropriate higher level care. The provider describes, "we can make referrals to the providers that we have relationships with and know they can provide the right care. Or, if this is something like your gallbladder, you might need an ultrasound and not need surgery. So we can prep you before you go to the provider." The final step in the process is to follow-up to ensure the patient accessed the next appropriate levels of care. The telemedicine provider will call back the next day to ensure the patient has contacted a specialist or taken the necessary steps to access the correct treatment. The providers therefore also guide the patient through the medical process, which is particularly beneficial for nascent users of medicine.

The primary benefit of a telemedicine service is to provide timely access to care. Telemedicine is advantageous to alternative options like urgent care centers or emergency rooms since it removes the barriers of transportation, time, or expense. Telemedicine is an immediate service, providing first-contact with a provider in a drastically reduced time. Accessing an urgent care center or a hospital often requires the use of a car. Lacking access to a vehicle may force a patient to use alternative means like public transportation, which can be extremely inefficient and negatively impact the health of the individual in that waiting time. Many patients do not have enough medical literacy to understand which center to choose, or where to go as well. Attempting to travel during these periods of illness, especially when trying to navigate an unknown area or inclement weather, may introduce greater complexity to reaching the appropriate care. These barriers are further accentuated in rural areas that may have scarce health resources at a greater travel distance. The time to first contact is an important metric in delivering effective care in emergency medicine (Huang 2010), and travel barriers that deter patients can be eliminated.

The cost of a telemedicine service is also advantageous for the consumer and for the healthcare system as a whole. The subscription structure of a telemedicine payment plan removes the deterrence of accessing care because of price sensitivity, since the

monthly fee covers all utilization of the service. Patients that already have a sunken cost will utilize the service at a much greater rate than having to pay directly out of pocket, especially considering the exorbitant fees that are associated with an emergency room visit. This removes the need to weigh cost options when an incident arises. Furthermore, the financial investment in a telemedicine service is much cheaper relative to the options like the emergency room, urgent care center, or primary care physician. Whereas a telemedicine service can cost up to $12 a month, a single emergency room visit will cost on average $1,500, an urgent care center visit will cost $175 a visit, and an appointment with a primary care physician is $130 (Bicki et al. 2013). The financial savings are evident if a single emergency room or urgent care visit is prevented. One provider mentioned that as an emergency care provider, "we see patients every week, like a mom that has four kids. Thinking that each has ear infections. That's a lot of money for insurance companies. A lot of people work and don't want to go to the doctor's during the day, so they go to the ER after work. Especially those that can't afford to take two hours off during the day to drive a baby to the primary care whereas they can go after work with all their kids. People use emergency rooms for different reasons, and it's not cheap. It just works for them. I totally believe it would save money." The company staff member echoed this statement, describing, "One urgent care, one ER visit. One visit paid itself back. And that's just the dollar, not to mention the travel, the time, the soft benefits…it does cost you gas and money. And you still have to pay them the 100 dollars."

3.2 Four-year Colleges:

Two interviews were conducted at a four-year college The subjects were a provider at the college's health center and school administrator. The health center provider related a health assessment of the student population: "We see a lot of colds, flu, upper respiratory type of complaints. We see injuries periodically, a lot of urinary tract infections. We may see two or three injury type related things a day, and maybe 20 cough-related things a day. Mostly acute, minor, and injury-related….we have very little chronic disease." Overall, this reflects the health profile of college students, who are

generally healthy and do not demonstrate high amounts of chronic disease that may require complex medical care (Turner and Keller 2015).

Currently, the health center offers primary care and mental health counseling. The health center employs registered nurses, a part-time physician, and mental health counselors as providers. The health center is open for extended hours on weekdays and closed on weekends. Regardless of being generally healthy, the college population at this school demonstrates high utilization of the health center. In a recent academic year, the health center recorded over 1,600 unique patient counts and more than 5,000 total appointments made, which is an increase from years before. High utilization may be explained by the convenience of location; the health center is located directly on-campus. Further, the health center organizes programs that actively engage the student population. The provider said, "Sometimes the RAs and dorms will come up with ideas that they want us to come talk about, like nutrition or sexually transmitted diseases. We haven't done surveys in a while. We used to do them pretty often. In fact, we should be doing surveys soon. That way people can write in." The provider furthered, "We also hold programs and fairs to promote the wellness classes that students can participate in." Therefore, the health center has successfully integrated into the campus culture and is a primary option for students during the operational hours.

The provider also described the perceived health gaps that the health center has identified in the student population. They are particularly concerned about the lack of health services provided by the college after hours and on weekends. They conveyed that, "Access on weekends or at night time is absolutely zero…all the health services in that time is done off-campus. There is no plan in place other than to send students to the emergency room. It's not like they can talk to anybody or call anyone…except for athletes, who have a bit of a cushion, because they can see a trainer. But the ones not on an athletic team have nobody." However, they know that students often need health services on weekends, saying that the health centers sees a lot of students on Mondays who received treatment at the ER over the weekend. They said, "Weekends are mostly injury. Stitches, broken bones…I would say more serious than routine. Although we have seen students go for strep throat and urinary tract infection." They also said that students primarily utilize the emergency room rather than urgent care, because "some students

have a car and they are able to reach an urgent care, but many students do not. And campus safety is instructed to take them to [the local hospital] because they can only go so many blocks from campus. So they aren't utilizing urgent care, unless they have a friend that can drive them."

