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Factors Associated with College Students' Intention to Use Telehealth for Primary Care

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Factors Associated with College Students' Intention to use Telehealth for Primary Care

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science at Virginia Commonwealth University.

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Abstract

FACTORS ASSOCIATED WITH COLLEGE STUDENTS' INTENTION TO USE TELEHEALTH FOR PRIMARY CARE

By Conor Duffy, B.S.

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science at Virginia Commonwealth University.

Virginia Commonwealth University, 2023

Major Director: Nao Hagiwara, PhD., Associate Professor, and Psychology

College students are less likely than the general population to have a regular primary care provider and engage in routine health visits. Recent research provides evidence that telehealth is a convenient alternative to in-person primary care and that college students are comfortable using this technology, suggesting that telehealth has the potential to mitigate this disparity. However, little research has examined which factors are associated with college students' intention to use telehealth and attitudes toward telehealth specifically in the primary care context. The overarching goal of this study was to address this gap in the literature and identify factors associated with college students' intention to use telehealth and attitudes toward telehealth for

primary care. This exploratory study drew upon three related lines of research to identify factors: (1) telehealth in the context of psychiatry/mental health visits, (2) telehealth in the context of primary care but in non-college populations, and (3) in-person primary care visits. The results of this study indicate that higher levels of trust in physicians, lower levels of medical mistrust, and lower levels of perceived discrimination in healthcare are associated with greater intention to use telehealth and more positive attitudes toward telehealth. These findings lay the foundation for future research to examine the processes associated with individuals' utilization of telehealth and factors that promote positive outcomes in telehealth.

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Introduction

Study Overview

College students are less likely than the general population to have a primary care provider and engage in regular health visits (Levine et al., 2020; Turner & Keller, 2015; Willis et al., 2020). Though college students tend to have good health overall (Unwin et al., 2013), primary care visits are an important form of preventive care and establishing routine visits may help prevent more serious health issues later in life (Hostetter et al., 2020). Therefore, it is important to find ways to encourage their engagement in regular primary care visits.

Recent research provides initial evidence that telehealth has the potential to address this disparity. Telehealth is defined as the use of synchronous digital information and communication technologies, such as phone or video, to communicate directly with a healthcare provider in real time (U.S. Department of Health and Human Services, 2022). Telehealth provides a convenient and accessible alternative to in-person primary care (Bull et al., 2016), and college students feel comfortable with those technologies (Schuh, 2021). Additionally, telehealth is expected to remain popular even after the COVID-19 pandemic (Doraiswaimy et al., 2020). Thus, encouraging college students to utilize telehealth for their primary care needs may be a viable alternative to regular in-person primary care visits. Introducing college students to telehealth might also make these students more open to in-person care subsequently, leading to greater utilization of healthcare overall.

The goal of this study is to identify factors that increase college students' intention to use telehealth for their primary care needs. Because there has been relatively little research on factors associated with college students' attitudes toward telehealth specifically in the context of primary care, the proposed research will draw on three related lines of research: (1) telehealth in the

context of psychiatry/mental health visits; (2) telehealth in the context of primary care but in non-college populations; and (3) in-person primary care visits. Findings from the proposed research will lay the foundation for future intervention research and ultimately aid in the development and dissemination of telehealth interventions that target college students as well as other populations that have been found to underutilize primary care.

Utilization of Primary Care among College Students

There are approximately 19.4 million college students in the United States (U.S. Department of Education, 2021). Though this population has good health on average, around 20% of US youth report some form of chronic health condition (Lemly et al., 2014). Common diagnoses include attention-deficit/hyperactivity disorder (ADHD), learning disabilities, psychiatric disorders, and chronic illnesses (Unwin, 2013). Caring for the college population involves managing and treating common illnesses and chronic conditions, as well as stressors and behaviors that are unique to college students. College students experience a novel set of social, financial, and academic responsibilities that can lead to high levels of distress and there is high prevalence of substance use and risky sexual behavior in this population (Bulo, 2014; Unwin, 2013).

Despite these unique stressors and behavioral issues, college students tend to underutilize primary care relative to the general population. In a representative sample of college students, only 15.6% of students engage in preventive primary care visits each year (Turner & Keller, 2015), compared to 44% of the general population (Willis et al., 2020). Healthcare utilization among college students also varied significantly by demographic characteristics such as age, gender, school level, and race/ethnicity (Turner & Keller, 2015). Engaging in routine primary care visits is associated with increased utilization of preventive services such as vaccinations and

screenings, decreased healthcare costs, and improved long-term health outcomes (Hostetter et al., 2020). Considering these benefits, it is important to address college students' underutilization of preventive services and develop interventions to encourage college students to engage in routine primary care visits. One potential solution to the college students' underutilization of primary care services may be promoting the use of telehealth.

The State of Telehealth

Telehealth is defined as the use of synchronous digital information and communication technologies, such as phone or video, to communicate directly with a healthcare provider in real time (U.S. Department of Health and Human Services, 2022).The utilization of telehealth visits across specialties increased dramatically in 2020 due to the COVID-19 pandemic. According to a national study, the percentage of health visits conducted virtually peaked at 32% in April 2020, and telehealth utilization stabilized at 13-17% as of July 2021 (Bestsennyy et al., 2021). These levels represent 38 times greater utilization of telehealth than before the pandemic. A recent study has also shown that uptake of telehealth varies widely by specialty, with the greatest utilization in psychiatry (50%) and substance use disorder treatment (30%) and the lowest utilization in orthopedic surgery (2%) and ophthalmology (2%; Bestsennyy et al., 2021).

The majority of research examining attitudes toward telehealth has shown that people still prefer to visit their doctor in person rather than virtually, with between 53% and 68% of participants reporting that they would prefer visiting their provider in person (Lacritz et al., 2020; Polinski et al., 2016; Predmore et al., 2021). Despite this overall preference for in-person care, those who have utilized telehealth tend to report high satisfaction with virtual visits (Lacritz et al., 2020; Polinski et al., 2016). In fact, research reports little difference in patient satisfaction between face-to-face visits and telehealth (Polinski et al., 2016; Pruitt et al., 2019). One study

examining a college sample generated similar results, finding that students reported high levels of satisfaction with telehealth, and more than half of the students surveyed reported that telehealth would be as helpful as in-person treatment (Michaels et al., 2022). Bestsennyy et al. (2021) also found that that attitudes toward telehealth have shifted since the start of the pandemic, with around 40% of individuals stating that they intend to use telehealth going forward, compared to 11% before the pandemic. Similarly, Predmore et al. (2021) found that only 10.3% of participants preferred telehealth over in-person visits but 66.5% intended to utilize some telehealth visits going forward.

Clearly, there are some disadvantages to telehealth that need to be addressed. Those include technical difficulties (Bull et al., 2016; Lacritz et al., 2020), patients' limited access to technology (Mohammed et al., 2021), impersonality/communication difficulties (Bull et al., 2016; Lacritz et al., 2020), and patients' concerns about the privacy of their health information (Bull et al., 2016). However, patients who have used telehealth also report many advantages compared to in-person care, such as convenience/accessibility (Bull et al., 2016; Lacritz et al., 2020; Powell et al., 2017), taking less time (Bull et al., 2016; Polinski et al., 2016; Schuh, 2021), and avoiding exposure to illness (Lacritz et al., 2020).

Consistent with these findings, in a qualitative study of college students' attitudes toward telehealth, participants reported that telehealth services can quickly connect students to providers, eliminate the need for travel/transportation, and allow students to easily access their health information (Bull et al., 2016). Students in this study also noted that telehealth could improve their relationship with their provider because they "could connect with them quickly," "communicate their concerns in real-time," and receive "quicker feedback" from providers. Other studies have also found that college students are less likely to report that they are

uncomfortable with telehealth than the general population (Predmore et al., 2021; Schuh, 2021), which might be because they tend to have higher technological literacy (Mamedova et al., 2018).

Finally, telehealth is expected to remain popular after the current pandemic and has the potential to play a significant role in the future of healthcare (Doraiswaimy et al., 2020). The increase in telehealth utilization has been accompanied by a significant increase in capital investment into digital health companies. The total venture capital investment into digital health was $14.7 billion in the first half of 2021, nearly equivalent to the total investment in 2020 and more than double the total investment in 2017 (Bestsennyy et al., 2021). This increasing investment of resources is likely to drive innovation in telehealth and further integrate telehealth into the healthcare system going forward.

Telehealth in Primary Care

The percentage of primary care visits conducted via telehealth prior to the COVID-19 pandemic was relatively low. For example, one study (Alexander et al., 2020) estimated that only 1.1% of primary care visits in 2018-2019 were conducted via telehealth in the United States. It should be noted, however, that there was large variability in the implementation of telehealth across healthcare systems. For example, Reed and colleagues (2021) reported that 14% of primary care visits at a large integrated health care delivery system in California were already conducted virtually between 2016 and 2018. The percentage of primary care visits conducted via telehealth rapidly increased nationally from 4.1% in the first quarter (January through March) of 2020 to a peak of 35.3% of visits in the second quarter (April through June) of 2020 as COVID-19 restrictions were implemented (Alexander et al., 2020). Rates of telehealth utilization have since stabilized at a rate much lower than this peak, albeit higher than pre-pandemic levels. As of February 2021, Bestsennyy et al. (2021) reported that 8% of primary care visits were conducted

virtually. In one survey of primary care physicians, 5.3% of participants reported using telehealth often before the pandemic, 46.2% during the pandemic, and 26.2% after the pandemic (Callaghan et al., 2022).

Though not all components of primary care visits are amenable to telehealth (e.g., breast, foot, neurologic, pelvic, rectal, and retinal examinations), many services do not require the physical presence of a primary care physician (Jetty et al., 2021). Examples of such services include general examinations; screening for alcohol misuse, depression, domestic violence, substance abuse, and skin conditions; mental health counseling; and health education/counseling. This study found that 73% of *services* provided by primary care physicians could be delivered via telehealth. This means that approximately 34% to 42% of *encounters* could occur via telehealth (Jabbarpour et al., 2021; Jetty et al., 2021). Patients also recognize the utility of telehealth in many primary care services. Ebbert et al. (2021) found that most patients reported being "very likely" to use telehealth services to refill medications (67.3%), prepare for an upcoming visit (66.1%), review test results (60.3%), or receive education (54.2%).

In summary, telehealth is expected to grow, college students tend to have both access to and ability to use technology necessary for telehealth, and many routine and preventive care services provided by primary care physicians can be delivered effectively via telehealth. Therefore, promoting the use of telehealth may be one viable solution to address college students' underutilization of primary care services.

Relevant Literatures Informing College Students' Utilization of Telehealth

While there is little research examining college students' attitudes toward telehealth and utilization of telehealth in primary care, there are at least three lines of research that are informative. First, there is substantial literature examining college students' attitudes toward

telepsychiatry (virtual visits for mental health care). Thus, the present study first draws on this line of telepsychiatry literature. However, it is important to acknowledge that the nature of care for mental health is different from that of physical health care in critical ways. For example, there is much greater stigma associated with the use of mental health services than physical health services (Thornicroft, 2008). Individuals with mental health conditions might be more inclined to engage in mental health visits in the privacy of their own home to avoid this stigma. Additionally, mental health visits primarily involve talking with a therapist or counselor, which translates more easily to telehealth than the physical examinations that are often necessary in primary care. Consequently, some of the findings from prior research on telepsychiatry may not be directly applicable to telehealth in primary care visits.

Therefore, the present study also draws on another relevant line of literature—individuals' attitudes toward and utilization of telehealth within primary care in populations other than college students. While college students' preferences for telehealth vs in-person care might differ from other populations due to factors that may be unique to college students, such as higher technological literacy (Mamedova et al., 2018), this research will provide some insight into the factors that influence college students' attitudes and intentions to use telehealth for primary care.

Finally, the present study draws on literature examining in-person primary care utilization. Though some factors that are associated with patients' attitudes toward telehealth vs. in-person primary care might be specific only to one modality (e.g., convenience, access to transportation, and access to technology or reliable internet), individuals likely have similar underlying motivations for engaging in primary care visits (e.g., preventive care, managing a long-term condition, etc.) whether those visits are virtual or in-person. While each line of

research may not be adequate to fully inform the current research, triangulation of findings from all three lines of research will enable us to create a more comprehensive list of potential factors that may predict college students' intentions to utilize telehealth in primary care

Intentions to Utilize Telehealth vs. Actual Utilization of Telehealth

Before moving on to reviews of the relevant literatures, it is important to discuss the distinction between intentions to utilize telehealth and actual utilization of telehealth. Utilization of telehealth is a planned, rather than spontaneous, behavior. Engaging in a telehealth visit requires a patient to first make an appointment with a physician and second fulfill the appointment. According to the Theory of Planned Behavior (Ajzen, 1991), intention is a necessary precursor to any planned behavior. In other words, an individual would not utilize telehealth unless they have intention to utilize telehealth. Therefore, the subsequent reviews will primarily focus on factors associated with individuals' *intentions* to utilize telepsychiatry, primary care telehealth, and in-person primary care visits, not the actual utilization of those services.

Factors Associated with College Students' Intentions to Utilize Telepsychiatry

This body of literature has identified factors associated with positive attitudes toward telehealth (and thus also likely with greater intention to use telehealth), which are perceived convenience and accessibility. Prior research has also identified factors associated with negative attitudes (and thus likely with reduced intention to use telehealth): perceived technical difficulties, impersonality of care, and concern about the privacy of patients' health information.

Perceived Convenience

A systematic review of college students' attitudes toward telepsychiatry identified convenience as one of the greatest advantages of telehealth (Hadler et al., 2021). In one survey of

university students' attitudes toward internet-delivered cognitive behavioral therapy programs, all 14 participants reported that convenience was a reason for using internet-based programs over in-person therapy (Palacios et al., 2018). In a study examining perceptions of telepsychiatry among 270 college students seeking mental health services, 79% of students endorsed convenience as an advantage of telepsychiatry (Petersen et al., 2020). It should be noted that convenience can be attributed to two different, yet related, dimensions: time and travel.

Time. College students report that telehealth in general saves time associated with commuting to a doctors' office and sitting in the waiting room (Bull et al., 2016; Schuh, 2021). Bull et al. (2016) conducted a survey examining perceived advantages and disadvantages of telehealth in a sample of 315 undergraduate students. In this study, 21.4% of students identified efficiency, defined as quick communication and rapid connection to services, as an advantage of telehealth. Similarly, in a study examining preferences for telepsychiatry in a sample of 537 college students with and without mental health diagnoses, 45% of participants believed that telehealth would take less time than in-person treatment, 19% reported that it would take more time, and 36% thought that it would take about the same amount of time (Schuh, 2021).

Travel. In one survey assessing utilization and attitudes toward telepsychiatry in 6,034 community college students, 47% of participants reported that online therapy would be more convenient than in-person treatment because they would not have to travel (Dunbar et al., 2018). In Bull et al. (2016), college students reported that the ability to meet with a doctor at home, avoid excessive travel, and access their health information easily is an advantage of telehealth over in-person care.

Perceived Accessibility

There is no direct evidence that college students report high levels of accessibility to telepsychiatry. However, college students generally have access to the technology necessary for telepsychiatry (and thus telehealth in general), as 98% of participants in one sample of college students reported owning a computer, tablet, laptop, or cell phone with internet access (Schuh, 2021). This suggests that college students should have access to telepsychiatry and telehealth services.

Perceived Technical Difficulties

In one study, 19.5% of 315 college students reported that the potential for "system errors" or "technological malfunctions" is one of the greatest drawbacks of telehealth (Bull et al., 2016). Specifically, they expressed concern that system errors could impact the accuracy or reliability of test results.

Perceived Impersonality of Care

In Petersen et al. (2020), 67% of 270 participants expressed concern about a lack of personalized care and a compromised therapeutic relationship with telepsychiatry compared to in-person counseling. Consistently, in Bull et al. (2016), 28.1% of college students reported that telehealth was "impersonal" and that they would still like to have in-person interactions with providers even considering tradeoffs such as additional travel and wait time.

Privacy Concern

College students report that one barrier to telehealth use is a lack of private spaces in which one can have a conversation without others overhearing, as many students live on-campus in shared rooms (Gatdula et al., 2022). Bull et al. (2016) also found that 34.5% of participants reported being hesitant to use telehealth because of issues related to the "privacy and security" of

personal health information. These students noted that they would not want their health information to be "given to the wrong person." Critically, students also stated that they would not use telehealth in the future if there was a "breach of the system" and/or if "personal information was left unprotected."

