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SWIPE RIGHT FOR CONDOMS AND TESTING:
DIFFERENCES IN HIGH-RISK SEXUAL BEHAVIOR AND SEXUAL HEALTH BELIEFS
AMONG DATING APP USERS COMPARED TO NON-APP USERS

A thesis submitted in partial fulfillment of the requirement of the degree of Master of Science at
Virginia Commonwealth University

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Table of Contents

	Page
Acknowledgements.....	3
List of Tables.....	4
List of Figures.....	5
Abstract.....	6
Introduction and Background.....	7
Dating Apps, MSM, and Sexual Behavior.....	10
Dating Apps, Non-MSM, and Sexual Behavior.....	12
Barriers to STI Testing: Stigma and Knowledge.....	14
Theory of Planned Behavior and Sexual Health.....	16
Current Sexual Health Initiatives via Dating Apps.....	19
The COVID-19 Pandemic.....	20
Present Research.....	21
Hypothesis 1.....	21
Hypothesis 2.....	21
Exploratory Aim 1.....	21
Exploratory Aim 2.....	21
Exploratory Aim 3.....	22
Method.....	22
Sample.....	22
Procedure.....	23
Measures.....	25
Analyses.....	32
Results.....	34
Discussion.....	51
List of References.....	61
Appendices.....	67
Consent Form.....	67
Questionnaire.....	68
Author Vita.....	91

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List of Tables

	Page
Table 1.a Differences in Demographic variables between Survey Platform	36
Table 1.b Difference in Measures between Survey Platforms	37
Table 2. Correlations	39
Table 3. Dating App Use and Sexual Behavior	41
Table 4. Hierarchical logistic regression predicting unprotected sex, past 3 months	42
Table 5. Hierarchical logistic regression predicting multiple partners, past 3 months	43
Table 6. One-Way ANOVAs for STI prevention measures	44
Table 7. One-Way ANOVAs for STI testing measures	45
Table 8. One-Way ANOVAs comparing participants who met someone off an app during the pandemic compared to those who had not across all measures	48
Table 9. One-Way ANOVAs comparing participants who had been participating in social isolation to those who had not across all measures	50

List of Figures

	Page
Figure 1. A model demonstrating the Theory of Planned Behavior taken from Friedman, H.S., 2014	17
Figure 2. A moderation model demonstrating the proposed analyses for Hypothesis 1b	32
Figure 3. Moderation model testing the moderating effect of STI related knowledge on the relationship between STI related stigma and STI testing intention	39

Abstract

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Millions of Americans are currently using smartphone dating applications (apps) to socialize and meet with others. In some cases, app-based conversations lead to sexual interactions. Previous research examining the relationship between the use of dating apps and sexual behaviors has found that individuals who use dating apps and meet with partners from the app are more likely to engage in high-risk sexual behaviors such as having multiple partners and inconsistent condom use. Individuals between the ages of 18 and 24 are the group most likely to be using dating apps compared to other age groups and are a high-risk group for contracting sexually transmitted infections (STIs). While much research has been done regarding the use of dating apps among men who have sex with men (MSM), the literature on dating app use among other populations is still developing. The purpose of this study is to examine how dating app users differ from non-app users in terms of high-risk sexual behavior and sexual health beliefs related to STI prevention and testing.

Swipe Right for Condoms and Testing
Differences in High-Risk Sexual Behavior and Sexual Health Beliefs
Among Dating App Users Compared to Non-App Users

Background

As of June 2019, over eight and a half million Americans report using the dating application (app) known as Tinder (Clement, 2019). While it is the most popularly used dating app, Tinder is just one of the various options available to smartphone users seeking conversation, friendship, or companionship (Flygare, 2019). Dating apps, also referred to as geo-social networking applications, allow people to meet other users by commenting or “liking” each other’s accounts in order to initiate a conversation. While some users report using such apps to “kill time” and “make friends” many also use these apps to seek out intimate sexual relationships (Griffin, Canevello, & McAnulty, 2018). In response to the popularity of these apps sexual health researchers have begun to examine how the use of dating apps might facilitate high-risk sexual behavior (Queiroz, de Sousa, de Araújo, de Oliveira, Moura, & Reis, 2017). Initial work examined apps specifically made for men who have sex with men (MSM), such as Grindr and Scruff, and found differences in sexual behavior among dating app users compared to non app users. Those who used these apps to meet sexual partners had a higher frequency of unprotected anal sex and were more likely to have multiple partners, compared to non app users (Goedel & Duncan, 2015). Furthermore, the apps were especially likely to be used by young MSM, who are at a higher risk of contracting HIV and other STIs (Goedel & Duncan, 2015; Cabecinha, Mercer, Grayningen, Aicken, Jones, Tanton, Wellings, Sonnenberg, & Field, 2017). One meta-analysis of MSM dating app use reported similar findings across fourteen studies demonstrating the health

risks associated with the ease and frequency of access to sexual partners facilitated by dating apps (Queiroz et. al, 2017).

While numerous studies have been conducted regarding MSM's use of dating apps, the literature on use by heterosexual individuals and sexual minority women is more recent and still developing. The research that has been conducted among more general populations has produced mixed results with some reporting high-risk sexual behavior among app users compared to non-app users and others reporting that few app users meet up with other app users at all (Griffin et. al, 2018; Sawyer, Smith, & Benotsch, 2018; Shapiro, Tatar, Sutton, Fisher, Naz, Perez, & Rosberger, 2017). Despite these differences, one consistent finding is that those who use dating apps the most are typically within the 18 to 24 year old age range (Clement, 2019). This is also the population with the highest risk of contracting STIs in the United States. Over the past few years, the CDC has reported an increase in reported STI infections particularly among young adult Americans. Reported cases of chlamydia saw a 3.7% increase in 20-24 year old women from 2016 to 2017 and a 7.8% increase in 20-24 year old men (Centers for Disease Control and Prevention [CDC], 2018). Cases of Gonorrhea and Syphilis have also seen an increase with a 12.8% increase in Gonorrhea cases in 20-24 year-olds from 2016 to 2017 and cases of Syphilis increasing each year, nearly doubling since 2013 (CDC, 2018). With 12.5 million students under the age of 25 enrolled in college as of 2019, colleges and universities are aware of the vulnerability to STIs that exist within this age group. To address this vulnerability, many colleges provide campus resources to test for and treat STIs in addition to creating campus wide initiatives to educate students on STIs (American College Health Association [ACHA], 2019). However, despite these efforts, an increase in STI cases among college-age Americans is evident.

In order to understand why reported cases of STI infection continue to increase in young adults we must consider the barriers to STI prevention and testing that exist even when resources are available. Condom use is one form of STI prevention that is frequently underutilized among young adults and particularly college students. In 2018, approximately half of college students reported inconsistent condom use for vaginal sex (American College Health Association [ACHA], 2018). Some of the primary reasons college students forgo using condoms are that they underestimate rates of condom use among their peers, they do not perceive themselves to be at risk of STIs, and they perceive that condoms are primarily used to prevent pregnancy as opposed to STIs (Whiting, Pharr, Buttner, & Lough, 2019; Rooker, 2017). While much is known about condom use among college students, the findings from studies looking at condom use among dating app users is mixed. A systematic review of the use of digital platforms (dating apps and the internet) to seek out partners assessed the findings from 19 studies related to condom use. Out of the 19 studies, 11 (58%) found that seeking a partner online was associated with inconsistent condom use compared to individuals who did not use these methods to find a partner (Tsai, Sussman, Pickering, & Rohrbach, 2019). However, three (16%) of the 19 examined studies found that online partner seeking functioned as a protective factor against condomless sex and five (26%) found no association between online partner seeking and condomless sex. These mixed findings demonstrate the continuing need to evaluate condom use among dating app users in order to gain a better understanding of condom habits and STI vulnerability within this population.

Various studies have examined barriers to getting tested for STIs among college students. One such barrier is the stigma related to STI testing. Reemst (2010) found that higher STI stigma was associated with lower testing intentions with higher perceived stigma being a primary

factor in lower intentions to get tested for STIs. Another study found that the greatest concern reported by participants was what other people would think about STI testing, with 61% of the participants specifically mentioning “embarrassment” as a reason to forgo getting tested for STIs (Barth, Cook, Downs, Switzer, & Fischhoff, 2002). The impact of stigma could play a key role in college students’ decision to not get tested given that STI testing rates among college students tend to be low (Wombacher, Dai, Matig, & Harrington, 2018). A survey of 1,500 undergraduate students found that almost half (48.5%) reported they had never been tested for an STI and most (62.9%) reported they had never been tested for HIV (Bontempi, Mugno, Bulmer, Danvers, & Vancour, 2009). Similar trends are evident among dating app users of undergraduate age. One study reported that, across all age groups, dating app users are more likely to get tested for STIs in the past compared to non-users (Coor, Kachur, Friedman, Witbart, Hable, Bernstein, & Hogben, 2019). However, among 18 to 24 year old’s in that study, STI and HIV testing was less common among app users compared to non-app users. These findings suggest that dating app users between the ages of 18 and 24 could be experiencing barriers to STI testing. Furthermore, previous research has also demonstrated inconsistent STI prevention methods, such as condom use, among both dating app users and college age individuals (ACHA 2018; Tsai, et. al, 2019). Therefore, it would be beneficial for sexual health initiatives to identify the potential barriers to STI prevention and testing among dating app users between the age of 18 and 24.