Another health gap that the provider and administrator both identified was the disparity in student health insurance. All students are required to have health insurance before they enroll in the college, which may be under the college's health insurance plan. However, there are disparities in the comprehensiveness and quality of insurance, which can impact access to healthcare. The health center provider related, "We once had a student that had an insurance that hardly paid for anything, and he had to make payments for a chest x-ray. He was trying to pay ten dollars a month for a whole cost of 700 dollars, which is ridiculous." The administrator also stated that while the school's health insurance can be purchased to upgrade a student's health insurance if needed, and is "very comprehensive with low payments…it still provides an additional cost to what the parent has to pay for their own health insurance." The provider pointed out that the services provided by the health center somewhat alleviates this disparity, because the health services are included in the college costs and therefore are equally available to all enrolled students. However, since the health center only offers primary care during available hours, accessing off-campus healthcare can be disproportionally damaging for students with poor health insurance.

3.3 Telemedicine and the four-year college:

The health center provider at the university was extremely supportive of applying telemedicine as a supplemental service for the college. They stated that, "college students are a perfect population for telemedicine. College students are healthy and need minor things. They don't have congestive heart failure or COPD, which are conditions that I believe need to be seen in person." The benefits of having a telemedicine service nights and weekends are primarily to provide a "peace of mind" for parents as well as a more efficient, convenient option to access care. They related that, "as a parent, I would pay for it in a heartbeat for my…kids in college. I'd rather them be able to talk to a physician at 2 AM in the morning when they woke up and were nauseated or didn't know what to do,

instead of blindly going to the ER. In fact, they don't have cars, so I don't even know how they would get there, and I don't know if campus safety would drive them. But if they can talk to a physician and ask what they think, then it would make me feel so much better."

Furthermore, telemedicine provides a more convenient and efficient medical service relative to the options of urgent care or emergency room. The health center provider said, "It's the way of the future of keeping people out of hospitals and the emergency room." They described, "You will be able to have a phone number to talk to a provider, the same one that you would have to wait to speak to in the emergency room anyways. The answer may still be that you are too sick and need to go to the hospital, but you will be able to speak to a provider. But most of the time, it is mostly going to be something simple like having a urinary tract infection, and the provider can say 'go to the hospital, I will send a slip for a urinary analysis, and I'll call you back with the results'. The patient has nothing to do other than get to the lab and get a test result. Then if they have an infection, it's not rocket science, the [telemedicine] provider can just prescribe the appropriate antibiotic. And of course they follow-up to make sure the issue is resolved." Hence, a telemedicine program essentially provides an early point-of-contact to act as a prevention barrier for unnecessary visits to the emergency room. Additionally, because telemedicine providers are all board-certified, they are able to prescribe and treat minor conditions.

A final benefit to implementing a telemedicine service is that for both students and employees of the college, telemedicine provides a cheaper option to access healthcare. Telemedicine might be a solution to alleviate the disparities in health coverage due to unequal insurance plans. The health center provider said, "let's say if someone called with a cough. But they weren't short of breath and speaking in full sentences, their temperature was not above 98.6 degrees, cough is non-productive. The [telemedicine] provider could say to trial an inhaler and to call back in four hours, and see if that helps. If it is, and the patient feels great, maybe that chest x-ray is unneeded. And of course someone is going to listen to his or her lungs in a follow-up, but you could really get a good assessment with a history and not having to do a whole exam. You could certainly avoid many costs in that case." Furthermore, the administrator agreed that

if telemedicine were offered to college employees, the cost-savings could be significant. This is especially true since the college provides health insurance to its employees and therefore takes on the financial risk of overutilization of medical care. The administrator said, "All things are seen as real benefits especially to faculty who work at all hours of the day and weekends, who want their lives to work the same way, and that would have been a benefit for them. Also different cost issues come to play, you know emergency rooms and urgent care is expensive. This is even a lower cost option. If it is used right for the right kinds of things, then it could save the employee and college money on expenses."

The provider advocated for the private subscription model as an initial start, allowing for parents to privately sign up for the service. They stated that private subscription might be the first step because it removes the financial burden from the college, which is often strapped for resources. Further, the malpractice is covered by the telemedicine practice, so liability remains with the provider. "[The college] isn't responsible…Frankly, every practice has medical malpractice. It doesn't cost [the college] anything." However, they hope that all students will be able to receive the service, especially since the most disadvantaged students most likely are the primary benefactors.

3.4 The Community College:

Interviews were conducted with administrators at a community college. The community college does not have a health center, but offers wellness programs. The administrator clarified that the college does not view providing healthcare as a priority that aligns with the institution's mission, since it is not a residential college. In answering what factors weighed into the decision to not offer health services, they replied, "my guess is that we are a commuter college and not a residential college, and therefore do not need a health center. People come here as a commuter service, they have their own health insurance and physicians. Certainly if there is an emergency situation, there are people on campus that can give first-aid but for more severe situations, they are transported to the hospital." This perspective of the college's mission was predominant throughout the

interview. The college is focused on education as the primary priority, and secondary obligations like residence and health are individual responsibilities.

However, the college offers wellness and support services. The focus of these wellness programs is to provide resources for mental health and to connect students to outside mental health providers. Since the community college does not have health center accreditation, it does not employ mental health providers like psychiatrists or psychologists. However, the college aims to support individuals with less complex issues like anxiety, addiction, and depression, and provides resources for students. The wellness services includes access to a part-time certified mental health counselor, support groups, mental health first-aid training sessions for faculty and staff, and help lines. However, since the financial resources are limited and the community college does not have health accreditation, these services are not offered to the same extent as a full mental health clinic. The administrator described that wellness services rely heavily on outside medical organizations, saying, "in so far as addressing mental health concerns and looking at the larger picture, we have reached out to various agencies. I am now working with [a local organization] that does mediation and leadership training, and they will be coming into the college to do some training that is open to the whole population. Listening to feedback from students, I've reached out to other community people. We offer veteran services with [the local hospital] to provide PTSD training. We're even forging a relationship with another group that can begin to do peer mentoring." The hope is that these programs will allow the community college's wellness staff to refer students to the appropriate organization or outside provider.