Factors Associated with Intentions to Utilize Primary Care Telehealth in Non-College Populations

Despite some important differences in the nature of care for mental versus physical health discussed earlier, research of primary care telehealth in non-college populations has generated similar results to research of telepsychiatry in college students (Lacritz et al., 2020; Polinski et al., 2016; Powell et al., 2017). More specifically, non-college populations report that convenience (Lacritz et al., 2020; Polinski et al., 2016; Powell et al., 2017) and accessibility (Lacritz et al., 2020; Polinski et al., 2016; Powell et al., 2017; O'Kane, 2020; Valdez et al., 2021) are positive aspects of telehealth, while technological difficulties (Lacritz et al., 2020), impersonality of care (Lacritz et al., 2020), and privacy concerns (Powell et al., 2017) are negative aspects of telehealth that influence their attitudes and intentions to use telehealth. In addition to those similarities, there are also two notable factors that are unique particularly to research of telehealth in non-college student populations: trust in physicians and perceived risk of disease exposure.

Trust in Physicians

In a study examining the relationship between trust in physicians and telehealth utilization among 162 African American older adults with diabetes during the COVID pandemic, Rovner et al. (2021) found that patients with greater trust in physicians were more likely to report that they had used telehealth. In another study, researchers administered a survey to a

sample of 1,624 patients who completed a telehealth visit at an academic medical center in Los Angeles. They found that patients who reported higher levels of trust in physicians also reported greater satisfaction with telehealth visits. Those patients were also less likely to be concerned with commonly reported drawbacks of telehealth, such as technical issues, privacy, and cost (Orrange et al., 2021).

Perceived Risk of Disease Exposure

Another factor that distinguished the two lines of research is the perceived risk of disease exposure in clinic. One of the key reasons behind the surge in telehealth appointments since the start of the COVID-19 pandemic is that using telehealth to visit a health provider reduces potential exposure to illness. In an opinion article published at the beginning of the pandemic, Zhou et al. (2020) suggested that one of the main benefits of telehealth is to reduce the risk of exposure of noninfected but susceptible patients in waiting room areas. In a study assessing patients' attitudes toward telephone-based neuropsychological assessment, "avoiding potential exposure to illness" was the most common advantage of telehealth reported, with 76.7% of 43 participants agreeing that telehealth's potential limit exposure to illness was an advantage over in-person care (Lacritz et al., 2020).

Factors Associated with Intentions to Utilize In-Person Primary Care

Unlike the first two lines of research reviewed above, which are still emerging, a large number of studies have examined in-person primary care utilization. Prior research shows that people with long-term physical and mental health conditions tend to report greater intentions to use primary care services regularly than those without long-term conditions (Sambamoorthi et al., 2015; Starfield et al., 2005). The literature also identified several psychological factors that often diminish people's intentions to utilize primary care, such as medical mistrust, trust in

physicians, and perceived discrimination (Benkert et al., 2009; LaVeist et al., 2009; Powell et al., 2019).

Presence of Long-Term Health Conditions

Individuals with long-term health conditions, whether they are physical or mental, require primary care visits more regularly than the general population in order to manage their condition(s) throughout life (Sambamoorthi et al., 2015; Starfield et al., 2005). One study examined utilization of primary care and specialty services among older adults with comorbidities (Starfield et al., 2005). The study found that patients with more chronic conditions reported increased utilization of primary care services and even greater increased utilization of specialty services. As with physical conditions, Turner et al. (2018) found that college students with a mental health diagnosis engaged in more primary care visits than students without a diagnosis. These findings were further supported by a literature review of healthcare costs among patients with multiple chronic conditions (Sambamoorthi et al., 2015), which found that the presence of multiple chronic conditions is associated with significantly greater healthcare utilization (and thus costs).

Medical Mistrust

Medical mistrust is defined as the "tendency to distrust medical systems and personnel believed to represent the dominant culture in a given society" (Benkert et al., 2019). Medical mistrust is a reliable predictor of underutilization of healthcare services and the use of clinics or emergency rooms as a primary source of care (Adams et al., 2017; LaVeist et al., 2009; Powell et al., 2019). In one study examining the relationship between medical mistrust and healthcare utilization in a community sample, medical mistrust was associated with postponing or delaying seeking care that participants felt they needed (LaVeist et al., 2009). Powell and colleagues

(2019) have also found that African American men who reported higher levels of medical mistrust were significantly more likely to delay blood pressure screenings, which are often done in primary care setting, than African American men who reported lower levels of medical mistrust. A systematic review investigating associations between medical mistrust and colorectal screening (including some that were done specifically in the context of primary care) in African Americans found substantial evidence that mistrust is associated with lower rates of screening (Adams et al., 2017).

Trust in Physicians

While medical mistrust represents individuals' attitudes toward the healthcare system broadly, trust in physicians represents one's attitudes toward physicians specifically. Although medical mistrust and trust in physicians tend to strongly and negatively correlate (Kim et al., 2018), it is important to differentiate the two constructs. Because patients interact with physicians directly and can develop personal relationships with them, individuals might have different attitudes toward physicians than they do toward the healthcare system in general (Benkert et al., 2009; Benkert et al., 2019; Hall et al., 2002). For example, Benkert and colleagues (2009) examined medical mistrust, trust in healthcare providers, and patient satisfaction in a sample of African American patients treated by a nurse practitioner in a primary care setting. They found that participants, on average, reported being moderately trustful of their provider and highly satisfied with their care despite having moderate levels of mistrust of the healthcare system in general (Benkert et al., 2009).

Like medical mistrust, lower levels of trust in physicians are associated with greater negative attitudes toward (Benkert et al., 2009) and decreased utilization of healthcare services (Musa et al., 2009; O'Malley et al., 2004). In a study examining the relationship between trust in

one's regular primary care provider and use of preventive services in 961 low-income African American women, O'Malley et al. (2004) found that higher trust was associated with significantly greater use of recommended preventive services. A study of preventive health service use among older adults also found that trust in one's physician is associated with greater utilization of preventive health services (Musa et al., 2009).

Perceived Discrimination

Perceived discrimination is another factor that has been found to be associated with attitudes toward healthcare utilization. In their qualitative study, Okoro and colleagues (2020) conducted interviews with 22 low-income Black women to examine their experiences of perceived discrimination in healthcare. One common theme that emerged in this study was participants feeling that they received differential care compared to other races/ethnicities, as well as patients with higher socioeconomic status. Some patients also reported physicians' hesitancy to make physical contact with them. Other participants reported that their physicians made stereotypical assumptions about them—for example, that the patients were seeking drugs or had sexually-transmitted diseases (Okoro et al., 2020). Critically, participants further reported that these discriminatory experiences in healthcare frustrated them and made them consider leaving or not returning to the doctors' office.

Hausmann et al. (2008) also found that perceived discrimination in general (i.e., discrimination that an individual has personally experienced or discrimination that one perceives toward their racial/ethnic group that is not specific to the context of healthcare) is associated with less utilization of preventive services, including those that are offered in primary care, such as pap test, PSA test, and blood stool test. In another study that examines healthcare utilization in general (i.e., not specifically primary care), participants who reported that they had experienced

discrimination in their lifetime reported more medical care delays or non-utilization than those with no experiences of discrimination (Casagrande et al., 2007).

In summary, three lines of literature (i.e., telepsychiatry in college students, telehealth in non-college populations, and in-person primary care utilization) collectively identified five factors that are likely to be associated with *increased* intentions to utilize primary care telehealth and five factors that are likely to be associated with *diminished* intentions to utilize primary care telehealth in college students (Table 1).

Table 1

Factors associated with intentions to use healthcare services in relevant literature

Factor	Literature		
	Telepsychiatry in college students	Telehealth in non-college student populations	In-person primary care utilization
Increased intentions			
Convenience	X	X	
Accessibility	X	X	
Disease exposure risks		X	
Chronic conditions			X
Trust in physicians		X	X
Diminished intentions			
Technical difficulties	X	X	
Impersonality of care	X	X	
Privacy concerns	X	X	
Medical mistrust			X
Perceived discrimination			X

Additional Factors to Consider

Demographic Characteristics

Many demographic characteristics were found to be associated with either the identified factors or intentions (or actual care utilization) in prior research. This suggests that demographic

characteristics need to at least be statistically controlled in order to examine which identified factors uniquely predict college students' intentions to utilize telehealth for primary care. Demographic characteristics that have been found to be associated with the identified factors are age (Mamedova et al., 2018; Ward et al., 2014; van Houwelingen et al., 2018), race/ethnicity (Armstrong et al., 2008; Benkert et al., 2019; Do et al., 2010; LaVeist et al., 2000; Okoro et al., 2020), sexual orientation and gender identity (Macapagal et al., 2016; Jackson et al., 2019), and socioeconomic status (SES; Arpey et al., 2017; Stepanikova & Oates, 2017). Demographic characteristics that have been found to be associated with the actual care utilization (no studies on intentions) are age (Levine et al., 2020; Turner & Keller, 2015; Willis et al., 2020), race/ethnicity (Arnett et al., 2016; Mueller et al., 1998), sexual orientation and gender identity (Bertakis et al., 2000; Jackson et al., 2016; James et al., 2020; Tabaac et al., 2020), and SES (Kirby & Kaneda, 2005; Latham-Mintus et al., 2020).

Demographic Characteristics Associated with the Identified Factors. Research has shown that *age* is associated with the presence of long-term health conditions (Ward et al., 2014). In a study examining the prevalence of chronic conditions among U.S. adults, Ward et al. (2014) found that 33.2% of adults over 65 had at least three chronic conditions, 27.6% had two chronic conditions, and 25.0% of adults had one chronic condition. These rates among older adults were significantly higher than those among adults aged 45-64 (13.8%, 18.5%, and 30.6% respectively) and adults aged 18-44 (2.0%, 5.1%, and 19.4% respectively). Age is also associated with technological literacy (Mamedova et al., 2018), which in turn is associated with attitudes toward telehealth in older adults (van Houwelingen et al., 2018). A U.S. Department of Education report on the demographic characteristics of U.S. adults who are not digitally literate found that adults who are not digitally literate tend to be older (Mamedova et al., 2018). In a

mixed-methods study examining older adults' readiness for receiving telehealth services, Van Houwelingen et al. (2018) found that digital literacy was a predictor of older adults' intention to use telehealth.

Race/ethnicity has been consistently found to be associated with medical mistrust (Armstrong et al., 2008; Benkert et al., 2019; LaVeist et al., 2000), trust in physicians (Do et al., 2010), and perceived discrimination (LaVeist et al., 2000; Okoro et al., 2020). Historically, medical institutions have been overwhelmingly controlled by the "dominant culture" (White men with high socioeconomic status) and have not been committed to the best interests of individuals who do not fit into the dominant group (Benkert et al., 2019). Additionally, medical mistrust specifically in Black Americans is rooted in historical oppression and discrimination both in and out of healthcare unique to them, such as slavery, segregation, and the history of medical experimentation on Black Americans (e.g., the Tuskegee Syphilis Study) (Brandon et al., 2005; LaVeist et al., 2000). In a study of patient satisfaction in Black and White cardiac patients, Black patients were significantly more likely than White patients to report medical mistrust and perceived racial discrimination (LaVeist et al., 2000). In another study that was conducted with a sample of racially diverse participants who had been treated in a large, urban, Mid-Atlantic healthcare system, Black participants reported significantly greater distrust in the healthcare system (Armstrong et al., 2008). Likewise, in a sample of patients with prostate cancer, Do et al. (2010) found that Black patients report lower trust in physicians. In a qualitative study of low-income Black women, participants consistently reported perceptions of racial discrimination in healthcare settings (Okoro et al., 2020). Consistent with these studies, a systematic review of medical mistrust found robust racial/ethnic differences in medical mistrust, such that Black

Americans, Latinx populations, and Native Americans tend to report higher levels of medical mistrust than White Americans (Benkert et al., 2019).

Sexual orientation and gender identity is another characteristic associated with perceived discrimination (Macapagal et al., 2016). In a study examining perceived discrimination, health, and wellbeing in a sample of 304 middle-aged and older LGBTQ people, researchers found that 47.4% of participants reported perceived discrimination in daily life and 23.7% reported receiving poorer treatment from doctors or hospitals (Jackson et al., 2019).

Finally, research has found that *SES* is associated with accessibility of healthcare (Arpey et al., 2017) and perceived discrimination (Stepanikova & Oates, 2017). In a qualitative study examining perceptions of healthcare in a sample of 80 enrollees in a state Medicaid program, the majority of participants reported that their access to healthcare was worse because of their SES (Arpey et al., 2017). Participants in this study described delaying or avoiding care due to cost, as well as difficulties finding providers who were willing and able to care for them. In a study examining perceived discrimination and privilege in healthcare among 90,477 respondents in the Behavioral Risk Factor Surveillance System (2005–2013) who had sought care in the past 12 months, Stepanikova & Oates (2017) found that individuals who face cost-related barriers to care report greater perceived discrimination.

Demographic Characteristics Associated with Utilization. Age (Levine et al., 2020; Turner & Keller, 2015; Willis et al., 2020), race/ethnicity (Arnett et al., 2016; Mueller et al., 1998), sexual orientation and gender identity (Bertakis et al., 2000; Jackson et al., 2016; James et al., 2020; Tabaac et al., 2020), and SES (Kirby & Kaneda, 2005; Latham-Mintus et al., 2020) are all associated with actual utilization of healthcare. For example, previous research shows that *age* is a significant predictor of primary care utilization. People tend to utilize healthcare services

more as they get older and young adults, including college students, tend to have the lowest rates of healthcare utilization of any age group (Levine et al., 2020; Turner & Keller, 2015; Willis et al., 2020). There is evidence that college students engage in preventive primary care visits roughly 3 times less than the general population (Turner & Keller, 2015; Willis et al., 2020).

Research has consistently demonstrated that *racial* and *ethnic* minorities are less likely to use primary care services and engage in preventive care than White patients (Arnett et al., 2016; Mueller et al., 1998). For example, Arnett et al. (2016) found that Black patients are more likely to use the emergency department and hospital outpatient department, which are partially due to underutilization of primary and preventive care, while White patients are more likely to visit a primary care provider as a usual source of care. It is important to acknowledge that it is not race that causes Black Americans to underutilize healthcare. Rather, the social, environmental, and historical factors that determine the experience of Black Americans in general in the US have created barriers that influence Black Americans to underutilize healthcare. Those social and environmental factors include insurance status (Holden et al., 2015; Mueller et al., 1998), SES (Arpey et al., 2017; Stepanikova & Oates, 2017), medical mistrust (Adams et al., 2017; LaVeist et al., 2009; Powell et al., 2019), trust in physicians (Benkert et al., 2009; Do et al., 2010), and perceived discrimination (LaVeist et al., 2000; Okoro et al., 2020).

Sexual orientation and gender identity is also associated with healthcare utilization, and the nature of association and its underlying mechanisms are very similar to the one for race/ethnicity. For example, a study examining healthcare utilization and experiences among a racially diverse sample of 206 LGBTQ adults found that 8.3% of participants reported that they did not seek or delayed seeking preventive or needed medical care due to perceived discrimination (Macapagal et al., 2016). In a study examining differences in insurance access,

healthcare utilization, and unmet need for care across sexual orientations and gender identities, Tabaac et al. (2020) also found that sexual minorities (mostly heterosexual, bisexual, gay/lesbian) were more likely than completely heterosexual individuals to use emergency departments as a usual source of care and were less likely to be privately insured. Another study found that sexual minorities are more likely to delay needed care for reasons of not wanting to bother a healthcare provider, concerns over cost/insurance, bad prior healthcare experiences, and being unable to get an appointment (Jackson et al., 2016). One study examined the impact of gender identity on primary care utilization among 509 men and women at a university medical center (Bertakis et al., 2000). Researchers found that women had a significantly higher mean number of visits to their primary care clinic and diagnostic services than men, as well as significantly higher mean costs. Similar findings have been observed in a sample of students at a public university in the southeastern United States as well, such that female students tend to report greater utilization of primary care services than male students (James et al., 2020).

Prior literature suggests that *SES* is another factor that significantly predicts utilization of healthcare services. A study examining the impact of neighborhood socioeconomic disadvantage on access to healthcare found that living in disadvantaged neighborhoods reduces the likelihood of having a usual source of care and of obtaining recommended preventive services (Kirby & Kaneda, 2005). In another study, Latham-Mintus and colleagues (2020) analyzed data obtained from a sample of 3,032 participants who participated in the 2012 Health and Retirement Study, an ongoing longitudinal survey of Americans older than 50 years, to examine the role of perceived neighborhood disorder in preventive care utilization. Perceived neighborhood disorder is operationalized as "visible cues indicating a lack of order and social control in the community" and is often used as an indicator of low SES. The researchers found that greater neighborhood

disorder reliably predicted lower utilization of preventive health services. Table 2 below summarizes how each demographic characteristic is associated with either the identified factors or intentions.