Dating Apps, MSM, and Sexual Behavior

The majority of research pertaining to dating app use and sexual behavior has been conducted among MSM populations and the apps they use such as Grindr and Scruff (Goedel & Duncan, 2015). This research has typically focused on sexual behavior of app users such as condomless sex, frequency of sex, number of partners, and other high-risk behaviors. A meta-

analysis of this research reviewed fourteen studies that consistently reported app users exhibiting high-risk sexual behavior such as having anal sex without a condom and multiple partners (Queiroz et. al, 2017). One of the studies reviewed for this meta-analysis utilized Grindr as a means for recruiting participants and found that 84.9% of their sample was HIV-negative, 8.7% was HIV-positive, and 6.5% had an unknown status or had never been tested (Goedel & Duncan, 2015). Out of this sample, HIV-positive participants reported having condomless sex with more partners in the last six months compared to HIV-negative participants. These findings demonstrate the sexual health risks associated with dating app use among MSM particularly as it relates to the increased risk of contracting HIV and other STIs. However, the relationship between dating app use and risky sexual behavior may not necessarily be a causal one.

A 2018 study examined how the difference in time between matching with someone on an app and meeting them in person might influence sexual risk taking (Hahn, You, Sferra, Hubbard, Thamocharan, & Fields, 2018). The first part of the study was conducted with MSM between the ages of 18 and 24 who used dating apps and asked them to report how many days they spent talking to an app match before meeting them in person. Participants were also asked whether or not they engaged in sexual behavior with their app-met partner. Results indicated that app users who had spent only a few days talking to their app match before meeting, compared to those who waited a few weeks, were more likely to engage in oral sex with their app-met partner and were more likely to engage in oral sex with more app-met partners compared to app users who waited a few weeks before meeting their app-met partner (Hahn et. al, 2018). The second part of this study replicated this process but with a broader population including heterosexual men and women and sexual minority women between the ages of 18 and 21. For the purpose of the analysis participants were categorized into one of four groups based on whether they

indicated that they had 1) not used a dating app, 2) talked with their app-partner a few days or less before meeting in person, 3) talked about a week before meeting in person, or 4) talked a few weeks before meeting in person. Statistical analyses indicated that sexual risk behavior differed among the four groups with individuals who talked with their app-met partner only a few days or less before meeting engaging in more unsafe sexual practices than individuals who waited a week or more and individuals who reported not using dating apps (Hahn et. al, 2018). The findings from this study demonstrate that while app usage itself does not necessarily result in riskier sexual behavior it does provide an accessible setting for individuals who might already engage in riskier sexual behavior do so with a wider range of people particularly those who also engage in sexual risk taking. This behavior was identified in both MSM and a more general population which demonstrates how what we know about MSM apps can potentially inform how we study and discuss dating apps used by other groups Therefore, utilizing dating apps for the purpose of sexual health interventions and initiatives could be a crucial strategy in targeting individuals at high risk of contracting STIs.

Dating Apps, non-MSM, and Sexual Behavior

As previously stated, few studies have examined the relationship between dating app usage and sexual behavior among heterosexual individuals and sexual minority women. Given the predominant use of dating apps among young adults relative to other age groups, many of these studies were conducted among undergraduate populations. One such study conducted in 2018 surveyed 409 college students at a public university located in the southeastern U.S. and reported that 39% of participants reported using dating apps and, of those participants, 40% had used them once, 19% monthly, 18% weekly, and 22% daily (Griffin et. al, 2018). This study also

found that those who used dating apps more frequently were more likely to meet a match in person compared to one-time users. While only 4% of participants reported using the apps for casual sexual encounters, 72% of men and 22% of women indicated they would be open to meeting a sexual partner through a dating app (Griffin et. al, 2018). Other reasons given for using the apps were “to have fun” (31%) and to “meet people” (11%).

Another study analyzed data from 509 college students at a public university located in the Mid-Atlantic region of the U.S. and reported that more than one third of the participants indicated that they had used a mobile dating app and over a quarter of those participants reported having sex with someone they met through the dating app (Sawyer et. al, 2018). Furthermore, those that reported using a dating app compared to those who had not were twice as likely to have had unprotected sex in the past 3 months. Motivations within the sample were similar to motivations indicated in the 2018 Griffin study with 94% reporting they used the app to “have fun” and 90.5% to “meet new people”. However, this sample of app users also indicated they used the app to “find a dating partner” (68.7%) and to “initiate sex” (37.8%) and seemed to act on these intentions more so than the sample from the 2018 Griffin study (Sawyer et. al, 2018). In general, the literature on dating app use among heterosexual individuals has demonstrated high-risk sexual behaviors among app users compared to non-app users particularly among young adults and college students (Tomaszewska & Schuster, 2019; Hahn et. al, 2018; Tsa et. al, 2019; Sawyer et. al, 2018). However, this body of literature is still in development and future work should address how sexual health initiatives ought to consider the difference in STI vulnerability among young adult dating app users and non-app users.

Barriers to STI Testing: Stigma and Knowledge

While access to STI testing services is certainly an important factor to consider when addressing barriers to STI testing there are also relevant intangible factors that have been shown to contribute to STI testing behaviors. Two of these primary barriers to STI testing are STI related stigma and lack of STI related education (Fortenberry, McFarlane, Bleakley, Bull, Fishbein, Grimley, Grimley, Malotte, & Stoner, 2002). Stigma is typically characterized as the perception of how others would perceive someone with an STI that influences whether or not someone seeks testing or treatment. Early studies on the relationship between stigma and STI testing found that participants reported being less likely to seek optimal STI/HIV related care based on their perception that others allot negative attributes to people with an STI (Fortenberry et. al, 2002). Furthermore, participants with higher STI related stigma had a decreased likelihood of being tested for gonorrhea or HIV in the past year (Fortenberry et. al, 2002). Multiple other studies conducted in more recent years have reported similar findings concerning the function of STI stigma as a barrier to getting tested specifically among women (Malta, Bastos, Strathdee, Cunningham, Pilotto, & Kerrigan, 2007; Darroch, Myers, & Cassell, 2003). Such studies conducted in clinic settings have found that heterosexual women tend to have less STI-related knowledge and greater levels of perceived stigma relative to heterosexual men. Furthermore, MSM patients received substantial STI related information from their peers although it was also noted that this information was not always accurate (Malta et. al, 2007). The findings from these various studies demonstrate the persistent negative influence of STI stigma on testing across time and study samples. Therefore, STI stigma should be considered as a crucial factor in evaluating barriers to STI prevention, testing, and treatment.

A lack of STI-related knowledge has also been shown to function as an additional barrier to STI testing. These two barriers typically work in tandem with a combination of greater perceived stigma and lack of knowledge often contributing to delayed health care seeking (Fortenberry 1997). However, it has also been demonstrated that proper STI education can reduce STI-related stigma. One study looking at stigma related to Human Papillomavirus (HPV) found a negative correlation between stigma about HPV and knowledge about HPV such that greater knowledge of HPV was associated with lower HPV stigma (Sandfort & Pleasant, 2009). Furthermore, individuals with greater STI knowledge and more positive attitudes towards STI screening were more likely to get screened compared to those with less knowledge and negative attitudes towards STI screening (Shepherd & Harwood, 2017). However, some studies on the influence of knowledge on STI stigma and testing attitudes have resulted in mixed findings. Foster and Byers (2008) found no association between higher STI knowledge and lower stigma (Foster & Byers, 2008). However, more recent research on HIV knowledge has demonstrated that an increase in HIV related knowledge is positively associated with HIV testing behavior (Evangeli, Pady, & Wroe, 2016). Therefore, it continues to be necessary to evaluate STI related knowledge when considering the role of STI stigma on testing behavior in order to better understand how to tailor sexual health initiatives.

Understanding the relationship of STI related knowledge and STI stigma to STI testing behaviors is especially important when evaluating how to encourage young adult populations to seek out such services. When asked about barriers to seeking out STI testing, one of the most common reasons provided by college students was concern with the potential negative social consequences and what their peers would think (Barth, et. al, 2002). Furthermore, the anticipation of embarrassment is frequently identified as a barrier to STI testing among many

college students (Barth et. al, 2002). In addition to putting off seeking testing and treatment, the fear of embarrassment has also been associated with a reluctance to disclose the name of sexual partners to the health department in the event of receiving an STI diagnosis (Lichtenstein, Hook, & Sharma, 2005). Studies exploring the role of social perception on STI stigma have demonstrated that individuals are perceived more negatively when their illness was specified as having been sexually transmitted compared to when the method of illness transmission was left unspecified (Smith & Nave, 2007). Even in the case of cervical cancer that developed due to HPV infection a woman is perceived as dirty, more dishonest, and unwise (Shepherd & Gerend, 2014). Such studies illustrate the very real influence of social perception of STIs and how they contribute to STI stigma, prevention, and testing. Therefore, continuing to examine the role of STI stigma within the context of sexual behavior could provide important insight on how to best encourage STI prevention, testing, and treatment among vulnerable populations such as young adults and frequent dating app users.