Yet, even with these services at hand, students still have insufficient access to mental health care. The administrator stated, "Its pretty frustrating for a lot of people. What does one do if someone wants to see a therapist and it takes two months to see someone? That's a regular story that one would hear. A student came to me and said that the provider won't even call him back. So I called around and tried to link the individual up with somebody, but the student just got so disgusted he didn't want to see anybody."

Although the wellness services maximize the resources available in the community to provide mental health services, there is a noticeable lack of knowledge or support for physical health. There is no mechanism to gather information about student

health needs, except through personal communication. While the wellness staff tries to be as accessible as possible, it is difficult for them to characterize the health of the student population as a whole. The administrator admits that when assessing if students have sufficient access to healthcare, "in terms of physical health, and the insurance that students have, I can't answer that. I hear some struggles from students in retaining health insurance, especially with all the changes, but I really can't answer that." Accordingly, the physical health resources that the wellness services provide are minimal. The administrator admitted that the college realizes that some students do not have health insurance, but the solution is minimal. They describe, "There [are] absolutely students who don't have health insurance. We sometimes have [an insurance company] table on our campus to help students sign up for insurance so that they have it. I'm not sure how effective it is, but is there a need? Yes, or else the tabling wouldn't make any sense." Furthermore, when students visit the wellness center with a physical condition, the center simply provides them with a list of urgent care centers in the area. The administrator said, "If individuals need to see a physician and do not have health insurance, we will give them a list of urgent care centers, if they need to see a physician for the difficulties they are having." This solution does not consider the barriers of transportation and cost, and moreover, cannot assess the outcomes of students accessing these urgent care centers.

3.5 The Community College and Telemedicine

The administrator was lukewarm in her assessment of using telemedicine on a community college, though most of her reservations stemmed from reluctance to telemedicine in general. They said, "I think I have mixed feelings about it in general. I would need to think it through in terms of pros and cons. Off the top of my head, if a person has chest pain and is unsure what to do, if you call the hospital, they are also going to talk you through it. You should come down or not. What would be the difference between using the service versus calling the hospital, and them giving you guidance? That's one big question. Without the doctor needing to see you or seeing the rash on your face, how do you make a diagnosis over the phone? If a doctor knows you and knows you have a history of XYZ, then that's very different. If you have a history of UTIs, then

maybe that makes sense to get a prescription over the phone. But without that background, I would question how that would work. I'd have to look into that more carefully."

The administrator also hesitated to even consider the possibility of a telemedicine system. While they stated that telemedicine companies have tried to contact her with proposals to set up a virtual health center, the administrator insisted that it did not align with the mission of the community college. They said, "They've asked us to push it with the students. I don't think we're in the position really. From our standpoint, it doesn't work. A lot of students are traditional students that have their own health insurance. I don't know how it would fit on our campus now. I would need to know a lot more." They furthered, "we're thinking about academic education and support and other things. I don't know who would be thinking along those lines. We are trying to provide other services. I don't know who would even be thinking of it. There are other priorities of other things and more important things for our college."

Chapter 4
Discussion

4.1 Four-year universities:

The presence of a health center staffed by college health providers is a vital component to treating the health needs for the student population. The health center provides almost immediate access on weekdays and can treat the large majority of conditions that students commonly have. However, the four-year university can still benefit greatly from a supplemental telemedicine program. Since colleges compete for students, improving the health services at the school can be considered a competitive advantage. Telemedicine therefore has a strong value proposition as a supplemental service that gives the college the ability to provide health care at all hours of the day. The value of the telemedicine program primarily appeals to parents who bear the financial burden of the student health cost, as well as the emotional burden of distantly caring for a sick student.

It became clear from speaking with the college administrators and health providers that the concept of telemedicine was well understood. Moreover, possible implementation was considered along with the potential benefits that could be realized. However, the primary barrier seems to be complacency due to two factors: lack of precedent and financial investment. Since there are very few models of college telehealth nationally, the university is hesitant to use a service that has not yet been tested elsewhere. Financial investment is an additional concern, although the administrators did not explicitly cite the estimated costs. It was echoed by the telemedicine providers that many colleges faced financial constraints as a barrier to actively pursuing telemedicine programs.

A partnership between the university and the telemedicine company may be beneficial for both parties. A telemedical service could provide care during the hours the health center is closed for the cost of a few dollars per student per academic quarter, a minimal fee. The college benefits by being able to provide access to medical services to its students 24/7. Further, by passing on the marginal cost to students, the college can write it

off as a passed on cost. It also increases the college's value in the college market by appealing to parents.