Table 2

Associations between demographic characteristics and healthcare utilization

	Age	Race/ ethnicity	Sexual orientation/ Gender identity	SES
Convenience				
Accessibility				X
Disease exposure risks				
Long-term health conditions	X			
Trust in physicians		X		
Technical difficulties	X			
Impersonality of care				
Privacy concerns				
Medical mistrust		X	X	
Perceived discrimination		X	X	X
Utilization	X	X	X	X

Finally, there is some evidence that many of the demographic characteristics that have been found to be associated with the identified predictors, healthcare utilization, or both may be also associated with preference for telehealth vs in-person care. Specifically, Predmore et al. (2021) found, in a sample of 2,080 participants, *younger* participants and participants with higher *SES* generally prefer telehealth to in-person care, as compared to their counterparts. Additionally, *race/ethnicity* was associated with different patterns of preference, such that Black respondents were more likely to prefer in-person care to telehealth, whereas Hispanic/LatinX respondents were more likely to prefer telehealth to in-person care.

Unique Factors during the COVID-19 Pandemic

Because the sudden shift in the utilization of telehealth for primary care visits is confounded with the COVID-19 pandemic (Alexander et al., 2020; Bestsennyy et al., 2021), there may be additional factors that may predict people's intentions to utilize telehealth only during the pandemic and thus should be tested in the current proposed research. One potential such factor is *COVID-19 anxiety*. A study examining factors predictive of social distancing intention found that anxiety associated with the COVID-19 pandemic is associated with increased risk perception, greater perceived vulnerability, and greater severity of COVID-19 (Graf et al., 2021). As discussed earlier, greater perceived risk of disease exposure is associated with greater intentions to utilize telehealth (Lacritz et al., 2020). Additionally, Hansen et al. (2021) found that perceived susceptibility to COVID-19 is associated with greater compliance to social distancing. Greater compliance to social distancing may, in turn, be associated with greater intentions to utilize telehealth.

Another potential factor unique during the COVID-19 pandemic is *political affiliation*. There is strong evidence that political affiliation is a significant predictor of behaviors, attitudes, and health outcomes related to COVID-19 in the U.S. (Ingram et al., 2021; Kiviniemi et al., 2022; Schoeni et al., 2021). More specifically, individuals who self-identify as Conservative report less adherence to COVID-19 mitigating health behaviors, such as mask-wearing (Schoeni et al., 2021) and social distancing (Ingram et al., 2021), as compared to individuals who self-identify as Liberal. Individuals who self-identify as Conservative also significantly underestimate the severity of COVID-19 (Kiviniemi et al., 2022). Again, considering that lower perceived risk of disease exposure is one of the primary factors that influences patients' intention

to use telehealth (Lacritz et al., 2020), more Conservative individuals who report less perceived risk associated with COVID-19 may also report diminished intention to use telehealth.

The Present Study

This study is the first to integrate the three lines of research reviewed above and examine key psychological factors that predict college students' intention to use telehealth for primary care—a necessary precursor to actual telehealth utilization. More specifically, this study examined which factors that have been identified to predict college students' intentions to utilize telepsychiatry, non-college-students' intentions to utilize telehealth in primary care, and patients' utilization of in-person primary care in prior research (e.g., trust in physicians, medical mistrust, perceived discrimination, presence of long-term physical and mental health conditions) would be associated with college students' intentions to utilize telehealth in primary care. This study also examined whether COVID-19 anxiety and political affiliation would predict college students' intention to use telehealth for primary care. Finally, this study investigated whether and which demographic characteristics (e.g., age, race/ethnicity, sexual orientation and gender identity, and socioeconomic status) are associated with telehealth attitudes and intentions. To address these research questions, I recruited VCU students and administered an online survey. Findings from the proposed research will serve as a stepping stone to the development of future interventions designed to increase primary care utilization in the college population.

Method

Participants

The participants in this study were 782 undergraduate students at Virginia Commonwealth University (VCU) recruited through the SONA research participant pool. SONA Systems software is a cloud-based research and participant management technology that allows

researchers to easily recruit participants from universities (SONA Systems, 2022). An a priori power analysis using G*Power software (Faul et al., 2009) revealed that, with six predictors and six covariates in a model (as proposed in our initial analysis plan), we can achieve adequate power (.80) to detect small effect size (f^2 = .02) with a minimum of 688 participants.

Because there is no prior research that examines the associations among the identified predictors and attitudes toward telehealth or intention to use telehealth in college students, the effect size was estimated based on literature reviewed earlier. Published studies in the first two lines of literature (i.e., telepsychiatry in college students and telehealth in non-college populations) primarily reported descriptive results rather than results from inferential statistics. As a result, we were unable to generate meaningful effect size estimates from these lines of literature. In the third line of literature (i.e., factors associated with in-person primary care utilization), odds ratios examining medical mistrust, trust in physicians, and perceived discrimination as predictors of primary care utilization ranged between 1.5 (O'Malley et al., 2004) and 2.87 (Powell et al., 2019), which is equivalent to small and small-to-medium effect sizes, respectively (Chen et al., 2009). Because the effect size for the present study was estimated based on a very limited number of available studies, using a more conservative estimate (i.e., small effect size) gives us greater confidence in our ability to detect the expected effects.

Measures

Primary Outcome

Intention to Use Telehealth. Participants' intention to use telehealth was assessed with the question, *"How likely are you to use telehealth services if they were offered by your provider?"* This item will be measured on a 1 (very unlikely) to 5 (very likely) Likert scale. This measure has previously been used to assess intention to use telehealth by Ghaddar et al. (2020).

Secondary Outcomes

Telehealth Attitudes. We planned to assess participants' attitudes toward telehealth by adapting two scales: the Telehealth Attitudes Questionnaire (TAQ; Grubaugh et al., 2008) and a set of supplementary questions to the National College Health Assessment (NCHA) that was used by Schuh (2021) to assess college students' attitudes toward telepsychiatry. The TAQ is designed to assess participants' general attitudes (i.e., valence) toward telehealth, comfort with and confidence in using telehealth in different settings (e.g., clinic, church, home), access to technology that is necessary to use telehealth, and concerns related to telehealth (e.g., technology too sophisticated, not as effective as face-to-face). The NCHA supplement further expands on the perceived benefits and concerns related to telehealth and assesses additional factors that are not examined in the TAQ, such as participants' beliefs about the confidentiality and financial cost of telehealth vs in-person care.

The TAQ is a 22-item measure and has demonstrated high internal consistency (α = .88) in previous research (Grubaugh et al., 2008). The TAQ consists of three components: a 14-item Telehealth Attitudes subscale, 4 items assessing concerns with telehealth, and a 4-item Technology Availability subscale. There was no internal consistency data available at the subscale level in Grubaugh et al. (2008). In addition to replacing the word "telepsychiatry" with "telehealth," we modified the TAQ by deleting items that were not relevant to telehealth for primary care (e.g., *"I would feel comfortable and have confidence using telehealth if I needed to consult with a dermatologist"*) and adding items to increase relevance for a college population (e.g., *"I would feel comfortable using telehealth from my dorm room*).

The TAQ General Attitudes Subscale assessed participants' valence toward telehealth (*"I would feel comfortable and have confidence using telehealth if I needed to have an annual*

check-up with a family physician (even when feeling healthy"), comfort using telehealth in different settings *("I would feel comfortable using telehealth at a local clinic"*), and preferences for telehealth vs in-person care (*"I would prefer to use telehealth (instead of visiting a primary care physician in person)"*). In our sample, the General Attitudes subscale demonstrated strong internal consistency (α = .88). The items included in the General Attitudes subscale are measured on a 1 (not at all) to 5 (extremely) Likert scale, and a composite score was computed by averaging the 14 items. Higher values indicate more positive attitudes toward telehealth. Due to its high internal consistency in our sample and the specific research questions examined in this study, the TAQ General Attitudes subscale was the only scale used to measure telehealth attitudes used in our final structural equation models.

The Technology Availability subscale demonstrated weak internal consistency in our sample (α = .45). However, the items assessing whether participants had access to a telephone, computer, and high-speed internet were strongly correlated ($r > 0.52$ in all bivariate correlations), while an item assessing access to dial-up internet was weakly correlated with the other items ($r < 0.14$ in all bivariate correlations). Because of this weak correlation and because most participants in our sample had access to high-speed internet (95.2%), we decided to exclude the item measuring access to dial-up internet. After excluding this item, the Technology Availability subscale demonstrated acceptable internal consistency (α = .80). Finally, the items included in the Technology Availability subscale are measured on a binary scale (0 = no, 1 = yes). A composite score was computed by calculating the mean score of the remaining three items, with higher numbers indicating greater access to technology.

Grubaugh et al. (2008) did not create a composite score from the items assessing concerns with telehealth, because each item assessed separate constructs (e.g., *technology too*

sophisticated, would not help with my problems, fear of what others might think, would not be as effective as in-person sessions). Thus, we had planned to include each individual item in our analyses rather than creating a composite score. The items assessing concerns with telehealth are measured on a binary scale (0 = no, 1 = yes).

The NCHA supplement consists of two parts. The first part of the NCHA supplement includes 5 items that measure participants' level of comfort across health visit modalities (i.e., face-to-face in clinic, face-to-face virtually, etc.) on a 1 (very uncomfortable) to 5 (very comfortable) Likert scale. Two items measured participants' level of comfort communicating with a physician over text or email. Because these items do not align with our definition of telehealth as the use of synchronous digital information and communication technologies, these items were excluded from our analyses. The remaining three items assessed participants' comfort using telehealth with video, telehealth without video, and visiting a physician in-person. Because each item assesses participants' comfort in different modalities, we planned to report descriptive statistics for each item separately rather than creating a composite score.

The second part includes 5 items assessing participants' general attitudes towards telehealth. These items are all assessed on a 1 to 3 scale, but the labels vary across items. Example items include "*Do you think meeting with a medical provider face-to-face using telecommunication to discuss your mental health would be*" (response options: "1. Less confidential than meeting face-to-face in a clinic setting," "2. Just as confidential as meeting face-to-face in a clinic setting," "3. More confidential than meeting face-to-face in a clinic setting"); "*Do you think meeting with a medical provider face-to-face using telecommunication to discuss your mental health would*" (response options: "1. Take less time than meeting face-to-face in a clinic setting," "2. Take about the same amount of time as meeting face-to-face in a

clinic setting," "3. Take more time than meeting face-to-face in a clinic setting"); and "*Do you think meeting with a medical provider face-to-face using telecommunication to discuss your mental health would*" (response options: "1. Cost less money than meeting face-to-face in a clinic setting," "2. Cost about the same amount of money as meeting face-to-face in a clinic setting," "3. Cost more money than meeting face-to-face in a clinic setting"). No internal consistency calculations are described in Schuh (2021), as each item assesses a separate construct and was analyzed individually rather than as part of a composite score.

Predictors

Trust in Physicians. Participants' trust in physicians in general was measured using the General Trust in Physicians Scale (GTPS; Hall et al., 2002). The GTPS consists of 11 items measured on a 1 (strongly disagree) to 5 (strongly agree) Likert scale. This scale is designed to assess participants' level of agreement with statements such as "*Doctors in general care about their patients' health just as much or more than their patients do"* and *"Doctors always use their very best skill and effort on behalf of their patients."* This scale was selected because of its high internal consistency in previous research (α = .89; Hall et al., 2002) and because it concerns physicians in general, rather than an individual's specific provider. Since many college students do not have a primary care provider (Levine et al., 2020; Turner & Keller, 2015), measuring trust in doctors in general is more applicable in this sample. A composite score was created by calculating the mean of the 11 item scores (reverse-scored for negative items), with higher scores indicating more trust in physicians. The GTPS demonstrated strong internal consistency in our sample (α = .88).

Medical Mistrust. Participants' trust in the overall healthcare system, as opposed to individual physicians, was assessed using the Medical Mistrust Multiformat Scale (MMMS;

Sanford & Clifton, 2022). The MMMS includes 6 items, three of which are assessed with a 5-point Likert scale, two of which are assessed with a 6-point Likert scale, and one of which was assessed with a 7-point Likert scale, and it has been validated with high internal consistency (α = .86). The scales for each item have different labels: "completely feel this way/definitely do not feel this way," "always/never," "tremendous risk/almost no risk" (reverse-coded), and "strongly agree/strongly disagree." Because the items in the MMMS have different denominators, we first computed standardized scores for each MMMS item. We utilized this approach so that items that are measured on larger scales (i.e., a 7-point scale vs. a 5-point scale) would not be weighed more heavily in the composite score. Next, we averaged scores across the six standardized item scores to create a composite score, with higher scores indicating greater mistrust in the healthcare system. The MMMS includes survey items such as *"Do you feel like medical authorities are trustworthy and honest?"* and *"How big is the risk that you may be harmed by medical treatment given to you in the United States?"* This scale was selected because a study by Sanford & Clifton (2022) found that MMMS demonstrates larger convergent validity effects than the Medical Mistrust Index, another measure commonly used to assess medical mistrust (LaVeist et al., 2009). The MMMS demonstrated acceptable internal consistency in our sample (α = .73).

Perceived Discrimination. Participants' perceived discrimination will be assessed with two measures. The first measure is designed to assess participants' perceptions of their own personal experiences of discrimination as well as their fellow ingroup members' experience of discrimination. The measure consists of eight items (five for the personal-level discrimination, three for the group-level discrimination) that were selected from two separate measures (Branscombe et al., 1999; Levin et al., 2002). Example items for the personal-level discrimination include "*I feel like I am personally a victim of society because of my race*" and "*I*

personally have been a victim of racial discrimination," and example items for the group-level items include "*Other members of my race experience discrimination*" and "*My racial group is discriminated against*." The scale ranges from 1 (strongly disagree) to 5 (strongly agree), and a composite score was created for personal- and group-level discrimination separately by computing the mean. Higher scores indicate greater perceived discrimination. This scale was validated with high internal consistency (α = .84) and was selected over other measures of perceived discrimination because it captures variability of perceived discrimination in Black Americans better (Brown et al., 2021; Hagiwara et al., 2015) than other measures commonly used in health disparities research (Williams et al., 2003; Bastos et al., 2010). This scale demonstrated excellent internal consistency in our sample (α = .96).

The second measure consists of three items adapted from the Healthcare for Communities survey (HCC; Sturm et al., 1999; Mays et al., 2017) and assesses participants' perceived discrimination in healthcare settings specifically. The three items are: "*a healthcare worker or provider acted as if they were uncomfortable with me*," "*a healthcare worker or provider made negative, hostile, or disrespectful comments*," and "*I felt discriminated against, treated disrespectfully, or given less good care than other people*." Each item will be assessed with a 1 (strongly disagree) to 5 (strongly agree) Likert scale. Mays et al. (2017) coded participants who agree with any of these items as a 1 and participants who do not agree with any items as a 0. However, we decided to use a Likert scale because we are interested in examining how individual variation in perceptions of discrimination predicts telehealth rather than only examining whether one has had an experience of discrimination as a predictor. The internal consistency of these three items of the HCC has not been analyzed in prior research but internal consistency was strong in our sample (α = .82). These items were included to assess perceived

discrimination in the context of healthcare specifically, which could influence participants' preferences for telehealth more than general perceived discrimination.

COVID-19 Anxiety. This study assessed participants' anxiety related to the COVID-19 pandemic with the 7-item COVID-19 Anxiety Scale (CAS; Chandu et al., 2020). Example items include *"How afraid are you of acquiring COVID-19 when going into the public?"* and *"How worried are you of acquiring COVID-19 when an unknown person is coming closer to you?"* Each item is assessed on a 4-point sliding scale, ranging from 1 to 4. Labels for anchoring points vary across items, and they include: "not at all afraid/extremely afraid," "never/always," and "not at all/extremely." The CAS is scored by computing a sum of all items (α = .74), with higher scores indicating increased anxiety associated with COVID-19. The CAS demonstrated strong internal consistency in our sample (α = .88).

Political Affiliation. Participants' political affiliation will be assessed with one item on a sliding scale ranging from 0 (Liberal) to 10 (Conservative; Agley, 2020).