Theory of Planned Behavior and Sexual Health

The Theory of Planned Behavior (TPB) was developed by Icek Ajzen in 1991 as a continuum model meant to predict human behavior (Ajzen, 1991). TPB posits that behavior is dependent on intention which is influenced by three interacting yet conceptually independent variables: attitudes, subjective norms, and perceived behavioral control of a specific health behavior. The attitude towards a behavior is indicative of the positive or negative value that is associated with execution of the behavior. Whether the value is positive or negative is dependent on the perceived outcome of the behavior (Ajzen, 1991). For example, if someone were to associate the use of condoms with positive outcomes such as STI and pregnancy prevention then they will be more likely to view condom use positively. However, if they learn to associate

condom use with negative outcomes such as partner rejection or loss of sexual intimacy then they are more likely to view condoms negatively. The question then becomes how individuals learn to develop positive or negative associations about a behavior and thus a positive or negative attitude. The development of positive or negative attitudes can be informed by personal experiences as much as it can be informed by the experiences of others. Here is where subjective norms function to influence the development of individual attitudes. Subjective norms are dependent on the perceived value of a behavior as demonstrated by others. In this case, “others” refers to either an important individual or a group (Ajzen, 1991). The stronger the relationship between an individual and their social reference point (i.e., an important person) or their peers, the more likely that individual is going to share the attitudes of their social reference point. Therefore, the perceived positive or negative attitude towards a behavior among others informs the potential outcome of a behavior which in turn influences the development and perpetuation of individual attitudes.

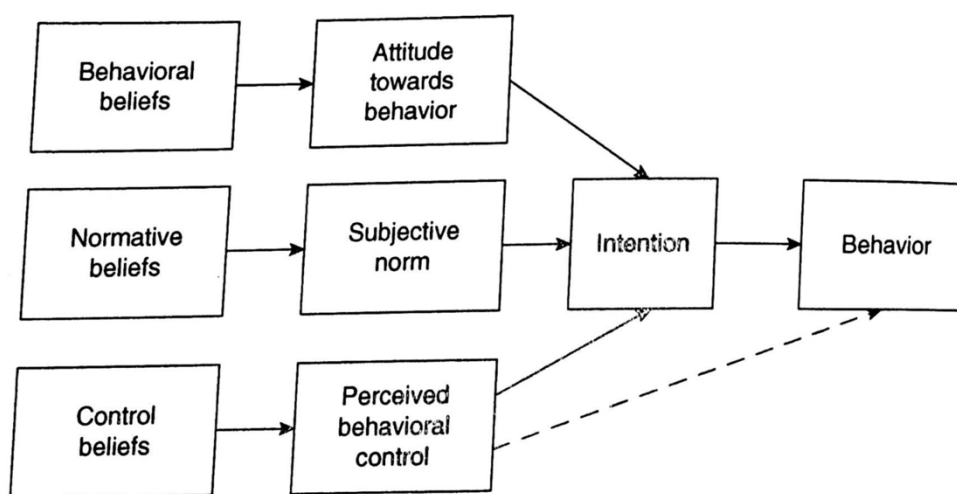


Figure 1. A model demonstrating the Theory of Planned Behavior taken from Friedman, H.S., 2014

Perceived behavioral control is the perception of one's ability to perform a behavior. Perceived behavioral control is considered to be the belief system that ultimately determines the intention to carry out a behavior (Ajzen, 1991). Whether or not someone perceives that they are capable of carrying out a behavior is largely dependent on the resources and opportunities that are available. Both positive attitudes and subjective norms towards a behavior can be present but not much can be achieved without the resources or opportunities to carry out a behavior. For example, someone can want to get tested for STIs because they have heard of their peers getting tested but they may not know where to go to get tested. If they do not know where to go to get tested then ultimately an STI test will never take place regardless of the positive individual or peer perception of the behavior. While a lack of knowledge can be addressed easily enough there are other barriers that can arise such as finances, transportation, and time. The more barriers that exist for an individual to conduct a behavior the less control they have and thus are less likely to perform the behavior. These three factors work together to influence the intention to perform a behavior which is considered the strongest predictor of the actual performance of a behavior (Ajzen, 1991). Within the context of TPB, intentions can function as a health outcome since without intention there can be no behavior.

Previous findings have demonstrated that the four components of TPB (i.e., attitudes, norms, perceived behavioral control, and intentions) are significantly related to high-risk sexual behavior and sexual protective behaviors including condom use and STI testing (Montanaro & Bryan, 2014; Muñoz-Silva, Sánchez-García, Nunes, & Martins, 2007; Wombacher et. al, 2018). Various studies assessing sexual health and high-risk sexual behavior have relied on principles from TPB in order to use intention as an indicator for actual behavior (Reemst, 2010; Thomas, 2019; Wombacher et. al, 2018). For example, studies focusing on health behaviors such as

alcohol use, smoking, and condom use have successfully demonstrated the use of behavioral intention as a strong predictor of actual change in behavior (Godin & Kok, 1996; Albarracin, Johnson, Fishbein, & Muellerleile, 2001). Studies that use the framework of TPB often use intention as a predictor since intention requires the same motivational factors that influence whether or not a given behavior occurs (Asare, 2015; Neuberger & Pabian, 2019). Previous research regarding the factors that contribute to whether or not college students get tested for STIs have used TPB to demonstrate that attitudes towards testing are the strongest predictor among college students as to whether or not they get tested for STIs (Reemst, 2010; Thomas 2019; Wombacher et. al, 2018). Therefore, testing intention can serve as a health outcome when examining barriers to testing such as STI stigma and lack of STI related knowledge.

Current Sexual Health Initiatives via Dating Apps

Many researchers and health organizations saw an opportunity to use dating apps for the purpose of delivering sexual health information and services (Cao et. al, 2017). For example, Grindr has worked with health clinics, public health organizations, and advocacy organizations to help MSM users locate their nearest testing center and increase general awareness of sexual health issues (Kirby & Thornber-Dunwell, 2014). Dating apps for MSM and other social media platforms have also been utilized to advertise and deliver at home HIV testing kits and the data resulting from these interventions indicate an increase in HIV testing following exposure to the intervention (Cao et. al, 2017). The vast majority of dating app based sexual health initiatives are advertised and delivered exclusively via MSM-specific dating apps despite the similarities in app related sexual behavior between MSM and the general population (Huang, Williams, Hocking, & Lim, 2016). If similar sexual health initiatives are to be conducted within apps used by the general population it would be advantageous to know what type of messages and interventions

are most relevant to dating app users. Therefore, we must identify potential barriers to STI prevention and testing that may exist for dating app users and how these barriers might differ from non- app users. By identifying these app-user specific barriers we can tailor health messages and interventions to best address their vulnerability to STIs.

The COVID-19 Pandemic

Beginning in March of 2020, federal and state governments began closing, or limiting, access to public areas such as bars, restaurants, and public transportation to combat the spread of the novel coronavirus (SARS-CoV2). These procedures were informed by CDC guidelines which advised individuals to limit interactions with others outside their home and to maintain a distance of six feet from others while out in public (CDC, 2020). These precautions are widely referred to as “social distancing”. Soon after, face masks were also recommended for use while in enclosed public spaces and often required by businesses for entry into their establishment. To date, no data has been provided on how social distancing guidelines may have impacted dating app use. While it may not appear as a prescient matter, knowing how dating app use among young adults changed or remained unchanged by the pandemic may provide important information about the social behaviors among this population. For instance, it may be worthwhile to know whether young adults are still meeting each other via dating apps during the pandemic. Young adults have been identified as potential asymptomatic spreaders of COVID-19 and are most likely to spread the virus to others in their age group (Laxminarayan, Wahl, Dudala, Gopal, Mohan, Neelima, Jawahar Reddy, Radhakrishnan, & Lewnard, 2020). Therefore, collecting information on young adults’ behaviors related to dating app use amidst the COVID-19 pandemic could contribute to a better understanding of behavior related to disease transmission, sexual or otherwise, among this already vulnerable population.

Present Research

The current study aimed to examine STI prevention and testing barriers among dating app users compared to non-app users. Although previous research regarding dating app use within populations not exclusive to MSM have examined STI prevention, testing, and sexual behavior, this research has not considered factors such as stigma and STI knowledge. Additionally, no one study has examined all of these factors together. As a result, much of this study was exploratory in order to determine whether differences in barriers to STI prevention and testing exist between dating app users and non-app users.