4.2 Community College

The described mission of the community college is to provide affordable education to students in the community. It relies on the health care resources in the community to provide the medical services that its students require. The institutional focus therefore limits the services of the community college. It was readily apparent that the college did not have a feedback mechanism to gather information regarding student health needs and characteristics. This gap in knowledge is concerning however, given the likely student demographic that predisposes community college students to lower health outcomes based on prior research. It was acknowledged by the administrator that she knew anecdotally that community college students increasingly come from disadvantaged backgrounds and struggle with accessing health care. Students often have to choose between medical care and their education. For example, the administrator and the telemedicine staff member shared stories of students who had to choose between medical care and their education. For those working full-time with dependents, paying the cost of a single emergency room visit possibly jeopardizes the ability to pay for classes. Moreover, beyond the opportunity cost of missing work or classes for a visit to a physician, these students can face difficulties accessing care due to travel difficulties or a lack of health literacy.

Telemedicine certainly has attractive potential as a primary mechanism to provide a form of health care for students at a community college. It could be argued that the community college has the greatest need for it. Telemedicine eliminates the barriers for travel and time taken off work, since it can be used in convenience with the patient's schedule. Additionally, telepsychiatry is being increasingly considered as an alternative option for mental health patients (Hilty et al. 2013), and would be particularly applicable for the wellness services at the community college. To be clear, telemedicine does not offer a long-term solution for chronic disease and therefore will not replace adequate medical insurance. The disparities in coverage might however be ameliorated by helping

insured and uninsured students access immediate care. A more accurate health profile of the community college student population would greatly assist in developing appropriate systems to address specific needs. In fact, telemedicine has already been used to expand health literacy, encouraging positive health outcomes In a pilot program, Mackert et al. (2009) created a virtual e-Health education center that targeted low-health-literate culturally diverse parents in order to provide education about healthier food options. The researchers found that these non-English speaking parents were able to easily access the website and receive the intended information.

The primary barrier to adoption for the community college is a lack of knowledge about telemedicine, the arrangement of priorities, and financial investment. It was readily apparent from the interview with the health administrator at the community college that they did not understand how the system would fit, simply because the community college did not believe its mission was to offer medical services. This is understandable considering the limited financial resources that are concentrated in maintaining academic programs. Yet, an argument could be made that helping its students stay healthy can enhance the academic success of its students. A strong indicator for difficulty in graduating college is missing time due to health reasons (Laanan 2000). Furthermore, the community college can increase its value proposition relative to other community colleges when competing for students. A 24/7 virtual health center might attract students who perceive benefit from an institution that is willing to offer some form of medical access. Additionally, education about the benefits of telemedicine in filling the community college student health gaps can prove to be significant.

4.3 Recommendations for the colleges and telemedicine company

Further research is required to quantitatively evaluate student health needs, especially in community colleges. The lack of knowledge prevents new programs from developing and appropriately targeting health gaps, which is corroborated in the interview with the college administrator. A greater understanding of student health can assist the college administration in both evaluating the potential for telemedicine as well as the financial burden. Mechanisms must be developed and implemented to characterize

the health needs from year to year. These can take various forms, such as surveys or personal interviews with students. In doing so, the community college can quantify the need for telemedicine systems before dedicating financial resources to its implementation. In the absence of the community college dedicating the necessary resources, the city or state health departments may find it beneficial to subsidize the services for its communities. It is unreasonable to expect college students to purchase their own subscriptions to telemedicine services, especially students attending community college that may be more price-sensitive. The state should have discussions on whether it has the obligation to its students, especially those in public community colleges, to help colleges in providing such health services.

Secondly, telemedicine should be highly considered by four-year universities. The minimal increase in the health service fee is justified by the value proposition that it provides the college. Since college tuition typically rises every year, especially for private colleges, the health service fee would be marginal. The student population is also relatively safe to trial the telemedicine services, since it already has strong access to medical care and would only need to use telemedicine services during nights and weekends. It may be wise to have a two-year trial period to measure utilization rates and evaluate if students choose to use the service. Of course, utilization is influenced by the education for using the service and thus must be planned carefully. For example, a brochure introducing the virtual health center and its capabilities could be included in a first-year student packet. The number for the telemedicine service can also be placed throughout dorms on a residential college. The health center may sponsor additional programs or table in communal areas to encourage utilization during after hours.

Telemedicine companies can also greatly benefit from continuing education programs to inform people about the structure and application of telemedicine for their families and organizations. The discussions with the school employees all conveyed hesitancy in embracing an unknown technology, but this is where education regarding telemedicine could be beneficial. .Pilot studies, if available, will be useful in demonstrating measurable benefits. Additionally, a particularly effective method for education internally is finding a staff champion that can educate through the relationships formed as an employee since the staff drives the internal processing. A coalition from

both parties will heavily encourage adoption. Without having a champion inside the college administration, the system faces barriers in complacency and lacking knowledge. Furthermore, a financial analysis must be performed before approaching the colleges with a telemedicine model. Facing limited resources, colleges are already incentivized to ignore solicitation. The health provider at the four-year university, for example, was the first to initiate discussions about telemedicine adoption. The provider is continuing to push this discourse throughout the administration, which was reflected in the interviews with administrators who were clearly more informed about telemedicine.

4.4 A look into telemedicine and healthcare overall

As people of all ages increasingly move toward using technology to simplify tasks and improve quality of life, the medical field will continue to innovate ways to make medicine more accessible through technology. It is not difficult to imagine a future where telemedicine becomes a ubiquitously accepted step in the medical process. The staff member of the telemedicine company said it best: "Just like when urgent cares were new ten years ago, and everyone was hesitant; this is where we find ourselves today with telemedicine. In fifteen years, no one will question that telemedicine is the better alternative to going to the emergency room." Indeed, telemedicine offers the healthcare system an optimal first-contact. It provides patients with the capability from any location to immediately access a licensed provider, who can triage accordingly. Once telemedicine is completely integrated into hospital and insurance systems, physicians may use telemedicine to enhance continuity of care of patients without having to schedule appointments. These potential applications especially benefit patients in rural areas who struggle with barriers of travel. It can also be beneficial to hospital systems in effectively triaging patients, saving costs associated with unnecessary emergency room visits.