Presence of Long-Term Health Conditions. In order to assess whether participants currently have a chronic/long-term health condition, we developed one-item scales for physical and mental health. Participants will indicate no (0) or yes (1) in response to the following questions: *"Have you been diagnosed with a chronic/long-term physical health condition that you are currently managing?"* and *"Have you been diagnosed with a chronic/long-term mental health condition that you are currently managing?"* This measure was selected over providing participants with a checklist of several different chronic health conditions because we aimed to assess whether the presence/absence of any chronic health condition (not which specific chronic health condition) would predict telehealth attitudes. However, we did provide a list of chronic health conditions that are common among college students for participants to reference. We also

differentiated the presence/absence of physical versus mental chronic health conditions because telehealth attitudes within the context of primary care may be contingent upon the presence of physical, but not mental, chronic health conditions or vice versa.

Covariates

Demographics. Participants reported demographic information including age, race/ethnicity, sexual orientation and gender identity, socioeconomic status, and number of children. Participants selected which category best describes their race (White American, Black/African American, Native American, Native Hawaiian/Pacific Islander, East Asian, South Asian, Middle Eastern/Arab, Multiracial, or not listed), their ethnicity (Hispanic/Latino(a) or not), their gender identity (Cis-woman, Cis-man, Trans-woman, Trans-man, Genderqueer or non-binary, or not listed), and their sexual orientation (Heterosexual, lesbian/gay, bisexual, queer, or not listed). Participants reported parental education, whether they receive governmental support currently, and whether they have received governmental support in the past. We used these items as a proxy for socioeconomic status.

Telehealth Utilization. We planned to assess participants' prior utilization of telehealth using two items developed by Fischer et al. (2020). Participants were asked to select the ways that they have ever communicated with a doctor to get advice about a health issue (e.g., text message, email, messaging within a website, telephone, teleconference, eVisit) and whether they have had a telephone or videoconferencing visit with a doctor to get advice about a health issue in the last 12 months (response options: "Yes, telephone visit with my personal doctor;" "Yes, telephone visit with an unfamiliar doctor;" "Yes, videoconferencing visit with my personal doctor;" "Yes, videoconferencing visit with an unfamiliar doctor;" and "None of these"). For both questions, participants were able to select all answers that apply. However, the first item did

not include a “None of these” option, so it was not possible to determine whether participants had never used telehealth, or whether their responses were missing. Thus, only the second item assessing telehealth use within the last 12 months was included in our subsequent analyses. This item was coded as a binary yes/no measure, in which participants who reported using any type of telehealth in the last 12 months were coded as “1” and participants who reported “None of these” were coded as “0.”

Procedure

Participants self-enrolled into the study through SONA and completed all measures via an online questionnaire, which was administered through Qualtrics. All students in the SONA system were eligible to participate in the study and there were no exclusion criteria. As compensation for completing the questionnaire, participants were compensated with 1 SONA credit toward a class research requirement. Data collection took place during the Fall 2022 semester.

Analysis Plan

Data were analyzed using SPSS Statistics 28.0 (IBM Corp, 2021) and JASP 0.17.1 (JASP Team, 2023). To minimize concerns over multiple testing with nine predictor variables (e.g., trust in physicians, medical mistrust, perceived discrimination- personal, perceived discrimination- group, perceived discrimination- healthcare, COVID-19 anxiety, political orientation, presence of long-term physical health condition, presence of long-term mental health condition; Ranganathan et al., 2016), the first step in our preliminary analysis was to identify potential latent variables that cluster together to use in our primary analysis. We conducted an exploratory factor analysis (EFA) assuming no *a priori* factor structure using principal axis factoring and a Promax rotation. This EFA included all nine predictor variables. We used

DeVellis' (1991) general cutoff of .50 to determine whether an item loads meaningfully onto a factor, as well as Worthington and Whittaker's (2006) threshold that cross-loadings should be at least .15 less than an item's highest factor loading. Thus, we selected predictors to load onto latent variables if they achieved simple structure, defined as the highest-loading eigenvalue exceeding an absolute value of .50, with all cross-loadings at least .15 less than the highest factor loading. After identifying latent variables, the next step in our preliminary analysis assessed means, standard deviations, ranges, and distributions of both items and composite scores for the outcomes (e.g., intention to use telehealth, attitudes toward telehealth), as well as composite scores of the predictors (e.g., trust in physicians, perceived discrimination in healthcare) used in our primary analyses. Finally, we explored bivariate correlations between predictors, covariates (e.g., demographics, prior telehealth utilization), and outcomes.

The primary analyses that we initially proposed were six stepwise regression models featuring intention to use telehealth and composite scores of each subscale of the TAQ (General Attitudes, Technology Availability, and Telehealth Concerns) and NCHA Supplement (Comfort Across Modalities, General) with the backward elimination of all predictor variables. Each model in the proposed analysis plan would start with all predictor variables, and we would delete one variable at a time until no variable could be removed without losing a model fit (ΔR^2, $p <$ .05). However, only one of these five composite scores (TAQ General Attitudes) demonstrated acceptable internal consistency and, upon further examination, the authors who developed these scales examined the remaining subscales on the item-level rather than creating composite scores (Grubaugh et al., 2008; Schuh, 2021). Treating each individual item of these subscales as an outcome in a series of stepwise regressions with backward elimination would require 14 different

models, greatly increasing the likelihood of Type I errors through multiple testing (Ranganathan et al., 2016).

Furthermore, not all these outcome measures aligned with the overall goal of this study: to identify factors associated with college students' intention to use telehealth and *attitudes* toward telehealth. Attitudes are defined as a general and enduring evaluation of an object or concept and are generally operationalized in terms of valence (positive vs negative) and magnitude (deviation away from neutrality in either a positive or negative direction (Fabrigar & Wegener, 2010). In contrast, beliefs are defined as an enduring organization of perceptions and cognitions about an object or target (Fishbein & Raven, 1962). Several of the items in the TAQ Telehealth Concerns and NCHA General subscale examined *beliefs* about telehealth rather than *attitudes* (e.g., "*Telehealth would probably not help with my problems*," "*Do you think meeting with a medical provider using telecommunication with video (e.g., video chat) to discuss your health would: [take less time than in-person, take about the same amount of time as in-person, take more time than in-person]*"). Thus, these subscales were excluded from our final models and we examined the TAQ General Attitudes subscale as our sole measure of telehealth attitudes.

To explore factors that predict intention to use telehealth and attitudes toward telehealth while addressing the two issues discussed above, we modified the original analysis plan and developed and tested two structural equation models (SEM) that only included items related to telehealth intentions and attitudes in our primary analyses (i.e., the single item assessing telehealth intentions and the composite score of the TAQ General Attitudes subscale). We created one SEM for our primary analysis which included intention to use telehealth as the outcome, four latent variables as predictors—attitudes and experiences related to healthcare (composed of trust in physicians, medical mistrust, perceived discrimination in healthcare),

perceived discrimination (perceived discrimination at the personal- and group-level), COVID-19 attitudes (COVID-19 anxiety and political orientation), and presence of a long-term health condition (presence of long-term physical and mental conditions)— and 9 demographic variables (age, gender [cisman, non-binary or not listed], race [Black, non-Black POC], Hispanic ethnicity, LGBQ sexual orientation, parental education, and prior utilization of telehealth) as covariates. We created another SEM for our secondary analysis which included the same covariates and predictors but utilized attitudes toward telehealth (measured only by the TAQ General Attitudes subscale) as the outcome. Categorical variables (e.g., race/ethnicity, gender, presence of long-term physical or mental health condition) were dummy-coded, and we used $\alpha = .05$ as the cut-off criterion for these analyses. These SEMs were tested using JASP 0.17.1 (Jasp Team, 2023).

In order to address missing data in our models, we used two approaches: full information maximum likelihood (FIML) to impute missing data for continuous variables and listwise deletion to remove observations with missing data on categorical variables. FIML generates estimates for missing values using a casewise likelihood function based on the mean and variance of the missing variable, as well as its covariance with other variables in the model (Enders & Bandalos, 2001). Comparisons of different approaches used for missing data in SEMs have revealed that FIML is more efficient and generates more unbiased estimates for missing values than traditional approaches such as listwise deletion and pairwise deletion, which require the deletion of observations, reducing the sample size and statistical power (Enders & Bandalos, 2001; Graham, 2003). However, FIML is most appropriate for use with continuous variables and tends to produce biased estimates when categorical and ordinal variables have missing data (Chen et al., 2020).

To address these concerns, we used listwise deletion to remove observations with missing data on our dummy-coded categorical variables (e.g., presence of long-term physical or mental health condition, race, ethnicity). Prior research indicates that listwise deletion generates stronger approximations of sample means and variance and lower empirical relative biases than other techniques for missing categorical data under the assumptions that 1) data are missing at random, and 2) approximately 20% of the sample or less is lost using this approach (Center for Behavioral Health Statistics and Quality, 2018; Chen & Astebro, 2003; Enders, 2003). In total, we removed 159 observations (20.3% of our sample) from our dataset because of missing data on categorical variables. This proportion of missing data is consistent with the percentage of missing data that is often found in psychological datasets (Enders, 2003). Additionally, we removed two covariates—past receipt of government assistance and current receipt of government assistance—from our SEMs because of the large amount of missing data on these two variables. By including these variables as covariates, our listwise deletion approach would have required us to delete an additional 61 observations—28.1% of our sample when combined with the original 159 observations. In order to retain as much of our sample size as possible and reduce the likelihood of biased estimates (Chen & Astebro, 2003), we decided to exclude these two variables from our models. We also excluded the number of children from the analyses because only 26 of 623 participants reported having any children, which heavily skewed this variable and negatively impacted model fit.

Results

Participant Characteristics

Our final sample, following all exclusions, was composed of 621 participants. A large majority (94.9%) of the participants in our sample were between 18 and 21 years of age, though

participants in our sample ranged from 17 to 43 years old (M = 18.94, SD = 2.31). Participants in this sample were younger on average than the age distribution of all college students in the U.S., as only 60.3% of U.S. college students were 21 years of age or younger in 2019 per the National Center for Education Statistics (2021). However, the age distribution in our sample is typical in the context of psychological research, which tends to use first-year students enrolled in introductory psychology courses as participants (Beanland et al., 2020; Gallander Wintre et al., 2001).

The gender distribution in our final sample (73.8% cisgender women, 19.0% cisgender men, and 7.2% non-binary or gender not listed) was similarly reflective of typical samples that examine undergraduate psychology students, in which cisgender women tend to be disproportionately represented (Gruber et al., 2021). An additional two participants identified as transgender men in our original sample. However, because patterns of perceived discrimination and healthcare avoidance tend to be qualitatively different between transgender individuals and other non-binary and gender diverse populations (Budge et al., 2014; James et al., 2016), we determined that it would not be appropriate to aggregate these individuals into the non-binary or gender not listed group. We excluded these transgender participants from our subsequent analyses, reducing the final sample from 623 to 621 participants.

The sample that we examined included a larger proportion of racially minoritized individuals than the overall population of college students in the U.S. (National Center for Education Statistics, 2021). Fewer students in our sample reported their ethnicity as Hispanic/Latino(a) (18.4%) compared to the national average (21.1%). However, there was a greater proportion of Black students (25.9% vs 12.6%) and a smaller proportion of White students (41.7% vs 51.3%) in our sample compared to the national averages. Additionally, 0.6%

of the students in our sample identified as American Indian, 7.2% as East Asian, 4.2% as Middle Eastern/Arab, 3.5% as Multiracial, 1.1% as Native Hawaiian/Pacific Islander, 11.0% as South Asian, and 4.7% as another racial identity not listed. Each of these individual groups was too small to include as a separate covariate and maintain sufficient statistical power for our analyses, so we aggregated these groups into a Non-Black Person of Color (POC) group that comprised 32.4% of our sample. We acknowledge that patterns of perceived discrimination, medical mistrust, and healthcare utilization vary significantly between these different racial groups and that members of these groups face different experiences both in and out of the healthcare system. However, the size of our sample does not allow us to analyze meaningful distinctions between individual racial/ethnic identities beyond Black, Hispanic/Latino(a), and White, and the aggregation of these racial identities allows us to maintain our sample size while examining some diversity that may not be fully represented by only examining Black, Hispanic/Latino(a), and White participants.

Our sample was composed of 67.1% individuals who identified as heterosexual, 4.7% as lesbian/gay, 19.8% as bisexual, 4.3% as queer, and 4.0% as a sexual orientation or gender identity not listed. The lesbian/gay, queer, and not listed groups were each too small to include as separate covariates in our models. Furthermore, individuals who identified as lesbian/gay, bisexual, queer, or a gender identity not listed did not differ significantly on any of the predictor variables used in our analyses. Thus, we aggregated these groups into a composite Lesbian/gay, bisexual, queer, or not listed (LGBQ) variable. This categorization is consistent with the way that lesbian/gay, bisexual, queer, and other sexual orientations have been grouped in previous literature (Ayhan et al., 2020; Casey et al., 2019).

We assessed participants' parental education and whether participants have received government assistance, either currently or in the past, as proxies for socioeconomic status. Among participants' first parents, 5.6% had not completed high school, 22.0% had earned a high school diploma or GED, 19.7% had completed some college or an Associate's degree, and 52.8% had earned at least a Bachelor's degree. Among participants' second parents, 7.6% had not completed high school, 26.5% had earned a high school diploma or GED, 15.4% had completed some college or an Associate's degree, and 50.5% had earned at least a Bachelor's degree. Because there were no significant differences in average levels of education between participants' first and second parents, we created a composite score of these two variables to represent parental education. 30.2% of participants reported receiving government assistance at some point while growing up and 13.8% reported that they are currently receiving government assistance. Finally, 4.2% of participants in our sample reported having children. Demographic characteristics of the participants in our sample are reported in Table 3.

Table 3

Participant Characteristics

	n	**%**
Gender		
Cis-man	118	19.0
Cis-woman	458	73.8
Non-binary or not listed	45	7.2
Ethnicity		
Hispanic/Latino(a)	114	18.4
Not Hispanic/Latino(a)	507	81.6
Race		
Black	161	25.9
Non-Black POC	201	32.4
White	259	41.7
Sexual orientation and gender identity		
Heterosexual	417	67.1
Lesbian/gay, bisexual, queer, or not listed	204	32.9
Parents' level of education *(first and second parent combined)*		
Did not complete high school	78	6.6
High school diploma or GED	287	24.2
Some college/Associate's degree	209	17.6
Bachelor's degree	332	28.0
Some graduate or professional school	42	3.5
Graduate or professional degree	239	20.1
Received public assistance from the government while growing up		
Yes	169	30.2
No	391	69.8
Currently receiving public assistance from the government		
Yes	79	13.8
No	492	86.2
Children		
Yes	26	4.2
No	595	95.8
Utilization of telehealth within the last 12 months		
Yes	274	44.1
No	347	55.9

Preliminary Analyses

Exploratory Factor Analysis

A Scree plot (Cattell, 1966) revealed an inflection point at the fourth-highest eigenvalue, and there was a relatively small difference in the amount of cumulative variance explained by the first four factors (70.51%) compared to the first five (79.84%). This small difference and the inflection point at the fourth eigenvalue suggest grouping these predictor variables into four latent variables. General trust in physicians, medical mistrust (reverse-scored), and perceived discrimination in healthcare (reverse-scored) loaded with simple structure onto Factor 1. Perceived discrimination at the personal and group level loaded with simple structure onto Factor 2. COVID-19 anxiety and political orientation loaded with simple structure onto Factor 3. Presence of long-term physical and mental health conditions loaded with simple structure onto Factor 4. There were no predictor variables that did not achieve simple structure on one of these four factors. The item loadings for these four factors are reported in Table 4.

Table 4

Factor Loadings of Predictor Variables onto Latent Variables

Predictor	**EFA Factor**			
	1	**2**	**3**	**4**
Trust in physicians	**.92**	.13	.05	.10
Medical mistrust~	**.80**	-.05	.12	.02
Perceived discrimination- personal	-.14	**.89**	.02	.06
Perceived discrimination- group	.10	**.94**	-.17	.03
Perceived discrimination- healthcare~	**.57**	-.25	-.25	.03
COVID-19 anxiety	-.24	.21	**.57**	.07
Political affiliation	.19	-.26	**.86**	-.02
Long-term physical health condition	.19	.14	.04	**.94**
Long-term mental health condition	-.36	-.42	-.08	**.45**

Note. ~ = Item was reverse-coded, **bold** = highest factor loading

x

Item-Level Analyses of Outcome Measures

First, we examined item-level frequencies of each outcome measure (e.g., intention to use telehealth, TAQ General Attitudes) to assess the specific components of telehealth attitudes reported by participants in our sample. Approximately half of the participants in the current sample (47.7%) reported that they are likely or very likely to use telehealth services if they are offered by their provider. Another 30.4% of participants felt neutral toward using telehealth, while 21.9% of the sample were unlikely or very unlikely to use telehealth. Descriptive statistics of participants' intention to use telehealth are reported in Table 6.