Hypothesis 1a-1b: In order to replicate findings from previous research related to STI stigma and knowledge on testing behavior, I hypothesized that STI stigma would predict lower STI testing intention and that STI related knowledge would buffer the effect of STI stigma on STI testing intention via moderation.

Hypothesis 2: Consistent with past research on dating app use and sexual behavior among college students, I hypothesized that app users will engage in more high-risk sexual behavior compared to non-app users.

Exploratory Aim 1: I conducted an exploratory analysis to determine if app users differ from non-app users on our STI prevention measures: condom attitudes, condom social norms, and condom self-efficacy.

Exploratory Aim 2: I conducted an exploratory analysis to determine if app users differ from non- users across STI testing measures: STI testing attitudes and STI testing intention.

Exploratory Aim 3: I conducted an exploratory analysis to determine if individuals who did meet someone off a dating app during the pandemic differ from those who did not across all

STI measures. Additionally, potential differences across all measures were assessed for those who participated in social isolation compared to those who did not.

METHODS

Sample

Approximately half (N=317) of the sample for this study was recruited from an undergraduate population at a public university in the Mid-Atlantic region of the United States. The survey that was administered to this portion of the sample used a university-based SONA system that allowed students enrolled in psychology courses to participate in research for course credit. The other half (N=328) of the sample (recruited after June 23, 2020) were provided with additional survey items asking them about their dating app use during the COVID-19 pandemic. Additionally, participant collection was extended to Amazon Mechanical Turk Prime (TurkPrime) in order to expedite participant responses. TurkPrime is an online tool designed to link people who have tasks that they need completed with people who are willing to complete these tasks. The participants collected from TurkPrime received financial compensation for their participation. For collection on TurkPrime, demographic settings required participants to be between the ages of 18 and 24 in order to participate in the study. Researchers were able to specify these age exclusions using the demographic filters featured on TurkPrime for an additional cost to ensure that only participants whose were between the ages of 18 and 24 were given the option to take the survey. Only the combined survey results from all participants between the ages of 18 and 24 were used for the final analyses. Data from one participant was removed due to random responding. A power analysis using G*Power software was conducted

and indicated that the optimal sample size for this study was 619 participants in order to detect small effect sizes (Faul, Erdfelder, Buchner, & Lang, 2009).

Procedure

VCU participants accessed the survey through the university-based SONA survey site where they received 0.50 credits for their psychology course. If they chose to participate in the study they were directed to the survey page where they were asked to provide informed consent. Once consent was obtained, participants were asked to respond to questions about demographic information, sexual behaviors, dating app usage, condom attitudes, STI testing attitudes and intention, perceptions of STI stigma, STI knowledge, and familiarity with sexual health related ads within dating apps. The total survey consisted of 135 items, including demographic questions, and took approximately 15 minutes to complete. The questionnaire order was not randomized. The SONA survey system has been used in previous university-based studies and has been identified as a reliable internet-based method of collecting data (Gamblin, Winslow, Lindsay, Newsom, & Kehn, 2017; Ramsey, Thompson, McKenzie, & Rosenbaum, 2016). When compared to other internet-based survey methods, participants recruited through SONA typically demonstrate similar levels of question comprehension and attention as other samples collected through different internet-based methods (Ramsey, et. al, 2016). Previous work has shown that sensitive or stigmatized health behaviors are more likely to be fully reported as anonymity increases and that self-administered internet or computer-based assessments can be an important tool for data collection in this regard (Newman, Des Jarlais, Turner, Gribble, Cooley, & Paone, 2002).

Given the unprecedented circumstances brought on by the COVID-19 pandemic, additional items related to dating app behaviors during the pandemic were included in order to

explore how certain practices, such as social isolation, have impacted the use of dating apps. For example, whether use of such apps has increased or decreased since isolating or whether someone has downloaded an app since isolating when they did not already have a dating app on their phone prior to isolating. In order to increase responses participants were recruited online via TurkPrime. TurkPrime participants were asked to complete these items related to COVID-19 in addition to the original 135 items. Participation took about 18 minutes on average, was completed online, and was completed in the participants' home/ internet access point. Using TurkPrime, participants could elect to complete the project at their free will after reading a short description posted on the site. Once participants entered the TurkPrime site for the study they were directed to a link that took them to the Qualtrics site. Upon entering, participants reviewed an electronic copy of an informed consent form, detailing what the study was about prior to completing any measures. Participants recruited through TurkPrime were compensated \$0.75. Since participants could self-select, potential subjects were not identified by the researchers. Additionally, names and contact information of the subjects were not collected so as to preserve their confidentiality. IP addresses were collected automatically, used for data quality purposes, and then removed from the dataset. This information was not used to identify or contact participants in any way.

One limitation of using university-based SONA surveys and TurkPrime is that it collects convenience samples. Critiques of the use of convenience samples, particularly those that come from undergraduate populations, have argued that convenience samples are not representative of the general population and thus cannot be used to make generalizable conclusions (Henrich, Heine, & Norenzavan, 2010; Peterson & Merunka, 2014). These samples are typically young, white, and college educated which poses limitations on the conclusions that can be drawn from

studies that produce findings using this population. However, recent university-based studies have reported relatively diverse samples with white or Caucasian participants making up approximately 43.6% to 52.9% of the sample and the remaining participants identifying as one or more non-white racial identity (Sawyer et. al, 2018; Benotsch, Snipes, Martin, & Bull, 2013). Studies have also produced findings indicating an association between the use of technology to acquire and communicate with sexual partners and high-risk sexual behavior among undergraduate populations (Sawyer et. al, 2018; Benotsch et. al, 2013).

Measures

Demographics

Participants were asked to indicate their age, gender, racial/ethnic identity, sexual orientation, and relationship status. The only demographic variable that were used to determine inclusion in the analyses were age which was limited to participants between the ages of 18 and 24.

Sexual Health Behaviors

Sexual behavior was assessed by asking participants to report their most recent sexual, STI prevention, and STI testing related activity. The measure asked participants to report their number of lifetime sexual partners as well as their number of sexual partners in the past three months. With regards to their partners in the past three months, participants were asked to report the number of male and/or female partners with whom they have engaged in vaginal, anal, or oral sex. Three separate items asked participants to report how many times they have had unprotected vaginal, anal, or oral sex in the past three months. Participants were then asked to report whether or not they have ever been tested for an STI and a separate item asked if they

have been tested in the past six months. Finally, participants were asked to report whether they knew where to go if they wanted to get tested for STIs, if they have been diagnosed with an STI in their lifetime, and if they have been diagnosed with an STI in the past six months. Prior research assessing sexual behavior in college students has used similar methodology (Sawyer et al, 2018; Benotsch et. al, 2013).

Dating App Usage and Behavior

Participants were asked to indicate whether they have ever used a dating app and if they have been active in the past 6 months. For both items, participants were asked to indicate which apps they have used. Participants were then asked to indicate how frequently they use dating apps with response options ranging from (1) less than once a month to (5) multiple times a day with a separate item (6) I have never used a dating app for those in the non-user group.

Participants were also asked to report their sexual behavior related to dating app use. Participants were asked to indicate the number of times they have had protected and unprotected vaginal, anal, or oral sex in the past three months and in their lifetime as well as the total number of people they have met off dating apps with whom they have had vaginal, anal, or oral sex. Prior research regarding the use of technology to acquire or communicate with sexual partners have use similar methodology (Sawyer et. al, 2018 Benotsch et. al, 2013).

Condom Attitudes, Norms, and Self-Efficacy

The Condom Attitudes, Norms, and Self-Efficacy scale is a 32-item instrument developed for use with young, diverse populations to assess and standardize the measurement of beliefs related to condom use (Pratte, Whitesell, McFarlane, & Bull, 2010). The measure has been validated among diverse populations and contains six subscales: positive outcome

expectancies, negative outcome expectancies, partner norms, peer norms, self-efficacy for condom negotiation, and self-efficacy for condom use.

Positive Outcome Expectancies Subscale

This subscale assesses the extent to which participants anticipate using condoms will result in positive outcomes. Example items from this subscale include “How likely is it that you would enjoy sex if you use condoms?” and “How likely is it that you would think your partner felt you trusted him or her with a condom?” with response options ranging from 1=not at all likely to 5=very likely. The measure demonstrated strong internal consistency in the present sample ($\alpha = 0.80$).

Negative Outcome Expectancies Subscale

This subscale assesses the extent to which participants anticipate using condoms will result in negative outcomes. Example items for this subscale include “How likely is it that you would think sex would feel unnatural with a condom?” and “How likely is it that your partner would be angry if you asked them to use a condom?” with response options ranging from 1=not at all likely to 5=very likely. The measure demonstrated moderate to strong internal consistency in the present sample ($\alpha = 0.78$).