The next few years will be dominated by rule writing on the state and federal levels. This will be primarily driven by the multiple court cases occurring in different states. For example, court cases in Texas, Michigan, and California are investigating confidentiality and patient safety from the relationships between telemedicine providers and patients (Parks 2016). The decisions will clarify how the physician-patient

relationship is established and maintained. An initial face-to-face meeting may be required as result of the court decision, which would create complications for telemedicine companies trying to reach large populations. These decisions will also clarify reimbursement schedules and prescription abilities for telemedicine providers. It will be important to monitor these developments as the cases progress to federal courts. While the federal government is expected to increasingly intervene as telemedicine court cases begin to reach the judiciary, it has already prompted investigation into telemedicine for use in the Centers of Medicaid and Medicare. The Department of Health and Human Services has proposed that Congress expand telemedicine eligibility to Medicare Advantage organizations, pending the budget proposals for the 2017 fiscal year (U.S. Department of Health and Human Services, 2016). The American Medical Association, the professional association for physicians, just recently passed its ethical guidance for telemedicine providers as well (American Medical Association 2016). It is clear from these institutional actions that telemedicine will continue to gain relevance in medicine and society.

Players in the private industry are the primary drivers of telemedicine agenda and innovation at the current time. Newly developed systems will continue to be introduced by companies into the medical market, which is dominated by large hospital systems, managed care organizations, and insurance companies. These institutions seek solutions for improved health outcomes and cost savings, and will undoubtedly be interested in telemedicine solutions to meet these ends. Some insurance companies have already started offering telemedicine as a service for their subscribers, though many are still researching how to best implement these systems to achieve improved health outcomes. Medical organizations have engaged in telemedicine focusing on providing specialty services, like neurology or dermatology. But while there are some examples of specialized telemedicine succeeding in single site studies (STROKE), it will be difficult for medical organizations to invest heavily with the financial resources needed to implement these systems. Telemedicine will likely be first adopted by large hospital systems and specialty medical organizations before smaller, community hospitals. This is unfortunate because community hospitals might stand the most to gain from telemedicine in benefiting its patients, who usually come from lower socioeconomic and disadvantaged backgrounds

and have less access to care. Furthermore, rural areas still must solve for insufficient broadband capabilities before entertaining the possibility of using telemedicine.

However, while telemedicine certainly has enticing potential, it must be recognized as a limited form of health care that can span large distances. It does not, and should not act as the sole mechanism for the delivery of health care. The treatment of chronic disease requires a strong continuity of care that can only be established and maintained through face-to-face contact with a provider who has intimate knowledge of the patient's history and body. Certain conditions, especially in relation to the cardio and respiratory systems, require diagnosis from tests that must be performed on the body itself. Thus far, there have been minimal remote diagnostic technologies that are proven to be effective in lieu of a personal exam. It is important to recognize that telemedicine at the current time is best suited for minor issues and for certain specialties.

4.5 Limitations and Future Research

This study did not sample interview subjects randomly or from a representative sample. The convenience sample exposes the results to geographical bias. The subjects were also pre-determined from these institutions, based on the ability to approve and schedule interviews. A restricting time period also played a factor insofar as limiting the amount of interviews that could be conducted and the amount of schools that could be contacted. Further studies would benefit by expanding the sample size in order to have qualitative data that is representative of the college population as a whole.

Future research should aim to gather quantitative data to characterize the health needs of the college student population, especially community college students. The paucity of knowledge in the medical community about this population must be addressed with quantitative data studies. There is a broad need for research on how telemedicine affects health outcomes as well as aspects of health care like the physician-patient relationship. This field is rapidly developing and evolving, and the research has not yet caught up to it since very there is little consistency between programs. But it is important for data to be recorded by players in the industry in order to contribute to the body of knowledge. Government, insurance companies, private companies, and consumer

organizations need to be committed to investigating if telemedicine can be used to achieve better patient care. Collaboration amongst all health care stakeholders – and this includes patients – will greatly accelerate the integration of telemedicine into healthcare.

Works Cited:

"Universal Service Administrative Company." *Annual Reports*. USAC, n.d. Web. 05 June
2016. http://www.usac.org/about/tools/publications/annual-reports/default.aspx

"Telehealth." HRSA Rural Health Glossary. Accessed November 17, 2014.
http://www.hrsa.gov/ruralhealth/about/telehealth/glossary.html
15939837]30:91689-1697; doi:10.1377/hlthaff.2011.0216

American Association of Community Colleges. 2013 community college fact sheet. 2013
Retrieved from
http://www.aacc.nche.edu/AboutCC/Documents/2013facts_fold_revised.pdf

Anderson, K.,PhD.(Chair), Balderrama, S. R., EdD., Davidson, J., PhD., De Maria, P.,
MD, Eells, G. T., PhD., Greenleaf, C., J.D., . . . Wyatt, J., PhD. (2010).
Considerations for integration of counseling and health services on college and
university campuses. Journal of American College Health, 58(6), 583-596.
Retrieved from
http://ezproxy.clarkson.edu/login?url=http://search.proquest.com/docview/744403
110?accountid=37646

Bailey, T.; Jenkins, D.; Leinbach, T. What we know about community college low income
and minority student outcomes: Descriptive statistics from national surveys. 2005.
Retrieved from http:// www.eric.ed.gov/PDFS/ED484354.pdf