In general, participants reported positive attitudes toward using telehealth for primary care if they were feeling sick (43.4% likely or very likely, 35.8% moderately likely, 20.8% unlikely or very unlikely) or for an annual check-up (42.6% likely or very likely, 29.9% moderately likely, 27.5% unlikely or very unlikely). On average, participants had high ("quite a bit" or "extremely") levels of comfort using telehealth from their home/apartment (74.3%) or their dorm room (60.3%). Participants were somewhat less comfortable using telehealth at a local clinic (32.7% quite a bit or extremely comfortable, 37.4% moderately comfortable, 29.8% a little bit or not at all comfortable) or student health services (34.8% quite a bit or extremely comfortable, 33.7% moderately comfortable, 29.5% a little bit or not at all comfortable). However, more than half (57.1%) of participants reported that they would be willing to use telehealth on campus if privacy was assured. Participants reported low ("a little bit" or "not at all") levels of comfort using telehealth at a local church (67.1%) or a public space on campus, such as the commons or library (70.5%).

Most participants reported that they would prefer to visit their primary care provider in-person, rather than using telehealth (68.5%), while only 10.2% of participants would prefer using

telehealth over visiting their provider in-person. However, participants reported more positive attitudes toward telehealth over in-person care if using telehealth would save them a one-hour (62.1%) or two-hour (77.4%) drive to a clinic. Finally, participants generally reported that they would be more likely to use telehealth for some health conditions than others (45.7% quite a bit or extremely likely, 24.8% moderately likely, 29.6% a little bit or not at all likely).

We created a composite score of the TAQ General Attitudes subscale to be included in our main analysis. On average, participants reported neutral attitudes toward telehealth (M = 3.06, SD = 0.69)—scored on a 1 to 5 scale. Descriptive statistics for each individual item of the TAQ General Attitudes subscale are reported in Table 5.

Table 5

Means, Standard Deviations, Ranges, and Distributions of TAQ Items

TAQ Item	Mean *(SD)*	Skewness *(SE)*	Kurtosis *(SE)*
Comfort using telehealth…			
… when ill	3.32 *(1.06)*	-0.18 *(0.10)*	-0.51 *(0.20)*
… for routine check-up	3.21 *(1.19)*	-0.21 *(0.10)*	-0.79 *(0.20)*
… at local clinic	3.04 *(1.13)*	-0.04 *(0.10)*	-0.61 *(0.20)*
… at local church	2.05 *(1.19)*	0.86 *(0.10)*	-0.33 *(0.20)*
… in public place	1.96 *(1.15)*	0.99 *(0.10)*	0.01 *(0.20)*
… at student health services	3.04 *(1.11)*	-0.05 *(0.10)*	-0.68 *(0.20)*
… from home/apartment	4.06 *(1.10)*	-1.14 *(0.10)*	0.62 *(0.20)*
… from dorm room	3.67 *(1.21)*	-0.66 *(0.10)*	-0.44 *(0.20)*
Likelihood of using…			
… in-person care over telehealth	3.97 *(1.07)*	-0.81 *(0.10)*	-0.07 *(0.20)*
… telehealth over in-person care	2.13 *(1.05)*	0.70 *(0.10)*	-0.14 *(0.20)*
… telehealth to save 1-hour drive	3.73 *(1.18)*	-0.67 *(0.10)*	-0.43 *(0.20)*
… telehealth to save 2-hour drive	4.21 *(1.09)*	-1.32 *(0.10)*	0.91 *(0.20)*
… telehealth on campus if privacy assured	3.60 *(1.13)*	-0.54 *(0.10)*	-0.42 *(0.20)*
… telehealth would be lower for certain conditions	3.16 *(1.39)*	-0.29 *(0.10)*	-1.13 *(0.20)*

Note. All items in this scale ranged from 1 to 5.

Descriptive Statistics of Predictors

The average scores on trust in physicians (M = 3.19, SD = 0.61) and discrimination at the group level (M = 3.08, SD = 1.48) were slightly above the midpoint of each scale. In contrast, the average levels of perceived discrimination at the personal level (M = 2.38, SD = 1.16), discrimination in the context of healthcare (M = 2.17, SD = 0.91), and COVID-19 anxiety (M = 1.80, SD = 0.66) were below the midpoint of each scale. We used standardized scores to create the composite score for medical mistrust (M = 0.00, SD = 0.66). Participants in our sample tended to report being more Liberal than Conservative (M = 3.25, SD = 2.09). 27.4% of

participants in our sample reported that they have been diagnosed with a long-term physical health condition and 41.7% with a long-term mental health condition.

Next, we checked the outcome and predictor variables' skewness and kurtosis to determine whether each outcome and predictor in our models are normally distributed. We considered variables normally distributed if skewness ranged between -2 and 2 and kurtosis ranged between -7 and 7 (Byrne, 2016; George & Mallery, 2018; Hair et al., 2010). According to these thresholds, all the outcome and predictor variables were normally distributed. Descriptive statistics of outcome variables are reported in Table 6 and descriptive statistics of predictor variables are reported in Table 7.

Table 6

Means, Standard Deviations, Ranges, and Distributions of Outcome Measures

Outcome Measure	**Mean *(SD)***	**Range**	**Skewness *(SE)***	**Kurtosis *(SE)***
Telehealth intent	3.32 *(1.12)*	1 to 5	-0.38 *(0.10)*	-0.52 *(0.20)*
Telehealth attitudes	3.06 *(0.69)*	1 to 4.86	-0.18 *(0.10)*	0.10 *(0.20)*

Table 7

Means, Standard Deviations, Ranges, and Distributions of Predictors

Predictors	**Mean *(SD)***	**Range**	**Skewness *(SE)***	**Kurtosis *(SE)***
General trust in physicians	3.19 *(0.61)*	1 to 5	0.21 *(0.10)*	0.13 *(0.20)*
Medical mistrust	0.00 *(0.66)*	-1.89 to 2.14	-0.09 *(0.10)*	-0.13 *(0.20)*
Perceived discrimination- personal	2.38 *(1.16)*	1 to 5	0.27 *(0.10)*	-1.12 *(0.20)*
Perceived discrimination- group	3.08 *(1.48)*	1 to 5	-0.25 *(0.10)*	-1.41 *(0.20)*
Perceived discrimination- healthcare	2.17 *(0.91)*	1 to 5	0.47 *(0.10)*	-0.44 *(0.20)*
COVID-19 anxiety	1.79 *(0.66)*	1 to 4	0.87 *(0.43)*	0.47 *(0.28)*
Political affiliation	3.25 *(2.09)*	0 to 10	0.53 *(0.10)*	0.30 *(0.21)*

Bivariate Correlations Between Study Variables

We conducted a series of bivariate correlations between all predictor variables in our models to assess relationships between study variables. In the SEMs that we used to conduct our primary analyses, we grouped the nine predictor variables into four latent variables. The first latent variable assessed participants' attitudes and experiences related to healthcare and was composed of trust in physicians, medical mistrust, and perceived discrimination in healthcare, all of which were significantly correlated. Participants who reported higher levels of trust in physicians tended to report lower levels of both medical mistrust, $r(614) = -.62$, $p < .001$, and perceived discrimination in healthcare, $r(615) = -.40$, $p < .001$. Medical mistrust and perceived discrimination in healthcare were also significantly positively correlated with each other, such that individuals who reported higher levels of perceived discrimination in healthcare tended to report higher levels of medical mistrust $r(616) = .33$, $p < .001$. The second latent variable assessed perceived discrimination at the personal and group level. Participants who reported higher levels of perceived discrimination at the personal level also reported higher levels of perceived discrimination at the group level, $r(617) = .79$, $p < .001$. The third latent variable assessed attitudes related to COVID-19 and was composed of COVID-19 anxiety and political orientation. Participants' political orientation and reported levels of COVID-19 anxiety were not significantly correlated, $r(288) = .10$, $p = .10$. Finally, the fourth latent variable assessed the presence of long-term physical and mental health conditions. Participants who reported that they had been diagnosed with a long-term physical health condition were more likely to report being diagnosed with a long-term mental health condition as well, $r(621) = .10$, $p = .02$. Bivariate correlations between predictor variables are reported in Table 8.

Table 8

Bivariate Correlations Between Predictor Variables

	1	2	3	4	5	6	7	8
1. Trust in physicians								
2. Medical mistrust	-.62**							
3. Perceived discrimination- personal	-.17**	.30**						
4. Perceived discrimination- group	-.05	.20**	.79**					
5. Perceived discrimination- healthcare	-.40**	.33**	.39**	.18**				
6. COVID-19 anxiety	-.13**	.17**	.32**	.16*	.32**			
7. Political affiliation	.14**	-.15**	-.07	-.05	-.06	.10		
8. Long-term physical health condition	-.03	.06	-.01	-.02	.05	.05	-.01	
9. Long-term mental health condition	-.13**	.12**	-.11**	-.20**	.12**	.07	-.10*	.10*

Note. *$p < .05$, **$p < .001$

Next, we conducted a series of bivariate correlations to examine whether each predictor variable was associated with the two outcome measures we used in our SEMs as well as whether the outcome measures were associated with one another. Individuals who reported greater intention to use telehealth also tended to report more positive attitudes toward telehealth, $r(607) = .50$, $p < .001$. Participants who reported higher levels of trust in physicians, $r(617) = .13$, $p < .01$ and the presence of a long-term mental health condition, $r(621) = .16$, $p < .001$, reported greater intention to use telehealth. In contrast, participants who reported higher levels of perceived personal discrimination, $r(618) = -.10$, $p = .01$, and perceived group discrimination, $r(619) = -.12$, $p < .01$, reported lesser intention to use telehealth. Participants who reported higher levels of trust in physicians reported more positive attitudes toward telehealth, $r(604) = .25$, $p < .001$. On the other hand, participants who reported higher levels of medical mistrust, $r(603) = -.17$, $p < .001$, perceived personal discrimination, $r(604) = -.12$, $p < .01$, perceived group discrimination, $r(605) = -.12$, $p < .01$, and perceived discrimination in healthcare, $r(604) = -.11$, $p < .01$, reported more negative attitudes toward telehealth. The results of these bivariate correlations are reported in Table 9.

Table 9

Bivariate Correlations Between Predictor Variables and Outcomes

	Telehealth Intent	Telehealth Attitudes
Telehealth intent		
Telehealth attitudes	.50**	
Trust in physicians	.13*	.25**
Medical mistrust	-.07	-.17**
Perceived discrimination- personal	-.10*	-.12*
Perceived discrimination- group	-.11*	-.12*
Perceived discrimination- healthcare	-.03	-.11*
COVID-19 anxiety	-.09	-.04
Political affiliation	-.05	.02
Long-term physical health condition	.00	.01
Long-term mental health condition	.16**	.07

Note. $^{**}p < .001$*;* $^{*}p < .05$

Finally, we conducted bivariate correlations between demographic characteristics (included as covariates in our models) and our outcome measures. Participants who had previously used telehealth within the last 12 months, $r(621) = .26$, $p < .001$, participants who were older, $r(539) = .09$, $p = .05$, participants who identified as LGBQ, $r(621) = .09$, $p = .02$, and participants with higher levels of parental education, $r(572) = .11$, $p = .01$, reported greater intention to use telehealth. Participants who reported Hispanic ethnicity, $r(621) = -.13$, $p < .001$, reported lesser intention to use telehealth. Individuals who reported using telehealth within the past 12 months reported more positive attitudes toward telehealth, $r(607) = .17$, $p < .001$, while those who identified as Hispanic reported more negative attitudes toward telehealth, $r(607) = -.12$, $p < .01$. The results of these bivariate correlations are reported in Table 10.

Table 10

Bivariate Correlations Between Demographic Characteristics and Outcomes

	Telehealth Intent	Telehealth Attitudes
Age	.09*	.01
Gender- Cisman	-.07	.00
Gender- Non-binary/not listed	.04	-.06
Ethnicity- Hispanic	-.13**	-.12**
Race- Black	-.06	-.04
Race- Non-Black POC	-.05	-.02
LGBQ	.09*	.00
Parental education	.11*	-.01
Past telehealth utilization	.26**	.17**

Note. *$p < .05$, **$p < .001$. Categorical variables (e.g., gender, race) were dummy-coded into dichotomous variables. For the gender variable, "ciswoman" was used as the reference group. For the ethnicity variable, "non-Hispanic" was used as the reference group. For the race variable, "White" was used as the reference group. For the sexual orientation variable, "Heterosexual" was used as the reference group. Gender- non-binary/not listed is composed of participants who responded that they identify as genderqueer/non-binary or another gender not listed. Race- non-Black POC is composed of participants who identify as American Indian/Alaska Native, East Asian, Middle Eastern/Arab, Multiracial, Native Hawaiian/Pacific Islander, South Asian, or another race not listed. LGBQ is composed of participants who identified as gay/lesbian, bisexual, queer, or another sexual orientation not listed.

Primary Analysis

Telehealth Intention. The goodness of fit index (GFI) in our primary SEM was .96, suggesting good fit. The normed fit index (NFI) was .90, where values of .90 or higher indicate fair fit. Other values of fit, all of which suggest goodness of fit as the value reached 1.00, suggested adequate fit (Incremental Fit Index [IFI] =.93, Comparative Fit Index [CFI] =.92), while the Tucker-Lewis Index (TLI) was .81, indicating weaker model fit. The current model

produced a Root Mean Square Error of Approximation (RMSEA) value of .066, suggesting a reasonable error of approximation and adequate fit.

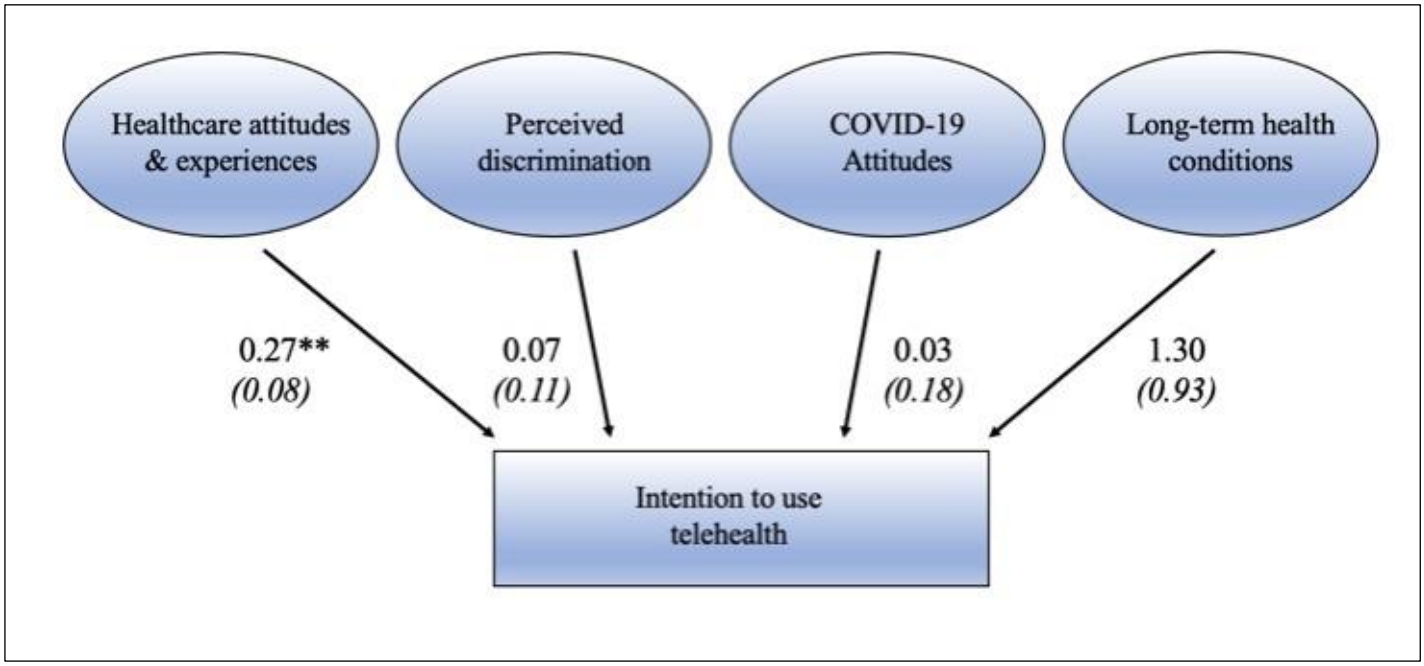
This model revealed that there was a significant and positive association between attitudes and experiences related to healthcare and telehealth intention, $\beta = 0.27$, $SE = 0.08$, $p < .001$, 95% CI [0.11, 0.43], indicating that individuals who reported higher levels of trust in physicians and lower levels of medical mistrust and perceived discrimination in healthcare reported greater intention to use telehealth. However, none of the other predictor variables in our model were significant after controlling for 9 demographic variables. There was no significant association between perceived discrimination at the personal- and group-level and telehealth intention, $\beta = 0.07$, $SE = 0.11$, $p = .54$, 95% CI [-0.15, 0.29]. COVID-19 attitudes and political orientation were also not significant predictors of intention to use telehealth, $\beta = 0.03$, $SE = 0.18$, $p = .86$, 95% CI [-0.32, 0.38]. Finally, presence of a long-term physical or mental health condition did not predict intention to use telehealth for primary care, $\beta = 1.30$, $SE = 0.93$, $p = .16$, 95% CI [-0.52, 3.11]). This model is illustrated in Figure 1.