Partner Norms Subscale

This subscale assesses the extent to which participants will forgo using condoms based on their feelings towards and how much they trust their partner. Example items for this subscale include “If you love someone, you don’t have to use a condom” and “If you know a person very well, you don’t have to use a condom” with response options ranging from 1=not at all true of me to 5=very true of me. The measure demonstrated strong internal consistency in the present sample ($\alpha = 0.89$).

Peer Norms Subscale

This subscale assesses the extent to which participants think that their peers use condoms. Example items from this subscale include “How important is it that people like you always discuss condoms with a new partner” and “How important is it that people like you use condoms in one-night stands/flings?” with response options ranging from 1=not at all important to 5=very important. The measure demonstrated strong internal consistency in the present sample ($\alpha = 0.81$).

Self-Efficacy for Condom Negotiation

This subscale assesses the extent to which participants feel they can effectively negotiate using condoms with their partner. Example items from this subscale include “How confident do you feel you could discuss using condoms with your partner?” and “How confident do you feel you could suggest using a condom with your partner to prevent STIs?” with response options ranging from 1=not at all confident to 5=very confident. The measure demonstrated strong internal consistency in the present sample ($\alpha = 0.83$).

Self-Efficacy for Condom Use

This subscale assesses the extent to which participants feel they can properly use condoms. Example items from this subscale include “How confident do you feel you could put a condom on correctly” and “How confident do you feel you could use a condom each and every time you have sex with a non-main partner” with response options ranging from 1=not at all confident to 5=very confident. The measure demonstrated low to moderate internal consistency in the present sample ($\alpha = 0.66$).

STI Testing Intention

The STI Testing Intention measure was developed to assess the likelihood that someone will get tested for STIs and HIV in the next six months. The measure consists of nine items modeled after the CDC'S Brief Sexual History Tool (CDC, 2018) and measures testing intention on a 5-point Likert scale with 1=not at all to 5=very likely (Reemst, 2010). Example items from this measure include “To what extent do you plan to get tested for STIs in the next six months?” and “To what extent do you plan to get tested for Human Immunodeficiency Virus (HIV) in the next six months?” The measure demonstrated strong internal consistency in the present sample ($\alpha = .98$).

STI Stigma and Shame

The STI stigma and shame measure was developed to assess levels of stigma and shame associated with STIs and to demonstrate a conceptual difference between stigma and shame (Fortenberry et. al, 2002). Both the stigma subscale ($\alpha = .78$) and the shame subscale ($\alpha = .91$) were used in the analysis. Example items from the stigma subscale include “Getting a sexually transmitted disease means I have poor morals” and “Most people I know think that a sexually transmitted disease is a sign of a weak character”. Example items from the shame subscale included, “Getting a sexually transmitted disease means I don't take care of myself” and, “People with sexually transmitted diseases should be ashamed of themselves”. This subscale is measured on a 5-point Likert scale with response options ranging from 1=strongly disagree to 5=strongly agree.

STI Testing Attitudes

Attitudes towards STI testing were assessed using a 4-item attitude measure developed to assess both positive and negative attitudes towards STI testing (Wombacher et. al, 2018). Items are measured using a 7-point Likert scale with response options ranging from 1=strongly

disagree to 7=strongly agree to statements such as “STI testing may mean I cannot hook up” and “STI testing is the responsible thing to do”. When all four items were loaded into the reliability analysis the Cronbach’s Alpha was 0.17. In order to improve reliability of the measure items three, “STI testing may mean I cannot hook up”, and four, “STI testing may make me feel embarrassed”, were removed the alpha increased to 0.59. Therefore, only the first two items were used in the analysis to assess STI testing attitudes. Some reasons for the lower internal consistency of this measure could be that it was only four items, two of which needed to be reverse coded. Additionally, this measure was administered towards the end of the survey and participant fatigue may have resulted in inattentive responding. Given that this measure was only used for exploratory purposes it was still included in the analysis.

STI Knowledge

STI knowledge was measured using a 27-item scale developed by Jaworski and Carey (2007) for use among college students to assess their knowledge of STI transmission, prevention, and treatment. STI related knowledge is assessed using true or false statements and is measured using a point system with each correct answer equating one point out of a potential twenty-seven total points. Incorrect answers or items marked as “I do not know” receive no points and were coded as 0. Correct responses were coded as 1 so that questions for which the correct answer is “False” all responses of “False” were coded as 1 and likewise for questions where the correct answer is “True”. Example items from this measure include, “There is a cure for Chlamydia” and “A woman who has Genital Herpes can pass the infection to her baby during childbirth”. The measure demonstrated strong internal consistency ($\alpha = .89$).

Ads on Dating Apps

Many dating apps run ads for goods, services, and other smart phone applications. Some apps, specifically those targeted towards MSM populations, also run ads related to sexual health including ads promoting condom use, testing facilities, or HIV prevention medication such as PrEP (Cao et. al, 2017). Therefore, participants were asked if they have seen ads on dating apps related to sexual health. One item on the measure asked participants to indicate whether they have seen an ad on a dating app promoting STI prevention and if so which apps. A separate item asked participants whether they have seen an ad on a dating app promoting STI testing and if so which apps. This allowed me to better understand who is receiving sexual health messages and through which dating apps.

COVID-19 and Dating App Use

Participant responses collected after June 23rd reported information on their participation in social isolation and dating app use within the context of the COVID-19 pandemic. Participants were asked whether they had been participating in social isolation and for how many days they had been isolating. Participants were also asked whether they had a dating app on their phone prior to the pandemic, whether they downloaded an app during the pandemic, and how their level of activity on dating apps had changed since they began isolating. Changes in dating app activity were ordered from 1 (Decreased a lot) to 5 (Increased a lot). Finally, participants were asked how interested they were in meeting people off dating apps prior to the pandemic on a scale from 1 (Not at all interested) to 5 (Very interested), during the pandemic, and whether they had met someone off a dating app in person during the pandemic.

Analyses

Hypothesis 1a-1b

In order to replicate findings from previous research regarding STI related knowledge and STI stigma, a hierarchical linear regression was conducted to determine if higher scores on the STI related knowledge scale predicts lower levels of STI stigma (Sandfort et. al, 2017; Thomas, 2019). Demographic information such as race, gender, and sexuality were entered into the first step of the model in order to demonstrate that high STI related knowledge can predict lower levels of STI stigma over and above demographics. Since previous findings have suggested that higher scores on STI related knowledge and lower levels of STI stigma have positively influenced rates of STI testing, a moderation analysis using Hayes' PROCESS was conducted to determine if STI related knowledge buffers the relationship between high levels of STI stigma and low levels of STI testing intentions (Hayes, 2017).

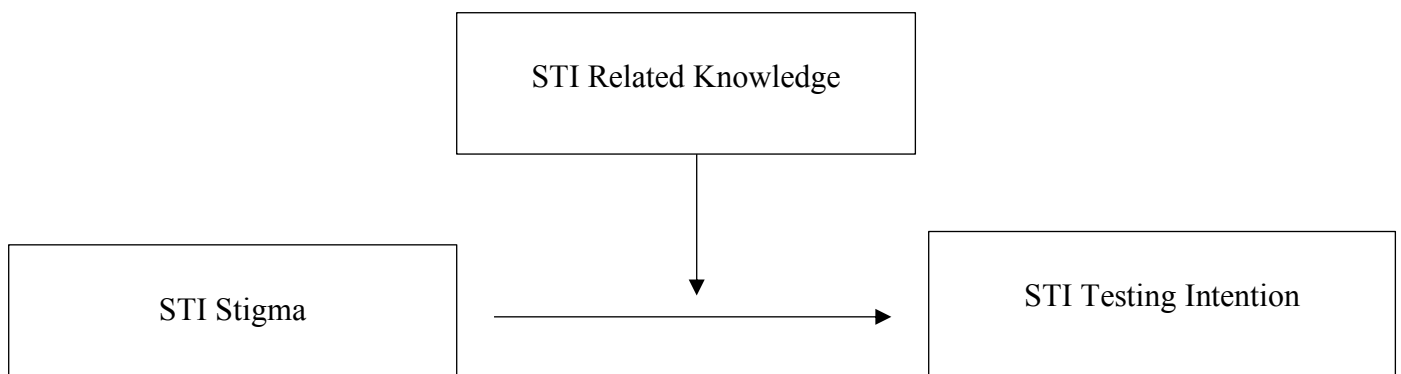


Figure 2. A moderation model demonstrating the proposed analysis for Hypothesis 1b

Hypothesis 2

Two hierarchical logistic regressions were conducted to determine whether dating app users engage in more high-risk sexual behavior compared to non-app users. The first regression assessed differences between individuals who reported unprotected sex in the past 3 months and those who did not. Demographic information such as race, gender, and sexuality were entered into the first step of the model as well as relationship status. Dating app use was entered into the final stage of the model. The second regression assessed differences between individuals who reported having multiple sexual partners in the past 3 months and those who did not. This second regression followed the same steps as the first.