Bashshur, Rashid L., Gary W. Shannon, Brian R. Smith, Dale C. Alverson, Nina
Antoniotti, William G. Barsan, Noura Bashshur, Edward M. Brown, Molly J.
Coye, Charles R. Doarn, Stewart Ferguson, Jim Grigsby, Elizabeth A. Krupinski,
Joseph C. Kvedar, Jonathan Linkous, Ronald C. Merrell, Thomas Nesbitt, Ronald
Poropatich, Karen S. Rheuban, Jay H. Sanders, Andrew R. Watson, Ronald S.
Weinstein, and Peter Yellowlees. "The Empirical Foundations of

Telemedicine Interventions for Chronic Disease Management." *Telemedicine and E-Health* 20.9 (2014): 769-800. Web.

Blanco, C., M. Okuda, C. Wright and et al. 2008. "Mental Health of College Students and Their Non–College-Attending Peers: Results from the National Epidemiologic Study on Alcohol and Related Conditions." *Archives of General Psychiatry* 65(12):1429-37. doi: 10.1001/archpsyc.65.12.1429.

Bicki, Alexandra, Adam Silva, Valerie Joseph, Ryan Handoko, Sheryl-Vi Rico, Jacqueline Burns, Anna Simonelli, Jordan Harrop, Jennifer Nedow, and Anne S. De Groot. "A Nurse-Run Walk-In Clinic: Cost-Effective Alternative to Non-urgent Emergency Department Use by the Uninsured." *Journal of Community Health* 38.6 (2013): 1042-049. Web.

Brindis, Claire and Patricia Reyes. 1997. "At the Crossroads: Options for Financing College Health Services in the 21st Century." *Journal of American College Health* 45(6):279-88. doi: 10.1080/07448481.1997.9936898.

Broderick, Andrew. "The Veterans Health Administration: Taking Home Telehealth Services to Scale Nationally." *Case Studies in Telehealth Adoption—The Veterans Health Administration: Taking Home Telehealth Services to Scale Nationally* (2013): n. pag. *Case Studies in Telehealth Adoption*. The Commonwealth Fund, 1 Jan. 2013. Web. 5 June 2016.

Christmas, W. (1995). The evolution of medical services for students at colleges and universities in the United States. *Journal of American College Health*, 43, 241 246. US Census Bureau. School enrollment. 2013 American Community Survey 1-year estimates—Table S1401. Avail- able at: http://factfinder.census.gov/faces/tableservices/jsf/ pages/productview.xhtml?pidDACS_13_1YR_S1401&pro- dTypeDtable. Accessed January 28, 2014.

Chumbler, Neale R., Rita Kobb, Linda Harris, Lisa C. Richardson, Adam Darkins, Melanie Sberna, Neha Dixit, Patricia Ryan, Molla Donaldson, and Gary L. Kreps. "Healthcare Utilization Among Veterans Undergoing Chemotherapy." *Journal of Ambulatory Care Management* 30.4 (2007): 308-17. Web.

Crihfield, Connie and Ted W. Grace. 2011. "The History of College Health Nursing." *Journal of American College Health* 59(6):470-76. doi: 10.1080/07448481.2011.563433.

Cohen, A.M.; Brawer, F.B. (2008). *The American Community College* (5ᵗʰ ed.) New York, NY: Jossey-Bass.

Community College Task Force and American College Counseling Association. (2010). *2009-2010 community college counselor survey.* Retrieved from <http://www.collegecounseling.org/community-college-survey-09-10>

Darkins, Adam, Patricia Ryan, Rita Kobb, Linda Foster, Ellen Edmonson, Bonnie Wakefield, and Anne E. Lancaster. "Care Coordination/Home Telehealth: The Systematic Implementation of Health Informatics, Home Telehealth, and Disease Management to Support the Care of Veteran Patients with Chronic Conditions." *Telemedicine and E-Health* 14.10 (2008): 1118-126. Web.

Demaerschalk, B. M., B. J. Bobrow, R. Raman, T. E. J. Kiernan, M. I. Aguilar, T. J. Ingall, D. W. Dodick, M. P. Ward, P. C. Richemont, K. Brazdys, T. C. Koch, M. L. Miley, C. R. Hoffman Snyder, D. A. Corday, and B. C. Meyer. "Stroke Team Remote Evaluation Using a Digital Observation Camera in Arizona: The Initial Mayo Clinic Experience Trial." *Stroke* 41.6 (2010): 1251-258. Web.

Downs MF, Eisenberg D. Help seeking and treatment use among suicidal college students. J Am Coll Health. 2012; 60(2):104–14.

DormanJM,ChristmasWA.Primarycareissuesincollege health. In: Turner HS, Hurley JL, eds. The History and Practice of College Health. Lexington, KY: The University Press of Ken- tucky; 2002:104–117.

Dohrenwend, B.P. (Ed.) (1998). *Adversity, stress, and psychapothology*. (1ˢᵗ ed.) New York, NY: Oxford University Press)

Elsenberg, D; Hunt, J; Speer, N; Zivin, K. 2011. Mental health service utilization among college students in the United States. J Nerv Ment Dis. 199(5):301-8.