In addition to the four latent predictor variables, this model also tested the associations between 9 demographic variables and telehealth intention. The demographic variable that was most strongly positively associated with telehealth intention was prior utilization of telehealth, $\beta = 0.19$, $SE = 0.06$, $p < .001$, 95% CI [0.08, 0.30], such that individuals who had used telehealth within the last 12 months reported greater intention to use telehealth in the future. The association between age and telehealth intention was marginally significant, $\beta = 0.08$, $SE = 0.04$, $p = .06$, 95% CI [-0.00, 0.16], such that older individuals reported greater intention to use telehealth. Hispanic ethnicity was significantly negatively associated with telehealth intentions, $\beta = -0.13$, $SE = 0.05$, $p < .01$, 95% CI [-0.21, -0.04], such that individuals who identified as

Hispanic reported less intention to use telehealth. None of the other demographic variables in our model were significantly associated with telehealth intention. The remaining covariates included in our model are reported in the note of Figure 1.

Figure 1

SEM Examining Predictors of Intention to Use Telehealth



Note. *$p < .05$, **$p < .001$. This model included 9 demographic characteristics (age, cisman, non-binary or another gender not listed, Hispanic ethnicity, Black race, non-Black POC race, LGBQ sexual orientation, parental education, prior utilization of telehealth) as covariates.

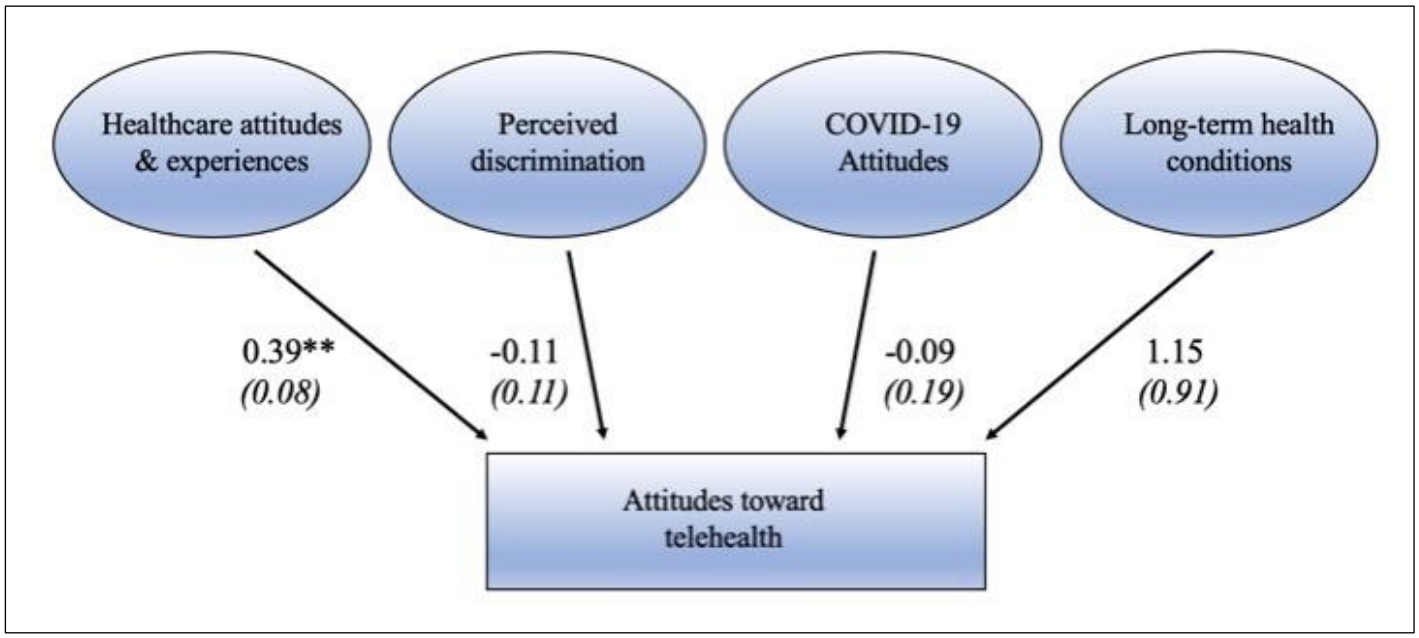
Telehealth Attitudes. The goodness of fit index (GFI) in our second model was .96, suggesting good fit. The NFI was .90, where values of .90 or higher indicate adequate fit. Other values of fit, all of which suggest goodness of fit as the value reached 1.00, suggested adequate fit (IFI =.93, CFI=.92), while the TLI of .81 suggested weaker fit. The current model produced a RMSEA of .066, suggesting a reasonable error of approximation and adequate fit.

This model revealed that the association between attitudes and experiences related to healthcare and attitudes toward telehealth was significant and positive, β = 0.39, *SE* = 0.08, $p <$ .001, 95% *CI* [0.23, 0.55], such that higher levels of trust in physicians, lower levels of medical mistrust, and lower levels of perceived discrimination in healthcare predicted more positive attitudes toward telehealth. There was not a statistically significant association between perceived discrimination at the personal- and group-level and attitudes toward telehealth, β = -0.11, *SE* = 0.11, p = .36, 95% *CI* [-0.33, 0.12]. Our model also found no association between either COVID-19 attitudes (β = -0.09, *SE* = 0.19, p = .63, 95% *CI* [-0.46, 0.28]) or presence of a long-term health condition (β = 1.15, *SE* = 0.91, p = .21, 95% *CI* [-0.63, 2.93]), and attitudes toward telehealth for primary care. This model is illustrated in Figure 2.

Among the demographic variables that we included as covariates in this model, there was a significant positive association between telehealth attitudes and prior telehealth utilization (β = 0.12, *SE* = 0.06, p = .05, 95% *CI* [0.00, 0.23]). No other demographic characteristics included in our model met our threshold for statistical significance but there was a marginally significant association between telehealth attitudes and Hispanic ethnicity (β = -0.08, *SE* = 0.05, p = .08, 95% *CI* [-0.17, 0.01]) suggesting that individuals who identify as Hispanic are more likely to report negative attitudes toward telehealth.

Figure 2

SEM Examining Predictors of Attitudes Toward Telehealth



Note. *$p < .05$, **$p < .001$. This model included 9 demographic characteristics (age, cisman, non-binary or another gender not listed, Hispanic ethnicity, Black race, non-Black POC race, LGBQ sexual orientation, parental education, prior utilization of telehealth) as covariates.

Discussion

The aim of this study was to identify factors associated with college students' intention to use telehealth for their primary care needs. We identified college students as a relevant target population because they tend to underutilize primary care (Turner & Keller, 2015; Willis et al., 2020) and they tend to report higher levels of technological literacy compared to the general population (Mamedova et al., 2018). Promoting the use of telehealth is one promising approach to increasing the utilization of primary care services among college students. Thus, it is important to investigate which factors are associated with positive or negative attitudes toward telehealth and intention to use telehealth for primary care. Because there has been relatively little

research on factors associated with college students' attitudes toward telehealth specifically in the primary care context, we identified these factors using three related lines of research: (1) telehealth in the context of psychiatry/mental health visits; (2) telehealth in the context of primary care but in non-college populations; and (3) in-person primary care visits.

Telehealth Intentions

In general, we found that college students in our sample were willing to use telehealth services if they were offered by their primary care provider. However, college students still reported greater intention to use in-person care than telehealth for primary care. Though there is no previous research examining intention to use telehealth among college students, this pattern of findings was consistent with prior research examining telehealth intentions in adult samples (Lacritz et al., 2020; Predmore et al., 2021; Polinski et al., 2016). While college students in our sample expressed a clear intention to utilize in-person care over telehealth for their primary care needs, there were situations in which they expressed greater intention to use telehealth. For example, most students reported that they would use telehealth over in-person services if it would save them a one- or two-hour drive to a clinic. These findings align with previous research suggesting that saving time and avoiding travel are appealing components of telehealth (Bull et al., 2016; Dunbar et al., 2018).

While telehealth may be unlikely to overtake in-person care as the preferred modality of primary care, these findings suggest that telehealth could serve as an effective *complement* to in-person care. That is, promoting both in-person and telehealth as available services could increase college students' utilization of primary care by providing a viable alternative to in-person services in situations where college students might otherwise delay seeking care or no-show at scheduled appointments.

The psychological factors that predicted intention to use telehealth in our sample were trust in physicians, medical mistrust, and perceived discrimination in healthcare. Participants with higher levels of trust in physicians were more likely to report intention to use telehealth, while individuals with higher levels of medical mistrust and perceived discrimination in healthcare were less likely to report intention to use telehealth. Our findings suggest that increasing college students' trust in physicians and the healthcare system, while mitigating experiences of discrimination in the healthcare system, are key considerations for interventions aimed at promoting the use of telehealth. Future research should further investigate the mechanisms through which each of these psychological constructs influence telehealth attitudes and intentions—for example, assessing which specific provider behaviors are associated with patients' trust and perceived discrimination in the context of telehealth. These findings will be critical to develop interventions that train physicians to engage in behaviors that build trust, while avoiding behaviors that are perceived by patients as prejudiced or discriminatory.

While no previous literature has demonstrated that these factors are associated with college students' intention to use telehealth for primary care, our findings aligned with previous research in other related lines of literature. Prior research in adult samples has demonstrated an association between trust in physicians and utilization of telehealth (Rovner et al., 2021), as well as satisfaction with telehealth visits (Orrange et al., 2021). No existing literature has examined medical mistrust and perceived discrimination in healthcare as predictors of telehealth intentions. However, our findings align with previous research in the context of in-person primary care utilization. Prior literature has demonstrated a consistent association between medical mistrust and lower utilization of in-person primary care services. Specifically, individuals with higher levels of medical mistrust are more likely to postpone or delay seeking needed medical care

(LaVeist et al., 2009) and less likely to utilize preventive services (Adams et al., 2017; Powell et al., 2019). Individuals who report higher levels of perceived discrimination in the context of healthcare also report less intention to utilize primary care services (Okoro et al., 2020).

In our study, we did not find any significant associations between intention to use telehealth and COVID-19 anxiety, perceived discrimination at the personal- or group-level, political orientation, or the presence of long-term physical or mental health conditions. These findings are inconsistent with the related lines of literature that we used to identify potential predictors of telehealth intention. Though none of these factors have been directly examined in the context of telehealth, previous research has demonstrated that perceived risk of disease exposure is associated with greater intention to use telehealth (Lacritz et al., 2020) and that reducing risk of COVID-19 exposure is a perceived benefit of telehealth (Zhou et al., 2020). As COVID-19 anxiety is a COVID-specific version of perceived risk of disease exposure (Boyraz et al., 2020), it is somewhat surprising that there was no association between COVID-19 anxiety and intention to use telehealth. However, one potential explanation for this inconsistency is the timing of data collection. We collected data for this study in Fall 2022, after many COVID-19 restrictions had been lifted in Virginia and on the VCU campus, so levels of COVID-19 anxiety in our sample might be lower and have a reduced impact on behavior than earlier in the pandemic or potentially in different locations that still had more restrictive COVID-19 policies in place.

Similarly, we found no association between political orientation and intention to use telehealth. One surprising finding in our sample was the direction of the relationship between political orientation and COVID-19 anxiety, as individuals who reported being more Conservative reported higher levels of COVID-19 anxiety. These findings contrasted with

previous research, which has demonstrated that political orientation is associated with reduced utilization of preventive behaviors (Schoeni et al., 2021; Ingram et al., 2021) and perceived susceptibility (Kiviniemi et al., 2022) related to COVID-19. One potential explanation for this finding was the distribution of political orientation within our sample. Relatively few students in our sample reported that they identified as politically Conservative, which might have skewed our results. In a more politically balanced sample, one might expect to find that more Liberal students tend to report greater COVID-19 anxiety and the association between political orientation and intention to use telehealth might be stronger.

Previous research in the context of in-person primary care has found evidence that individuals who have experienced higher levels of perceived discrimination at the personal- and group-level tend to underutilize preventive care (Burgess et al., 2008; Casagrande et al., 2007). In our study, we found no association between either personal- and group-level discrimination and telehealth intention. Perceived discrimination could theoretically influence individuals' intention to use telehealth in either the positive or negative direction. Prior literature suggests that individuals who report higher levels of perceived discrimination in their lifetime tend to utilize preventive primary care services less often (Hausmann et al., 2008) and report more medical care delays or non-utilization than those with no experiences of discrimination (Casagrande et al., 2007). These findings suggest that individuals who have experienced more discrimination are less likely to utilize telehealth. However, telehealth might be a particularly appealing alternative to in-person care for individuals who have experienced high levels of perceived discrimination because they would not have to travel to a doctor's office in which they could potentially face discrimination and they can easily leave a virtual appointment by clicking a button if they have a negative encounter with a physician. Though our findings were null,

future research should further investigate mechanisms that might explain the relationship between perceived discrimination and telehealth intention in different samples and contexts.

Previous research has demonstrated that patients who have been diagnosed with long-term physical and mental health conditions utilize primary care services more often than those who have not been diagnosed with long-term conditions (Sambamoorthi et al., 2015; Starfield et al., 2005; Turner et al., 2018). We theorized that telehealth might appeal to patients who have been diagnosed with long-term conditions because the convenience of telehealth might be particularly salient to patients who must interact with the healthcare system more often. However, we did not find an association between the presence of long-term mental or physical health conditions on telehealth intention in our sample. There are several potential explanations for these null findings. Only about one quarter of our sample indicated that they had been diagnosed with a long-term physical condition and slightly over half of these participants reported that their primary care physician helps manage their condition. While the percentage of individuals diagnosed with a long-term mental health condition was higher, primary care physicians were less likely to be involved in the management of these conditions. It is possible that the presence of long-term physical and mental health conditions is less relevant to intention to use telehealth for primary care compared to telehealth for mental health care or care from a specialist. It is also possible that these conditions do not influence the telehealth intentions of college samples, who tend to have more flexible schedules and fewer commitments (Kasworm, 2003), as much as adult samples.

Finally, our study examined the relationship between demographic characteristics and intention to use telehealth. The demographic characteristics that were positively associated with telehealth intentions were prior utilization of telehealth and age, while Hispanic ethnicity was

negatively associated with telehealth intentions. The association between prior telehealth utilization and future intention to use telehealth is consistent with the mere exposure effect. The mere exposure effect suggests that individuals who have been exposed to a stimulus develop more positive attitudes about that stimulus (Zajonc, 1968). This finding is also consistent with prior literature suggesting that individuals who have used telehealth tend to report high levels of patient satisfaction and intend to use telehealth again in the future (Lacritz et al., 2020; Polinski et al., 2016; Predmore et al., 2021). Older individuals in this college sample might be more likely to be adult learners who have more additional responsibilities than younger students (e.g., full-time jobs, children). Thus, the convenience of telehealth might be particularly appealing to these individuals. There are several factors that could explain why Hispanic students are less likely to intend to use telehealth including the factors identified in this study (e.g., trust in physicians, medical mistrust, perceived discrimination in healthcare), as well as additional considerations such as language barriers or socioeconomic factors. However, this finding conflicts with prior research in the field, as Predmore et al. (2021) found that Hispanic individuals were more likely to prefer telehealth over in-person care than individuals from other racial/ethnic groups. Future research should further investigate psychological mechanisms and situational factors that might explain why Hispanic students report greater or lesser intention to use telehealth.