Exploratory Aim 1

As part of our exploratory analysis, multiple One-way analysis of variance (ANOVA) tests were conducted to determine whether dating app users compared to non-app users significantly differ across the three STI prevention measures: condom attitudes, condom social norms, and condom self-efficacy. These ANOVAs compared differences between the two groups across all three measures and indicated whether app users experience significantly greater barriers to STI prevention compared to non-app users. By identifying potential differences in barriers to STI prevention among app users compared to non app users I was able to attain a better understanding of what type of sexual health initiatives would be most beneficial for dating app users.

Exploratory Aim 2

Multiple One-Way ANOVAs were conducted to determine whether dating app users compared to non-app users significantly differ across the two STI testing measures: STI testing attitudes and STI testing intention. The ANOVAs compared differences between the two groups

across the two measures and indicated whether app users experience significantly greater barriers to STI testing compared to non-app users. By identifying potential differences in barriers to STI testing among app users compared to non app users I was able to attain a better understanding of what type of sexual health initiatives would be most beneficial for dating app users.

Exploratory Aim 3

Multiple exploratory One-Way ANOVAs were conducted to assess differences between participants who met someone off a dating app during the pandemic compared to those who did not across all STI measures. Additionally, I conducted multiple exploratory One-Way ANOVAs to assess differences between participants who participated in social isolation compared to those who did not participate in social isolation across all STI measures.

RESULTS

Demographics

Normality checks were conducted on the overall sample and were within normal ranges for skewness and kurtosis. Given that the participants who were displayed the COVID-19 items were compared amongst each other, separate checks for normality were conducted for this portion of the sample. Values for skewness and kurtosis were within acceptable ranges for participant who were displayed the COVID-19 items. Although participants who left questions blank were prompted to complete the questions before moving on to the next section there was some missing data among the target variables. However, approximately 96% of responses were complete so no data imputation was needed.

Of the total 644 participants, 317 were collected at VCU using the SONA system and 327 were collected online across the United States using the TurkPrime survey platform. Participants

from the two locations significantly differed across age, race, and a number of the primary measures of interest. Therefore, the survey platform was controlled for in the analyses. See Tables 1.a and 1.b for the full list of differences between participants recruited from the two survey platforms.

When compared to the populations in each state the geographic distribution of TurkPrime participants had a Pearson correlation of .89 ($p < .001$) indicating that the portion of this sample collected from TurkPrime was geographically representative of the United States. When the two sets of participants were combined, the mean age of the sample was $M=20.5$ ($SD=1.88$). The sample was predominantly female with 66.1% ($n=426$) identifying as female, 30.6% ($n=197$) as male, 1.7% ($n=11$) as gender non-conforming, 1.1% ($n=7$) as a transgender man, and 0.5% ($n=3$) as another identity not listed. The sample was fairly representative with 42.4% ($n=273$) identifying as White or Caucasian, 18.5% ($n=119$) as Black or African American, 16.5% ($n=106$) as Asian, 11.3% ($n=73$) as Multiracial, 8.2% ($n=53$) as Latino, Latina, or Latinx, 1.7% ($n=11$) as Middle Eastern, 0.5% ($n=3$) as an identity not listed, 0.3% ($n=2$) as Native American, and 0.2% ($n=1$) as Hawaiian or Pacific Islander. About half of the sample, 50.6% ($n=326$) were not dating or currently in a relationship while 23.6% ($n=152$) indicated they were in a long-term relationship, 19.6% ($n=126$) were in a newer relationship with one person, 3% ($n=19$) were married, and 3.1% ($n=20$) were dating or in a relationship with more than one person.

Table 1.a Difference in Demographic variables between Survey Platforms

Characteristic	VCU	TurkPrime
	Means (SD)/percentages (<i>n</i>)	Means (SD)/percentages (<i>n</i>)
Age (years)**	Mean = 19.53 (SD = 1.53)	Mean = 21.51 (SD = 1.68)
Lifetime Sexual Partners	Mean = 5.96 (SD = 10.62)	Mean = 6.31 (SD = 10.20)
Race/ethnicity**		
Caucasian/White	32.5% (<i>n</i> = 103)	52% (<i>n</i> = 170)
African American/Black	24.6% (<i>n</i> = 78)	12.6% (<i>n</i> = 41)
Latino/Latina/Latinx	7.6% (<i>n</i> = 24)	8.9% (<i>n</i> = 29)
Asian	14.5% (<i>n</i> = 46)	18.3% (<i>n</i> = 60)
Middle Eastern	2.5% (<i>n</i> = 8)	0.9% (<i>n</i> = 3)
Hawaiian/Pacific Islander	0.3% (<i>n</i> = 1)	0% (<i>n</i> = 0)
Islander		
Native American	0% (<i>n</i> = 0)	0.6% (<i>n</i> = 2)
Not Listed	0.6% (<i>n</i> = 2)	0.3% (<i>n</i> = 1)
Multiracial	16.7% (<i>n</i> = 53)	6.1% (<i>n</i> = 20)
Gender		
Male	26.2% (<i>n</i> = 83)	34.9% (<i>n</i> = 114)
Female	71.3% (<i>n</i> = 226)	61.9% (<i>n</i> = 200)
Nonbinary	1.3% (<i>n</i> = 4)	2.1% (<i>n</i> = 7)
Transgender Man	0.9% (<i>n</i> = 3)	1.2% (<i>n</i> = 4)
Not Listed	0.3% (<i>n</i> = 1)	0.6% (<i>n</i> = 2)
Relationship Status**		
Single	57.1% (<i>n</i> = 181)	44.3% (<i>n</i> = 145)
In a relationship	42.6% (<i>n</i> = 135)	55.7% (<i>n</i> = 182)

** . Difference in Mean is significant at the 0.01 level (2-tailed)

Table 1.b Difference in Measures between Survey Platforms

Measure	VCU	TurkPrime
	Means (SD)	Means (SD)
Positive Condom Outcome Expectancies**	Mean = 4.00 (SD = .65)	Mean = 3.780 (SD = .69)
Negative Condom Outcome Expectancies**	Mean = 1.741 (SD = .67)	Mean = 1.930 (SD = .71)
Condom Partner Norms**	Mean = 1.818 (SD = .99)	Mean = 2.086 (SD = 1.14)
Condom Peer Norms*	Mean = 3.814 (SD = .94)	Mean = 3.664 (SD = .97)
Condom Self-Efficacy for Negotiation**	Mean = 4.302 (SD = .84)	Mean = 3.664 (SD = 1.02)
Condom Self-Efficacy for Use**	Mean = 4.09 (SD = .77)	Mean = 3.87 (SD = .86)
STI Testing Attitudes**	Mean = 6.13 (SD = .93)	Mean = 5.80 (SD = 1.12)
STI Testing Intention**	Mean = 1.47 (SD = 1.26)	Mean = 2.13 (SD = 1.16)
STI Stigma*	Mean = 2.68 (SD = .88)	Mean = 2.84 (SD = .92)
STI Shame**	Mean = 1.87 (SD = .82)	Mean = 2.25 (SD = 1.00)
STI Knowledge	Mean = 9.88 (SD = 6.12)	Mean = 10.75 (SD = 7.05)

** . Difference in Mean is significant at the 0.01 level (2-tailed)

* . Difference in Mean is significant at the 0.05 level (2-tailed)

Dating App and Sexual Behavior

Within this sample, 17.8% ($n=115$) indicated they had multiple sexual partners in the past 3 months. With regards to unprotected sex in the past 3 months, 52.9% ($n=341$) reported having unprotected oral sex, 42.3% ($n=273$) reported having unprotected vaginal sex, and 10.9% ($n=70$) reported having unprotected anal sex. A large portion of the sample, 72% ($n=464$), indicated they have used a dating app in their lifetime and 37% ($n=238$) indicated they had been active on a dating app within the past 3 months of taking the survey. Of the participants who have ever been active on a dating app, 49.1% ($n=228$) reported having sex with someone they met off a dating app in their lifetime, 9.7% ($n=45$) of the sample reported having unprotected sex with multiple people they had met off a dating app in the past 3 months, and 11.2% ($n=52$)

reported having unprotected sex multiple times with someone they met off a dating app in the past 3 months.

Additionally, less than half of the sample, 42.1% ($n=271$), indicated they had ever been tested for an STI in their lifetime despite 79.8% ($n=514$) indicating they knew where to go if they wanted to get tested for STIs. Of those who have ever been active on a dating app, 21.3% ($n = 99$) of the sample had ever seen an ad promoting STI or HIV prevention on a dating app with the most common app identified being Tinder. Additionally, only 16.8% ($n =78$) had ever seen an ad promoting STI or HIV testing on a dating app with the most common app identified also being Tinder.