Ensz GR, Kruger K. "A solution for rural physician burnout: the creation of the PEERist. *J Med Pract Manage.* 26(1): 53-6
http://www.ncbi.nlm.nih.gov/pubmed/20839515

Escoffery C, et al. Internet use for health information among college students. J Am Coll Health. 2005; 53(4):183–8. [PubMed: 15663067]

Fulop, Mark P. and Nicholas Nader Varzandeh. 1996. "The Role of Computer-Based Resources in Health Promotion and Disease Prevention: Implications." *Journal of American College Health* 45(1):11.

FingarA.Patientproblemsencounteredatastudenthealth service. J Am Coll Health. 1989;38:142–144.

Gallagher, R.; Gill, AM.; Sysko, HB. National survey of counseling directors, 2000. University of Pittsburgh.

Giovenco, Daniel P., Daniel A. Gundersen and Cristine D. Delnevo. 2016. "Reaching a Representative Sample of College Students: A Comparative Analysis." *Journal of American College Health* 64(3):262-67. doi: 10.1080/07448481.2015.1088018.

Grace, Ted W. 1997. "Health Problems of College Students." *Journal of American*
 College Health 45(6):243.

Haas A, et al. An interactive web-based method of outreach to college students at risk for
 suicide. J Am Coll Heal. 2008; 57(1):15–22.

Hall, Kathleen. "Andrew Lansley Plans Online NHS Consultations to save £250m a
 Year." *ComputerWeekly*. N.p., 06 Apr. 2016. Web. 05 June 2016.
 http://cph.uiowa.edu/rupri/publications/policybriefs/2013/Uninsured%20Analysi
 %202013.pdf International Association of Counseling Centers, Inc; 2000.

Heller, J. R. and A. L. Sarmiento. 2016. "Health Behaviors of Culturally Diverse Inner
 City Community College Students." *J Am Coll Health*:1-13. doi:
 10.1080/07448481.2016.1223674.

Hilty, D. M., Ferrer, D. C., Parish, M. B., Johnston, B., Callahan, E. J., & Yellowlees, P.
 M. (2013). The Effectiveness of Telemental Health: A 2013
 Review. *Telemedicine Journal and E-Health*, *19*(6), 444–454.
 http://doi.org/10.1089/tmj.2013.0075

Huang, Qing, Amardeep Thind, Jonathan F. Dreyer, and Gregory S. Zaric. "The Impact of
 Delays to Admission from the Emergency Department on Inpatient
 Outcomes." *BMC Emergency Medicine* 10.1 (2010): n. pag. Web.

Ickes, Melinda J. and Randall Cottrell. 2010. "Health Literacy in College Students."
 Journal of American College Health 58(5):491-98. doi:
 10.1080/07448481003599104

Jarudi, Lama. "Doctors Without Borders: The Advent of Telemedicine and
 Society." *Harvard International Review* 22.1 (2000): 36-39. Web. 5 June 2016.

Johnson and Rochkind. "With their whole lives ahead of them: myths and realities about why so many students fail to finish college". Bill and Melinda Gates Foundation.

Kahn, Elyne N., Frank La Marca, and Catherine A. Mazzola. "Neurosurgery and Telemedicine in the United States: Assessment of the Risks and Opportunities." *World Neurosurgery* 89 (2016): 133-38. Web.

Katz, D. S., & Davison, K. (2014). Community college student mental health: A comparative analysis. Community College Review, 42(4), 307-326.

Keeton, V., S. Soleimanpour and C. D. Brindis. 2012. "School-Based Health Centers in an Era of Health Care Reform: Building on History." *Curr Probl Pediatr Adolesc Health Care* 42(6):132-56; discussion 57-8. doi: 10.1016/j.cppeds.2012.03.002.

Kaushal, Mohit, Kavita Patel, Margaret Darling, Kate Samuels, and Mark McEllan. "Closing The Rural Health Connectivity Gap: How Broadband Funding Can Better Improve Care." *Health Affairs*. N.p., 1 Apr. 2015. Web. 05 June 2016.

Kessler, Ronald C., Patricia Berglund, Olga Demler, Robert Jin, Kathleen R. Merikangas, and Ellen E. Walters. "Lifetime Prevalence and Age-of-Onset Distributions of DSM-IV Disorders in the National Comorbidity Survey Replication." *Archives of General Psychiatry* 62.6 (2005): 593. Web.

Kraft, D. P. 2011. "One Hundred Years of College Mental Health." *J Am Coll Health* 59(6):477-81. doi: 10.1080/07448481.2011.569964.

Laanan FS. Community college students' career and educational goals. New directions for Community Colleges. 2000; 112:19–33.

Lindenbaum, Jeffrey E., Robert J. Hunner and Robert W. Deisher. 1981. "Community College Health Services." *Journal of Adolescent Health Care* 1(3):225-28. doi:

http://dx.doi.org/10.1016/S0197-0070(81)80062-9.

Boynton Health Service. 2015. "Health and Health-related behaviors: University of
    Minnesota-Twins Cities Students". University of Minnesota.

MacDonald, Ilene. "9 out of 10 New York Hospital Emergency Room Visits
    Unnecessary."*FierceHealthcare*. QUESTEX, 11 Apr. 2016. Web. 01 Mar. 2017.

 Mackert, M., Kahlor, L., Tyler, D., & Gustafson, J. (2009). Designing e-Health
    Interventions for Low-Health-Literate Culturally Diverse Parents: Addressing the
    Obesity Epidemic. *Telemedicine Journal and E-Health*, *15*(7), 672–677.
    http://doi.org/10.1089/tmj.2009.0012

Mills, Robert. "AMA Adopts New Guidance for Ethical Practice in
    Telemedicine." *American Medical Association*. American Medical Association,
    13 June 2016. Web. 01 Mar. 2017.