Telehealth Attitudes

Students in our sample reported greater comfort and more positive attitudes toward visiting their primary care provider in-person rather than via telehealth. These findings are consistent with previous research that has examined attitudes toward telehealth relative to in-person care in college samples (Schuh, 2021). However, the attitudes toward telehealth reported by participants in our sample were less positive than findings from research examining adult

populations. Prior research in this line of literature has found that most individuals are comfortable with using telehealth and report positive attitudes toward telehealth (Lacritz et al., 2020; Polinski et al., 2016). In fact, many participants in Polinski et al. (2016) reported liking telehealth better than in-person services. However, one critical difference between our study and these studies is that Lacritz et al. (2020) and Polinski et al. (2016) both examined participants who had recently visited a provider using telehealth and assessed patient satisfaction. The recency of these patients' experiences with telehealth may have primed them to remember their telehealth experiences better and answer more positively. In contrast, only 44.1% of participants in our sample reported utilizing telehealth in the last 12 months. Though participants in our sample reported neutral-to-positive attitudes toward telehealth on average, they reported more positive attitudes toward in-person care.

The factors that predicted attitudes toward telehealth in our sample were consistent with the factors that predicted intention to use telehealth. Participants who reported higher levels of trust in physicians and lower levels of medical mistrust and perceived discrimination in healthcare reported more positive attitudes toward telehealth. As with telehealth intentions, there were no significant associations between our other predictor variables—perceived discrimination at the personal- and group-level, COVID-19 anxiety, political orientation, and presence of long-term physical and mental health conditions—and attitudes toward telehealth. The consistency between the predictors of telehealth attitudes and telehealth intentions can be explained by the strong correlation between these two measures in our sample. Theoretical frameworks such as the theory of planned behavior (Ajzen, 1991) and the integrated behavior model (Kasprzyk et al., 2006) posit that attitudes are a key predictor of behavioral intentions and, ultimately, behavior. Future research in this area should examine the extent to which telehealth attitudes predict

telehealth intentions while also accounting for other relevant theoretical constructs such as perceived norms and perceived behavioral control, which were not assessed in this study.

The only demographic characteristic that was significantly associated with telehealth attitudes was prior utilization of telehealth. Consistent with intention to use telehealth and with prior literature examining telehealth users (Lacritz et al., 2020; Polinski et al., 2016; Predmore et al., 2021), individuals who reported that they have used telehealth in the last 12 months reported more positive attitudes toward telehealth. While they did not meet our threshold for statistical significance, individuals who identified as Hispanic were marginally more likely to report negative attitudes toward telehealth. Future research should further investigate mediating factors that might explain the processes through which Hispanic individuals develop attitudes toward telehealth and how these attitudes ultimately influence the utilization of telehealth services.

Limitations

This is the first study to examine factors associated with college students' intention to use telehealth and attitudes toward telehealth for primary care. Our study serves as an important foundation for future research to examine predictors of intentions and attitudes related to telehealth. However, there are several limitations in this exploratory study that may have influenced our findings and should be addressed in future research.

There is a relative dearth of validated scales examining attitudes and intentions related to telehealth. As a result, we used a single-item measure to assess participants' intention to use telehealth. There is some evidence that traditional validated scales and single-item measures do not significantly differ in convergent, discriminant, and construct validity, at least for certain constructs (Elo et al., 2003; Gardner et al., 1998; West et al., 2012). However, validated psychometric scales are generally viewed as the preferred methodology to collect self-report data

in psychological research (Nunnally, 1978). The TAQ, which we used to assess attitudes toward telehealth, was originally developed for telepsychiatry and we had to modify this scale to be appropriate to examine telehealth for primary care and in the college population. Furthermore, the TAQ was developed before the COVID-19 pandemic and the corresponding increase in telehealth utilization. As a result, one significant limitation of our study is that our measure of telehealth attitudes might not assess important factors that predict attitudes related to telehealth in the modern world.

All participants in this sample were undergraduate students at Virginia Commonwealth University, a sample which might not generalize to all college students. VCU is an urban school featuring a wide array of healthcare services located within the Richmond, VA metro area, including a leading academic medical center in VCU Health. The proximity of these health services and the ability to use public transportation and rideshare services in Richmond might make healthcare more accessible for students at VCU than for students who attend rural or suburban colleges and universities. As a result, some of the benefits of telehealth—including convenience and saving time by using telehealth services from home rather than traveling to receive care—might be less salient to students at VCU than students attending colleges and universities in other locations.

In examining attitudes and intentions to use telehealth for primary care, it is important to carefully consider the timing of this study in the context of the COVID-19 pandemic. Data collection for this study took place in Fall 2022, a period of time in which many COVID-19 restrictions had been lifted. For example, VCU had implemented a mask mandate from the start of the pandemic through Spring 2022 but this policy was no longer in place when we collected data (Roberson, 2022). However, COVID-19 was still highly prevalent during this timeframe, as

approximately 300,000 new COVID-19 cases were reported per week in the United States on average through the Fall 2022 semester (Centers for Disease Prevention and Control, 2023), a number that is likely underestimated due to the popularity of at-home tests (Park et al., 2023). While we found that there was no association between COVID-19 attitudes and participants' intentions and attitudes related to telehealth, these findings might be a product of the timing of our data collection. The data that we analyzed in this study must be evaluated and interpreted in the specific context in which they were collected. While our study serves as a foundation of the factors that may be associated with telehealth intentions and attitudes, our findings cannot necessarily be generalized to other periods of time earlier in the pandemic or to the future, as the COVID-19 caseload continues to decrease, and we become farther removed from the policies that were implemented early in the pandemic.

Finally, this study did not measure several additional factors that would have provided clarity to the current findings. First, we did not assess participants' intentions or attitudes toward using *in-person* primary care services. Thus, we were not able to examine whether the factors identified in this study—trust in physicians, medical mistrust, and perceived discrimination in healthcare—predict attitudes and intention to use healthcare in general, or whether these factors are particularly important in the context of telehealth. We also did not assess whether patients have a regular primary care provider. Because individuals with a regular primary care provider tend to utilize primary care services in general more often (Lambrew et al., 1996), whether students have a primary care provider they regularly see should be included as a predictor or covariate. Another factor is self-reported health; prior research indicates that individuals with worse self-reported health tend to visit physicians more often (Miilunpalo et al., 1997). Including these measures in future studies will allow researchers to not only better understand whether the

factors that predict intention to use telehealth differ from those that predict intention to use in-person care but also give more confidence in the role of the factors identified in this study in intentions to use telehealth among college students.

Future Directions

This exploratory study lays the groundwork for future research examining the processes that are associated with individuals' utilization of telehealth and the effectiveness of telehealth. Our study identified that trust in physicians, medical mistrust, and perceived discrimination in healthcare are three factors that are associated with attitudes toward telehealth and intention to use telehealth. Future research should build upon this study by addressing the limitations discussed in the previous section, generalizing these findings to different populations and domains of healthcare, and examining additional factors associated with patient-centered outcomes and health outcomes in telehealth.

It is imperative that future research examines factors associated with telehealth attitudes and intentions through theoretically-grounded approaches. Our study demonstrates that trust in physicians, medical mistrust, and perceived discrimination in healthcare are factors that might predict telehealth intentions and attitudes in college students. Future research must investigate *why* these factors are associated with telehealth intentions and attitudes, identifying individual characteristics (e.g., self-reported health, perceived vulnerability) and situational factors (e.g., whether a patient has a regular primary care provider, duration of time seeing this provider) that moderate these relationships, as well as other processes (e.g., quality of patient-provider communication, relationship with physician) that mediate these relationships. While no existing theories specifically examine telehealth attitudes and intentions, future research should modify existing theories that address in-person healthcare utilization and/or other health behaviors to the

telehealth setting. Theories such as the theory of planned behavior (Ajzen, 1991), the integrated behavior model (Kasprzyk et al., 2006), and the health belief model (Rosenstock, 1974) are examples of seminal theories in health psychology that could plausibly be applied and tested in the context of telehealth utilization. Key constructs involved in each of these theories could be modified to address utilization of telehealth— for example, subjective norms (i.e., frequency of telehealth use among peer group/family), perceived behavioral control (i.e., access to a private space at home), perceived susceptibility (i.e., COVID-19 anxiety), and cues to action (e.g., contracting COVID-19). It is also conceivable that critical factors associated with telehealth utilization are not captured in existing theories, so it might be necessary to use empirical findings such as those discussed in this study to generate new theories specific to the modality of telehealth. Through this iterative process of modifying existing theories and testing novel theories specific to telehealth, researchers will be able to gain a greater understanding of the processes through which certain factors predict telehealth attitudes, intention, and utilization.

Future research should also aim to extend the findings from this study to different populations and domains of healthcare. Compared to the general population, college students are relatively healthy (Unwin et al., 2013), less likely to have a regular primary care provider and utilize primary care services (Levine et al., 2020; Turner & Keller, 2015; Willis et al., 2020), and have greater technological literacy (Mamedova et al., 2018). College students also tend to have more flexible schedules and relatively fewer commitments (e.g., children, financial responsibilities) than adult populations (Kasworm, 2003). In order to develop a stronger understanding of factors associated with telehealth attitudes, intentions, and utilization, it is important for future research to attempt to generalize our findings to broader populations.

It is also necessary for future research to explore telehealth attitudes and intentions in domains of healthcare other than primary care. Primary care visits are often primarily composed a back-and-forth discussion between the patient and provider about biomedical topics (e.g., symptoms a patient is experiencing), psychosocial topics (e.g., challenges with adhering to a treatment plan), and the provider answering a patient's questions (Tai-Seale et al., 2007). These back-and-forth discussions lend themselves well to a telehealth setting, but there might be other situations in which physicians need to perform physical examinations on patients and telehealth is not an appropriate modality (Hammersley et al., 2019). The general findings reported in this study are likely applicable to other medical specialties as well, but there is little empirical evidence demonstrating whether our results will generalize. While there is some preliminary evidence investigating the utility of telehealth in some components of specialty care—for example, pre- and post-operative consultations in surgical care (Hakim et al., 2020)—there is relatively little literature assessing which factors predict patients' attitudes and intentions to use telehealth in these contexts. It is essential for future research to assess the domains of healthcare in which patients report the greatest intentions to use telehealth and examine why telehealth is particularly appealing in these contexts.

Additional critical areas for future research to investigate are the factors associated with utilization of telehealth, patient-centered outcomes (e.g., patient satisfaction), and health outcomes in telehealth. Our study provides preliminary evidence that trust in physicians, medical mistrust, and perceived discrimination in healthcare are factors associated with intentions to use telehealth and attitudes toward telehealth. However, while attitudes predict intentions and intentions are a necessary precursor to behavior (Ajzen, 1991), individuals do not always act on their intentions (Fishbein et al., 2003). One critical next step in this field of research is to

examine whether these factors predict actual utilization of telehealth. Future research should also investigate specific provider behaviors that are associated with patients' perceptions of trust and perceived discrimination in telehealth visits. One relevant application in the context of health disparities is to investigate how providers' implicit bias manifests in telehealth visits and whether these mechanisms differ from in-person visits. Further, this line of research should investigate which factors influence patient-centered outcomes such as patient satisfaction with telehealth visits and treatment adherence following telehealth visits. In addition to examining these patient-centered outcomes, future research should also examine the provider behaviors and patient-centered outcomes associated with patients' long-term health outcomes. Future research in this field should investigate whether best practices for healthcare providers differ between telehealth and in-person care and provide empirical evidence for the comparative effectiveness of telehealth and in-person modalities for primary care.

Conclusion

This study aimed to identify factors associated with college students' intentions to use telehealth and attitudes toward telehealth. We identified psychological factors through three related lines of literature—college students' intentions to utilize telepsychiatry, non-college-students' intentions to utilize telehealth in primary care, and patients' utilization of in-person primary care in prior research—and assessed relevant demographic variables that have been associated with healthcare attitudes and utilization in prior research (e.g., age, race/ethnicity, gender). We found that trust in physicians is associated with greater intention to use telehealth and more positive attitudes toward telehealth, while medical mistrust and perceived discrimination in healthcare are associated with lesser intention to use telehealth and more negative attitudes toward telehealth. These findings suggest that trust in physicians, medical

mistrust, and perceived discrimination in healthcare are key psychological constructs to consider when designing interventions to promote the use of telehealth in college students. We also identified prior utilization of telehealth, age, and Hispanic ethnicity as relevant demographic variables that might moderate the relationships between these predictors and telehealth intentions and attitudes. This exploratory study serves as a foundation for future research that examines mechanisms associated with the utilization of telehealth and interventions aimed at promoting and improving the effectiveness of telehealth. Future research in this field should aim to 1) strengthen the theoretical and empirical understanding of which factors predict attitudes and intentions related to telehealth, and explain the processes through which these factors influence telehealth attitudes and intentions, 2) identify the populations and medical contexts in which telehealth is most appropriate for providing quality care to patients, and 3) identify provider behaviors associated with patient-centered outcomes and health outcomes in telehealth. This knowledge will be critical for developing evidence-based telehealth interventions that target the populations and medical contexts in which telehealth is most appropriate and prepare healthcare providers to deliver high-quality care via telehealth.

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Appendix A: Survey Instrument

1. **Patient_age**
   "How old are you? _____ years old"

2. **Patient_gender**
   "What is your gender?"
   0= Cis-woman
   1= Cis-man
   2= Trans-woman
   3= Trans-man
   4= Genderqueer or non-binary
   5= Not listed above (Specify: _____)"

3. **Patient_ethnicity**
   "Are you Spanish/Hispanic/Latino(a)? (Select one)"
   1= No, not Spanish/Hispanic/Latino(a)
   2= Yes, Mexican, Mexican American, Chicano
   3= Yes, Puerto Rican
   4= Yes, Cuban
   5=Yes, but not listed above (Specify: _____)

4. **Patient_race**
   "What is your race? (Select one or more races to indicate what you consider yourself to be)"
   1= American Indian or Alaska Native
   2= Black or African American
   3= East Asian
   4= Middle Eastern or Arab
   5= Multiracial
   6= Native Hawaiian or Other Pacific Islander
   7= South Asian or Asian Indian
   8= White
   9= Not listed above (Specify: _____)

5. **Sexual_orientation**
   "What is your sexual orientation and/or gender identity?"
   1= Heterosexual or straight
   2= Lesbian or gay
   3= Bisexual
   4= Queer
   5= Not listed above (Specify: _____)

6. **Parental_education_1**

"What is your mother's or (the 1st) parent's/guardian's highest level of education?"

1= Did not complete high school
2= High school diploma or GED
3= Some college/Associate degree
4= College degree
5= Some graduate or professional school
6= Graduate or professional degree
7= Not applicable
8= Don't know

7. Parental_education_2

"What is your father's or (the 2nd) parent's/guardian's highest level of education?"

1= Did not complete high school
2= High school diploma or GED
3= Some college/Associate degree
4= College degree
5= Some graduate or professional school
6= Graduate or professional degree
7= Not applicable
8= Don't know

8. Government_support_1

"While growing up, was there ever a time when your family received any form of public assistance from the government such as welfare, TANF, WIC, public housing, section eight housing, Medicaid, or food stamps?"

1= Yes
2= No
3= Don't know

9. Government_support_2

"Are you currently receiving any form of public assistance from the government such as welfare, TANF, WIC, public housing, section eight housing, Medicaid, or food stamps?

1= Yes
2= No
3= Don't know

10. Children

"Do you have any children?"

0= No
1= Yes

11. Number_children

[If Q11= Yes] "How many children do you have?" _____ Children

12. Telehealth_utilization_1

"Select the ways that you have ever communicated with a doctor to get advice about a health issue." (Select all that apply)

1= Text message
2= Email
3= Messaging within a website
4= Telephone
5= Teleconference
6= eVisit

7 = Other (Specify: _____)
8 = None of the above

13. Telehealth_utilization_2

"Have you had a telephone or teleconferencing visit with a doctor to get advice about a health issue in the last 12 months? (Select all that apply)"

1= Yes, telephone visit with my personal doctor
2= Yes, telephone visit with an unfamiliar doctor
3= Yes, videoconferencing visit with my personal doctor
4= Yes, videoconferencing visit with an unfamiliar doctor
5= None of these

14. Telehealth_intention

"How likely are you to use telehealth services (the use of synchronous digital information and communication technologies, such as phone or video, to communicate directly with a healthcare provider in real time) if they were offered by your provider?"

1= Very unlikely
2= Unlikely
3= Neutral
4= Likely
5= Very likely

15. TAQ_1

"I would feel comfortable and have confidence using telehealth if I needed to consult with a family physician because I was feeling ill."