Associations among constructs

As shown in Table 2, positive condom outcome expectancies were significantly and positively correlated with condom peer norms, condom self-efficacy negotiation, condom self-efficacy use, and STI testing attitudes. Positive condom outcome expectancies were negatively and significantly correlated with negative condom outcome expectancies, condom partner norms, STI testing intention, and STI stigma. STI knowledge was significantly and negatively correlated with negative condom outcome expectancies and positively correlated with STI testing attitudes. Interestingly, STI stigma was correlated with five out of the six subscales for Condom Attitudes, Norms, and Self-Efficacy Scale but none of the testing measures.

Table 2 Correlations

	Positive Condom Outcome Expectancies	Negative Condom Outcome Expectancies	Condom Partner Norms	Condom Peer Norms	Condom Self- Efficacy for Negotiation	Condom Self Efficacy for Use	STI Testing Attitudes	STI Testing Intention	STI Stigma	STI Shame	STI Knowledge
Positive Condom Outcome Expectancies	1.00										
Negative Condom Outcome Expectancies	-.491**	1.00									
Condom Partner Norms	-.371**	.346**	1.00								
Condom Peer Norms	.490**	-.338**	-.368**	1.00							
Condom Self- Efficacy for Negotiation	.568**	-.522**	-.324**	.560**	1.00						
Condom Self Efficacy for Use	.500**	-.504**	-.224**	.495**	.667**	1.00					
STI Testing Attitudes	.254**	-.156**	-.051	.144**	.225**	.174**	1.00				
STI Testing Intention	-.096*	-.116**	.139**	.069	-.030	.006	.091*	1.00			
STI Stigma	-.173**	.281**	.096*	-.029	-.139**	-.230**	-.303	-.031	1.00		
STI Shame	-.282**	.309	.192**	-.127**	-.198**	-.226**	-.148**	.014	.610**	1.00	
STI Knowledge	.075	-.090*	.013	-.014	-.004	.062	.188**	.171**	-.1466**	-.179**	1.00

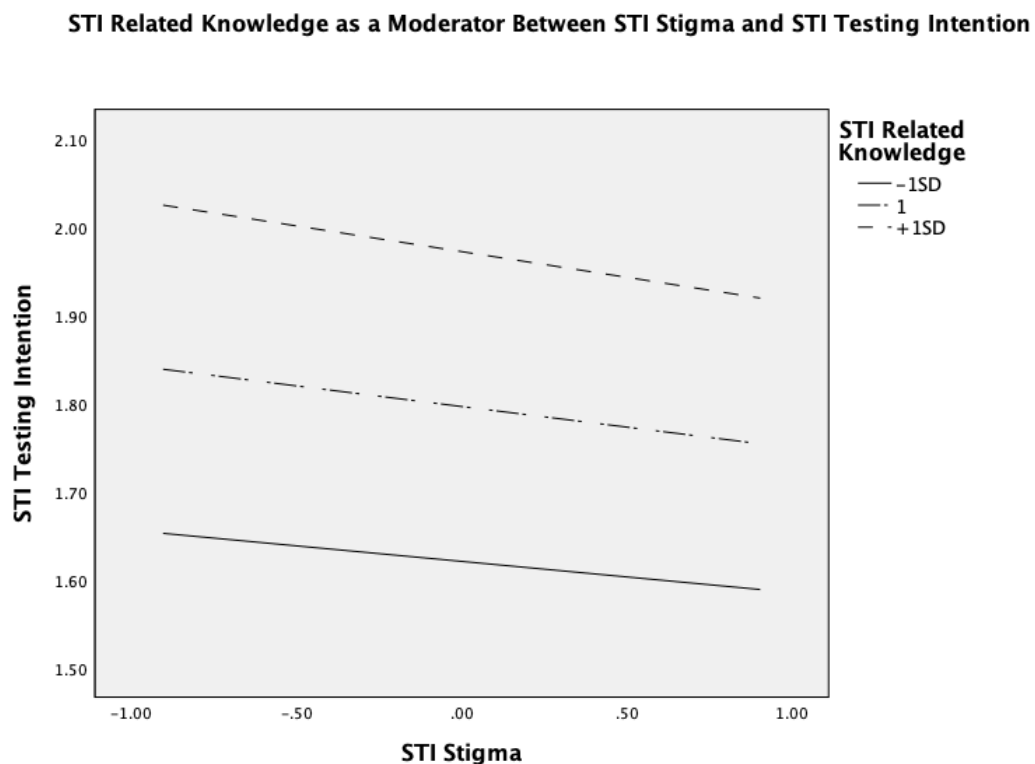
** . Correlation is significant at the 0.01 level (2-tailed)

* . Correlation is significant at the 0.05 level (2-tailed)

Hypothesis 1

To test the first hypothesis that STI-related knowledge would buffer the effect of STI stigma on STI testing intention, a moderation analysis was conducted while controlling for survey platform. Hayes' (2018) PROCESS macro (Model 1) was used to generate 5,000 bootstrapped confidence intervals of the conditional effect. The overall model was significant, $F(4, 624) = 15.61, R^2 = .30, p < .001$. STI-related knowledge positively predicted high testing intentions ($b = .03, p < .01$). However, STI-related stigma did not predict testing intentions ($b = -.05, p = .39$) and the interaction was not significant ($b = -.002, \Delta R^2 = .00, F(1, 620) = .5, p = .823$). These findings suggest that STI-related knowledge is a good predictor of STI testing intentions while STI-related stigma is not.

Figure 3. Moderation model testing the moderating effect of STI related knowledge on the relationship between STI related stigma and STI testing intention



In order to better understand the relationship between STI-related knowledge and STI testing intentions a linear regression was conducted. Controlling for location, it was found that STI related knowledge significantly predicted testing intention, $R^2 = .03$, $F(1, 625) = 30.99$, $p < .001$. These findings imply that as STI-related knowledge increases so does STI testing intention.

Hypothesis 2

To test the second hypothesis that app users would engage in more high-risk sexual behavior compared to non-app users, multiple chi-squared tests were conducted. All individuals regardless of lifetime partners were included in the analysis. As shown in Table 3, dating app users compared to non-app users reported more high-risk sexual behaviors in the past 3 months. Dating app users were significantly more likely to have multiple partners, $\chi^2(1, N = 635) = 20.65$, $p < 0.001$, compared to non-app users. Dating app users were also significantly more likely to have unprotected oral sex, $\chi^2(1, N = 602) = 4.56$, $p < 0.05$, and unprotected anal sex, $\chi^2(1, N = 605) = 5.74$, $p < 0.05$, but not significantly more likely to have unprotected vaginal sex, $\chi^2(1, N = 602) = 1.55$, $p = .21$. To further expand on these findings, two hierarchical logistic regressions were conducted to compare dating app users and non-app users while accounting for demographic variables and relationship status.

Table 3 Dating app use and sexual behavior

Behavior	Individuals reporting dating app use (<i>n</i> = 464) % reporting (<i>n</i>)	Individuals not reporting dating app use (<i>n</i> =180) % reporting (<i>n</i>)	χ^2
Multiple partners in the past 3 months	22.0 (<i>n</i> =102)	6.4 (<i>n</i> =11)	20.65**
Unprotected oral sex in the past 3 months	56.5 (<i>n</i> =262)	45.0 (<i>n</i> =77)	4.56*
Unprotected anal sex in the past 3 months	12.9 (<i>n</i> =60)	5.8 (<i>n</i> =10)	5.74*
Unprotected vaginal sex in the past 3 months	44.6 (<i>n</i> =207)	37.4 (<i>n</i> =64)	1.55

N = 644

***p* < .001, **p* < .05

Unprotected Sex

The first hierarchical logistic regression predicted membership in one of two groups: individuals who reported unprotected oral, vaginal, or anal sex in the past 3 months (*n*=268) and those who did not report these behaviors (*n*=357). The demographic variables of age, gender, race, survey platform site, and relationship status were entered into step 1 and significantly predicted unprotected sex when compared to the constant-only model, χ^2 (4, *N* = 625) = 73.11, *p* < 0.001. Those who were in a relationship compared to those who were single were about 4 times more likely to have had unprotected sex in the past 3 months. Dating app use was added to the final step of the model which contributed to the predictive utility of the model, χ^2 (4, *N* =654) = 83.86, *p* < 0.001. Those who indicated they have ever been active on a dating app were about 1.9 times more likely to have had unprotected sex in the past 3 months compared to those who had never used a dating app. Results from the Hosmer and Lemeshow Test were not

significant, $\chi^2(8, N = 625) = 5.73, p = .68$, suggesting that the model was an adequate fit for the data.