National Advisory Committee on Rural Health and Human Services.*Telehealth in Rural
    America*. Rep. N.p.: HRSA.gov, 2015. Accessed: .
    http://www.hrsa.gov/advisorycommittees/rural/publications/telehealthmarch2015.
    pdf

 National Comorbidity Survey Replication. Arch Gen Psychiatry. 2005; 62(6):593–602.

NelsonM,LarsonN,Barr-AndersonD,Neumark-Srtainer D, Story M. Disparities in dietary
    intake, meal patterning, and home food environments among young adult nonstu-
    dents and 2- and 4-year college students. Am J Public Health [serial online].
    2009;99:1216–1219. Available from: Academic Search Complete, Ipswich, MA.
    Accessed July 29, 2015.

Office of the Assistant Secretary for Planning and Evaluation (ASPE) analysis of Gallup

Healthways Well-Being Index survey data through 3/4/15:
https://aspe.hhs.gov/sites/default/files/pdf/139211/ib_uninsured_change.pdf

Parks, Troy. "Court Case Examines Telemedicine Safety Regulations." *AMA Wire*.
American Medical Association, 27 Oct. 2016. Web. 01 Mar. 2017.

Pedrelli, P., M. Nyer, A. Yeung, C. Zulauf and T. Wilens. 2015. "College Students:
Mental Health Problems and Treatment Considerations." *Acad Psychiatry*
39(5):503-11. doi: 10.1007/s40596-014-0205-9.

Pokhrel, P., M. A. Little and T. A. Herzog. 2014. "Current Methods in Health Behavior
Research among U.S. Community College Students: A Review of the Literature."
Eval Health Prof 37(2):178-202. doi: 10.1177/0163278713512125.

Robinson, Jenna Ashley. "How Student Health Fees Are Wasted by Colleges." *The Fiscal
Times*. N.p., 2 May 2014. Web. 14 Nov. 2016.

Rosato, C.P. "Why Universities and Colleges Are Turning to Telehealth." *Fonemed*.
FoneMed, 23 Oct. 2016. Web. 03 Nov. 2016.

Survey on Student Health Services and Student Health Insurance. Richmond, VA:
American College Health Association; 1992.

Trieu S, Bratton S, Hopp Marshak H. Sexual and repro- ductive health behaviors of
california community college students. J Am Coll Health [serial online].
2011;59:744– 750. Available from: Education Full Text (H.W. Wilson), Ipswich,
MA. Accessed July 12, 2013.

Turner, James C. and Adrienne Keller. 2015. "College Health Surveillance Network:
Epidemiology and Health Care Utilization of College Students at Us 4-Year
Universities." *Journal of American College Health : J of ACH* 63(8):530-38. doi:

10.1080/07448481.2015.1055567.

Stuber D.; Otto, M. (1995). Incidence of depression amongst community college students. *NAPSA Journal*, 32, 279-286.

United States Government Accountability Office (GAO). 2008. "Most college students are covered through employer-sponsored plans, and some colleges and states are taking steps to increase coverage". Report to the Committee on Health, Education, Labor, and Pensions, U.S. Senate.

United States. Department of Health and Human Services. Office of Health Policy. *Report to Congress: E-Health and Telemedicine*. Washington D.C.: Department of Health and Human Services, 2016. Print.

Wamala, Dans, and Kaddu Augustine. "A Meta-analysis of Telemedicine Success in Africa." *Journal of Pathology Informatics J Pathol Inform* 4.1 (2013): 6. Web

Woolard, Deborah and William R. Donohue. 1995. "Student Health Services at Four Rural Colleges: Implications for Healthcare Reform." *Journal of American College Health* 44(1):15.

Yorgason, J. B., D. Linville and B. Zitzman. 2008. "Mental Health among College Students: Do Those Who Need Services Know About and Use Them?". *J Am Coll Health* 57(2):173-81. doi: 10.3200/JACH.57.2.173-182.

Youn SJ, et al. Using online social media, Facebook, in screening for major depressive disorder among college students. Int J Clin Health Psychol. 2013; 13(1):74–80.

Zivin K, et al. Persistence of mental health problems and needs in a college student population. J Affect Disord. 2009; 117(3):180–5. [PubMed: 19178949]

Appendix A:

Interview Guide for College Health Service Providers

What do you think are the greatest health needs for college students today?

How do you assess the health needs of the students on this campus and decide what services to offer? What are the main factors that determine the services offered?

Does your center have accreditation? What factors influence(d) this decision?

What does the college health service most commonly treat? What percentage of students seeks services?

Do you think the health services at the college are sufficient for the health needs of students? Why or why not?

Do you think that students easily access health services? Please explain. What are the major factors that determine accessibility?

What types of services are typically needed when the center is closed? Who pays for these off-campus services?

How can college administrations help to improve campus health services, if it at all?

Do you think that telemedicine may be useful for college students? Please explain.
     -Are you familiar with existing telemedicine services that have been offered on some college campuses?
     -Has your college considered using telemedicine?
     -Have students requested telemedical services?
     -What are the main benefits or drawbacks of telemedicine for college students?
     -Can you foresee using telemedicine as a supplement service or even primary mechanism for healthcare
     delivery?

Appendix B:

Interview Guide for Telemedicine Providers

What types of telemedicine services do you currently offer for college campuses?

How does your telemedicine services address college health needs? What are the greatest health needs you have observed so far?

How do you envision telemedicine programs being integrated into college health services for the future?

What are the barriers from integrating telemedicine into college campuses right now?