1= Not at all
2= A little bit
3= Moderately
4= Quite a bit
5= Extremely

16. TAQ_2

"I would feel comfortable and have confidence using telehealth if I needed to have an annual check-up with a family physician (even though feeling healthy)"

1= Not at all
2= A little bit
3= Moderately
4= Quite a bit
5= Extremely

17. TAQ_3

"I would feel comfortable using telehealth at a local clinic"

1= Not at all
2= A little bit
3= Moderately
4= Quite a bit
5= Extremely

18. TAQ_4

"I would feel comfortable using telehealth at a local church"

1= Not at all
2= A little bit
3= Moderately
4= Quite a bit
5= Extremely

19. TAQ_5

"I would feel comfortable using telehealth from a public space, such as the commons or library"

1= Not at all
2= A little bit
3= Moderately
4= Quite a bit
5= Extremely

20. TAQ_6

"I would feel comfortable using telehealth at student health services"

1= Not at all
2= A little bit
3= Moderately
4= Quite a bit
5= Extremely

21. TAQ_7

"I would feel comfortable using telehealth from my home/apartment"

1= Not at all
2= A little bit
3= Moderately
4= Quite a bit
5= Extremely

22. TAQ_8

"I would feel comfortable using telehealth from my dorm room"

1= Not at all
2= A little bit
3= Moderately
4= Quite a bit

5= Extremely

23. TAQ_9

"I would prefer to visit a primary care physician in person (instead of using telehealth)"

1= Not at all
2= A little bit
3= Moderately
4= Quite a bit
5= Extremely

24. TAQ_10

"I would prefer to use telehealth (instead of visiting a primary care physician in person)"

1= Not at all
2= A little bit
3= Moderately
4= Quite a bit
5= Extremely

25. TAQ_11

"I would use telehealth if it would save me a 1-hour drive to a clinic"

1= Not at all
2= A little bit
3= Moderately
4= Quite a bit
5= Extremely

26. TAQ_12

"I would use telehealth if it would save me a 2-hour drive to a clinic"

1= Not at all
2= A little bit
3= Moderately
4= Quite a bit
5= Extremely

27. TAQ_13

"I would use telehealth on campus (e.g., student health center, the commons, the library) if privacy was assured"

1= Not at all
2= A little bit
3= Moderately
4= Quite a bit
5= Extremely

28. TAQ_14

"I would be less likely to use telehealth for certain types of health conditions (Please specify)"

1= Not at all
2= A little bit
3= Moderately
4= Quite a bit
5= Extremely

29. TAQ_14_1

Entry for the "Please specify" for TAQ_14

"What kind of concerns would you have about using telehealth?"

30. TAQ_15

"The technology may be too sophisticated"

1= Yes
2= No

31. TAQ_16

"It probably would not help my problems"

1= Yes
2= No

32. TAQ_17

"Fear of what others might think"

1= Yes
2= No

33. TAQ_18

"It probably wouldn't be as effective as in-person sessions"

1= Yes
2= No

"Please indicate which types of the following technology you currently have in your home"

34. TAQ_19

"Telephone"

1= Yes
2= No

35. TAQ_20

"Computer"

1= Yes
2= No

36. TAQ_21

"Dial-up internet access

1= Yes
2= No

37. TAQ_22

"High-speed internet access"

1= Yes
2= No

“If you had an appointment with a medical provider to discuss your mental health, how comfortable would you be with each type of meeting?”

38. NCHA_1

“Face-to-face in a clinic setting”

1= Very uncomfortable”
2= Uncomfortable
3= Neither
4= Comfortable
5= Very comfortable

39. NCHA_2

“Face-to-face using telecommunication”

1= Very uncomfortable”
2= Uncomfortable
3= Neither
4= Comfortable
5= Very comfortable

40. NCHA_3

“Telephone”

1= Very uncomfortable”
2= Uncomfortable
3= Neither
4= Comfortable
5= Very comfortable

41. NCHA_4

“Email communication”

1= Very uncomfortable”
2= Uncomfortable
3= Neither
4= Comfortable
5= Very comfortable

42. NCHA_5

“Text communication”

1= Very uncomfortable”
2= Uncomfortable
3= Neither
4= Comfortable
5= Very comfortable

43. NCHA_6

“Do you think meeting with a medical provider face-to-face using telecommunication to discuss your health would be:”

1= Less confidential than meeting face-to-face in a clinic setting

2= Just as confidential as meeting face-to-face in a clinic setting
3= More confidential than meeting face-to-face in a clinic setting

44. NCHA_7

"Do you think meeting with a medical provider face-to-face using telecommunication to discuss your health would:"

1= Take less time than meeting face-to-face in a clinic setting
2= Take about the same amount of time as meeting face-to-face in a clinic setting
3= Take more time than meeting face-to-face in a clinic setting

45. NCHA_8

"Do you think meeting with a medical provider face-to-face using telecommunication to discuss your health would:"

1= Cost less money than meeting face-to-face in a clinic setting
2= Cost about the same amount of money as meeting face-to-face in a clinic setting
3= Cost more money than meeting face-to-face in a clinic setting

46. NCHA_9

"Do you think meeting with a medical provider face-to-face using telecommunication to discuss your health would be:"

1= More effective treatment than meeting face-to-face in a clinic setting
2= About as effective as meeting face-to-face in a clinic setting
3= Less effective treatment than meeting face-to-face in a clinic setting

47. NCHA_10

"If you were to meet with a medical provider using face-to-face telecommunication to discuss your mental health, would you prefer:

1= A medical provider you regularly see
2= A medical provider you only see using face-to-face telecommunication
3= A medical provider you have never seen before

48. GTPS_1

"Doctors in general care about their patients' health just as much or more than their patients do"

1= Strongly disagree
2= Disagree
3= Neutral
4= Agree
5= Strongly agree

49. GTPS_2

"Sometimes doctors care more about what is convenient for them than about their patients' medical needs"

1= Strongly disagree
2= Disagree

3= Neutral
4= Agree
5= Strongly agree

50. GTPS_3

"Doctors are extremely thorough and careful"

1= Strongly disagree
2= Disagree
3= Neutral
4= Agree
5= Strongly agree

51. GTPS_4

"You completely trust doctors' decisions about which medical treatments are best"

1= Strongly disagree
2= Disagree
3= Neutral
4= Agree
5= Strongly agree

52. GTPS_5

"Doctors are totally honest in telling their patients about all of the different treatment options available for their conditions"

1= Strongly disagree
2= Disagree
3= Neutral
4= Agree
5= Strongly agree

53. GTPS_6

"Doctors think only about what is best for their patients"

1= Strongly disagree
2= Disagree
3= Neutral
4= Agree
5= Strongly agree

54. GTPS_7

"Sometimes doctors do not pay full attention to what patients are trying to tell them"

1= Strongly disagree
2= Disagree
3= Neutral
4= Agree
5= Strongly agree

55. GTPS_8

"Doctors always use their very best skill and effort on behalf of their patients"

1= Strongly disagree
2= Disagree
3= Neutral
4= Agree
5= Strongly agree

56. GTPS_9

"You have no worries about putting your life in the hands of doctors"

1= Strongly disagree
2= Disagree
3= Neutral
4= Agree
5= Strongly agree

57. GTPS_10

"A doctor would never mislead you about anything"

1= Strongly disagree
2= Disagree
3= Neutral
4= Agree
5= Strongly agree

58. GTPS_11

"All in all, you trust doctors completely"

1= Strongly disagree
2= Disagree
3= Neutral
4= Agree
5= Strongly agree

"Medical authorities include doctors, healthcare professionals, government health agencies, and scientists."

59. MMMS_1

"Do you feel like medical authorities are trustworthy and honest?"

1= Definitely do not feel this way
2= Do not feel this way
3= Might slightly feel this way
4= Somewhat feel this way
5= Completely feel this way

60. MMMS_2

"How often do you think medical authorities make mistakes?"

1= Almost never (1% of the time or less)

2= Rarely (5% of the time)
3= Occasionally (10% of the time)
4= Frequently (25% of the time)
5= Half of the time (50% of the time)
6= Most of the time (75% of the time or more)

61. MMMS_3

"How much would you agree that medical authorities are more concerned about making money than taking care of people?"

1= Strongly disagree
2= Disagree
3= Somewhat disagree
4= Neither agree nor disagree
5= Somewhat agree
6= Agree
7= Strongly agree

62. MMMS_4

"Do you feel concerned about the possibility of being deceived or misled by medical authorities (such as doctors, healthcare professionals, government health agencies, or scientists)?"

1= Definitely do not feel this way
2= Do not feel this way
3= Might slightly feel this way
4= Somewhat feel this way
5= Completely feel this way

63. MMMS_5

"When healthcare organizations make mistakes, how often do you think they try to cover it up?"

1= Never cover it up
2= Rarely cover it up (10% of the time)
3= Occasionally cover it up (25% of the time)
4= Frequently cover it up (50% of the time)
5= Usually cover it up (75% of the time)
6= Always cover it up (100% of the time or more)

64. MMMS_6

"How big is the risk that you may be harmed by medical treatment given to you in the United States?"

1= Almost no risk
2= A small risk
3= Moderate risk
4= High risk
5= Tremendous risk

65. Perceived_discrimination_1

"I experience discrimination because of my race."

1= Strongly disagree
2= Disagree
3= Neutral
4= Agree
5= Strongly agree

66. Perceived_discrimination_2

"I feel that I am discriminated against because of my race."

1= Strongly disagree
2= Disagree
3= Neutral
4= Agree
5= Strongly agree

67. Perceived_discrimination_3

"I feel like I am personally a victim of society because of my race."

1= Strongly disagree
2= Disagree
3= Neutral
4= Agree
5= Strongly agree

68. Perceived_discrimination_4

"I consider myself a person who is deprived of opportunities that available to others because of my race."

1= Strongly disagree
2= Disagree
3= Neutral
4= Agree
5= Strongly agree

69. Perceived_discrimination_5

"I personally have been a victim of racial discrimination."

1= Strongly disagree
2= Disagree
3= Neutral
4= Agree
5= Strongly agree

70. Perceived_discrimination_6

"Other members of my race experience discrimination."

1= Strongly disagree
2= Disagree
3= Neutral

4= Agree
5= Strongly agree

71. Perceived_discrimination_7

"My racial group is discriminated against."

1= Strongly disagree
2= Disagree
3= Neutral
4= Agree
5= Strongly agree

72. Perceived_discrimination_8

"My racial group has been victimized by society."

1= Strongly disagree
2= Disagree
3= Neutral
4= Agree
5= Strongly agree

73. HCC_1

"A healthcare worker or provider has acted as if they were uncomfortable with me"

1= Strongly disagree
2= Disagree
3= Neutral
4= Agree
5= Strongly agree

74. HCC_2

"A healthcare worker or provider has made negative, hostile, or disrespectful comments"

1= Strongly disagree
2= Disagree
3= Neutral
4= Agree
5= Strongly agree

75. HCC_3

"I have felt discriminated against, treated disrespectfully, or given less good care than other people."

1= Strongly disagree
2= Disagree
3= Neutral
4= Agree
5= Strongly agree

[Items in the CAS and political orientation scale use a sliding scale rather than a Likert scale]

76. CAS_1

"How afraid are you of acquiring COVID-19 when going into the public?"

1= Not at all afraid
2
3
4= Extremely afraid

77. CAS_2

"How frequently are you feeling worried that you have acquired COVID-19?"

1= Never
2
3
4= Always

78. CAS_3

"How frequently is your sleep getting affected because of thoughts relating to COVID-19?"

1= Never
2
3
4= Always

79. CAS_4

"How frequently are you avoiding conversations on COVID-19 related information out of fear/anxiety?"

1= Never
2
3
4= Always

80. CAS_5

"How worried are you of acquiring COVID-19 when an unknown person is coming closer to you?"

1= Not at all worried
2
3
4= Extremely worried

81. CAS_6

"How anxious are you getting when knowing information on COVID-19?"

1= Not at all anxious
2
3
4= Extremely anxious

82. CAS_7

"How concerned are you when people cough or sneeze because of the fear that you may acquire COVID-19?"

1= Not at all concerned
2
3
4= Extremely concerned

83. Political_affiliation

"What is your political affiliation?"

0= Liberal
1
2
3
4
5
6
7
8
9
10= Conservative

84. Long_term_physical

"Have you been diagnosed with a chronic/long-term physical health condition that you are currently managing?"

0= No
1= Yes

85. Long_term_mental

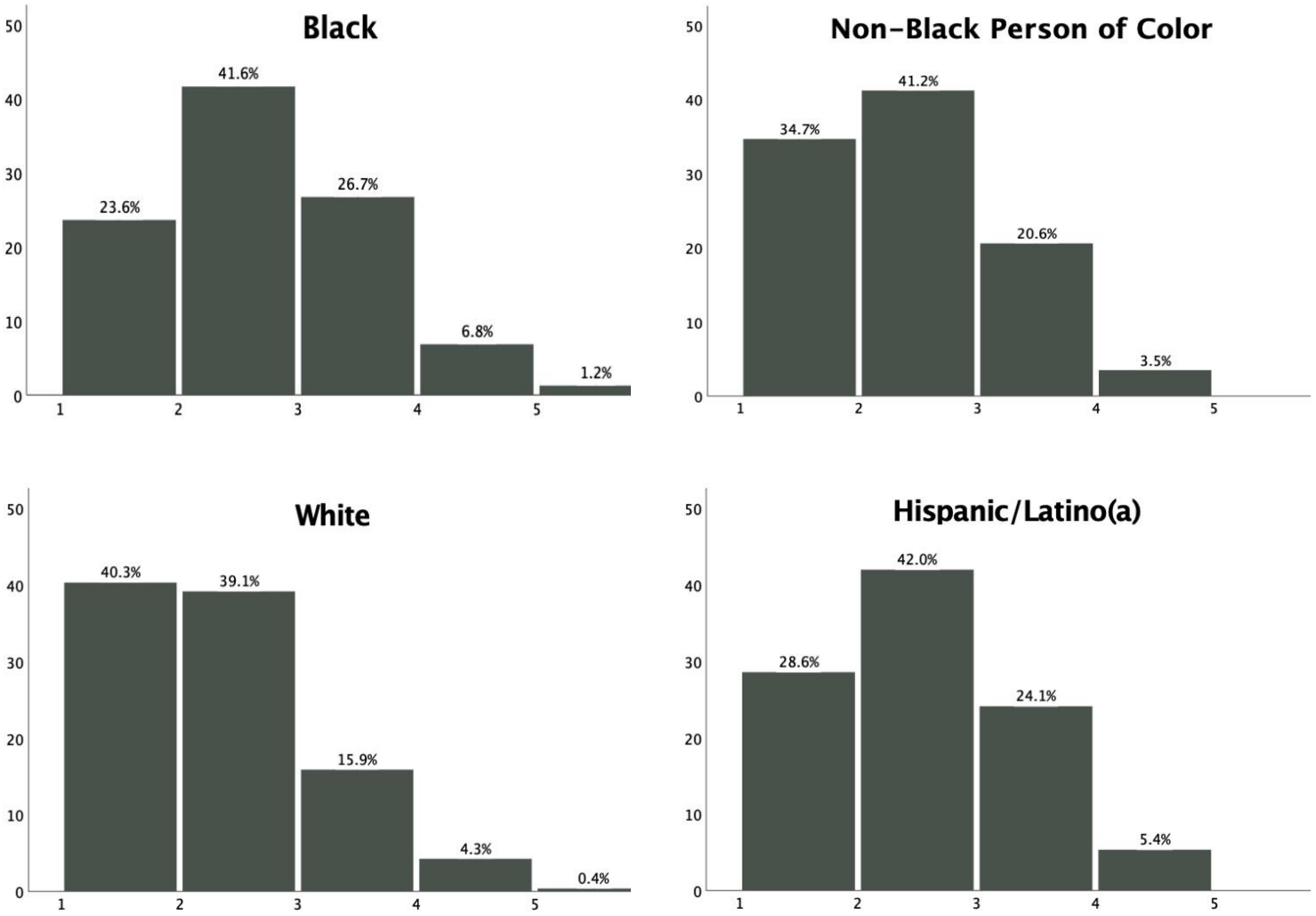
"Have you been diagnosed with a chronic/long-term mental health condition that you are currently managing?"

0= No
1= Yes

Appendix B: Distribution of Perceived Discrimination in Healthcare by Race/Ethnicity

Figure 3

Distribution of Perceived Discrimination in Healthcare by Race/Ethnicity



Note. The composite score measuring perceived discrimination in healthcare represents the mean value of the three items in the scale. All items ranged from 1 to 5, with higher scores indicating higher levels of perceived discrimination in healthcare.