Table 4 Hierarchical logistic regression predicting unprotected sex, past 3 months

Step	Variable	OR	CI	B	SE	p
1	Age (years)	.99	(.89, 1.12)	-.01	.06	<i>ns</i>
	Gender (males as reference group)	1.08	(.84, 1.40)	.08	.13	<i>ns</i>
	Race (Whites as reference group)	1.15	(.81, 1.64)	.14	.18	<i>ns</i>
	Location	.81	(.54, 1.22)	-.21	.21	<i>ns</i>
	Relationship (single as reference group)	4.38	(3.10, 6.26)	1.48	.18	<.001
2	Dating app use	1.91	(1.29, 2.81)	.65	.20	<.01

N = 645

ns not significant

Multiple Partners

The second hierarchical logistic regression predicted membership in one of two groups: individuals who reported multiple sexual partners in the past 3 months ($n=109$) and those who reported zero or one partner in the past 3 months ($n=516$). The demographic variables of age, gender, race, survey platform site, and relationship status were entered into step 1 and significantly predicted multiple partners when compared to the constant-only model, $\chi^2(4, N = 625) = 17.10, p < 0.01$. Being in a relationship functioned as a protective factor against having multiple partners. Dating app use was added to the final step of the model which contributed to the predictive utility of the model, $\chi^2(4, N = 625) = 40.81, p < 0.001$. Those who had reported ever using a dating app were nearly 4.2 time more likely to have reported multiple sexual

partners in the past 3 months compared to those who had never been active on a dating app.

Results from the Hosmer and Lemeshow Test were not significant, $\chi^2(8, N = 625) = 5.57, p = .70$, suggesting that the model was an adequate fit for the data.

Table 5 Hierarchical logistic regression predicting multiple partners, past 3 months

Step	Variable	OR	CI	B	SE	p
1	Age (years)	.89	(.78, 1.03)	-.11	.07	<i>ns</i>
	Gender (males as reference group)	.89	(.64, 1.23)	-.12	.17	<i>ns</i>
	Race (Whites as reference group)	1.40	(.90, 2.17)	.33	.23	<i>ns</i>
	Location	.68	(.41, 1.13)	-.38	.26	<i>ns</i>
	Relationship (single as reference group)	.59	(.38, .93)	-.53	.23	<.05
2	Dating app use	4.18	(2.16, 8.10)	1.43	.34	<.001

N = 645

ns not significant

Exploratory Aim 1

In order to understand the relationships among dating app use and condom attitudes, norms, and self-efficacy, multiple one-way ANOVAs were conducted to compare scores between lifetime dating app users and non-app users. Results are shown in Table 6. Dating app users compared to non app users did not significantly differ across positive condom outcome expectancies, $F(1, 629) = .81, p = .37$, negative condom outcome expectancies, $F(1, 625) = .94, p = .84$, condom peer norms $F(1, 626) = .26, p = .61$, condom-efficacy negotiation $F(1, 623) = .81, p = .37$, or condom self-efficacy use, $F(1, 623) = .26, p = .61$.

Table 6 One-Way ANOVAs for STI prevention measures

	Dating App Users	Non-App Users	
Positive Condom Outcome Expectancies	<i>M</i> =3.88 <i>SD</i> =.68	<i>M</i> =3.93 <i>SD</i> =.67	<i>F</i> (1, 629)=.81
Negative Condom Outcome Expectancies	<i>M</i> =1.84 <i>SD</i> =.70	<i>M</i> =1.83 <i>SD</i> =.69	<i>F</i> (1.625)=.04
Condom Partner Norms	<i>M</i> =2.00 <i>SD</i> =1.12	<i>M</i> =1.81 <i>SD</i> =.94	<i>F</i> (1.621)=4.15*
Condom Peer Norms	<i>M</i> =3.75 <i>SD</i> =.95	<i>M</i> =3.71 <i>SD</i> =.96	<i>F</i> (1, 626)=.26
Condom Self-Efficacy Negotiation	<i>M</i> =4.09 <i>SD</i> =.97	<i>M</i> =4.14 <i>SD</i> =.90	<i>F</i> (1, 621)=.35
Condom Self-Efficacy Use	<i>M</i> =3.97 <i>SD</i> =.83	<i>M</i> =4.01 <i>SD</i> =.79	<i>F</i> (1, 623)=.26

$p < .05^*$

However, there were significant differences across condom partner norms, $F(1, 621)=4.15$, $p < .05$, with dating app users ($M= 2.00$, $SD=1.12$) compared to non-app users ($M= 1.8$, $SD=.94$) expressing greater acceptance of norms such as “If you love someone you don’t have to use a condom”. Taken together, these results suggest that dating app users compared to non-app users do not differ in regards to condom attitudes, norms, and self-efficacy. While there was a significant difference across norms, the overall scores were still low suggesting low rates of acceptance of condom partner norms.

Exploratory Aim 2

In order to understand the relationships among dating app use and testing intention and attitudes, multiple one-way ANOVAs were conducted to compare scores between lifetime dating app users and non-app users. First, the analysis comparing testing attitudes was significant, $F(1, 626) = 8.20, p < .01$, with dating app users ($M = 6.03, SD = 1.05$) having more positive attitudes towards STI testing compared to non-app users ($M = 5.77, SD = .98$). The second model comparing testing intention was significant, $F(1, 626) = 14.54, p < .001$, with dating app users ($M = 1.91, SD = 1.26$) having higher testing intention scores compared to non-app users ($M = 1.48, SD = 1.20$). Taken together these results suggest that not only are dating app users more likely to get tested for STIs compared to non-app users but they generally have more positive attitudes towards getting tested compared to non-app users.

Table 7 One-Way ANOVAs for STI testing measures

	Dating App Users	Non-app Users	
Testing Attitudes	$M = 6.03$ $SD = 1.05$	$M = 5.77$ $SD = .98$	$F(1, 624) = 8.19^*$
Testing Intention	$M = 1.91$ $SD = 1.26$	$M = 1.48$ $SD = 1.20$	$F(1, 626) = 14.54^{**}$

$p < .001^{**}$

$p < .01^*$

Love in the time of Coronavirus

Participants who completed the survey after June 23rd responded to items related to their app-related behaviors within the context of the COVID-19 pandemic. These items consisted of questions related to their participation in social isolation, whether their activity on dating apps

had changed since they began isolating, and whether they had met someone off an app during the pandemic. Of the participants who responded to these items, 85.5% ($n=227$) reported participating in social isolation. About half, 51.5% ($n=166$) had a dating app on their phone prior to isolation and 12.1% ($n=78$) reported downloading an app since they began isolation. Changes in level of activity on dating apps were only reported by 28.8% ($n=186$) of these participants and their level of activity varied. Of those who reported any dating app activity 30.6% ($n=57$) reported their activity had decreased a lot, 17.2% ($n=32$) reported decreasing some, 24.7% ($n=46$) reported staying the same, 19.9% ($n=37$) reported increasing some, and 7.5% ($n=14$) reported it had increased a lot. Most people, 82.4% ($n=154$), who reported some dating app activity indicated they had not met anyone off a dating app in person since they had begun isolating while some participants, 17.6% ($n=33$), reported they had.

When looking at those within the sample who had met someone off a dating app during the COVID-19 pandemic compared to those who had not, the two groups did not significantly differ across race or sexual orientation. They did, however, differ across gender with cisgender men being significantly more likely to have met someone off an app compared to cisgender women, trans women, trans men, and gender non-conforming individuals $\chi^2(4, N = 187) = 10.55, p < 0.05$. Additionally, One-way ANOVAs were conducted to explore whether those who had met someone off an app during the pandemic compared to those who had not differed across the STI prevention and testing attitude measures. While they did not differ across STI related knowledge, $F(1, 186) = 2.22, p = .14$, condom self-efficacy negotiation, $F(1, 186) = 3.16, p = .08$, or STI testing attitudes, $F(1, 186) = 3.46, p = .07$, they did differ across STI testing intention, $F(1, 186) = 7.02, p < .01$, positive condom outcome expectancies, $F(1, 186) = 8.27, p < .01$, negative condom outcome expectancies, $F(1, 186) = 16.25, p < .001$, condom partner norms, $F(1, 186) =$

9,52, $p < .01$, peer condom norms, $F(1, 186) = 3.16$, $p < .05$, and condom self-efficacy use, $F(1, 186) = 10.15$, $p < .01$. Those who had met someone off an app during the pandemic ($M = 2.75$, $SD = 1.20$) had higher STI testing intention scores compared to those who had not met someone off an app ($M = 2.17$, $SD = 1.13$) indicating a greater intention to get tested for STIs in the next 6 months.

However, with regards to positive condom outcome expectancies, those who had met someone off an app during the pandemic ($M = 3.45$, $SD = .68$) had lower scores compared to those who had not met someone off an app ($M = 3.835$, $SD = .67$) indicating less positive expectations towards condom use. This was also the case for condom self-efficacy use whereby those who had met someone off an app during the pandemic ($M = 3.43$, $SD = .95$) had significantly lower scores compared to those who had not met someone off an app ($M = 3.93$, $SD = .79$). Additionally, those who had met someone off an app during the pandemic ($M = 3.32$, $SD = .93$) had significantly lower acceptance of peer norms compared to those who had not met someone off an app ($M = 3.32$, $SD = .93$). Participants who had met someone off an app during the pandemic also had significantly higher negative condom outcome expectations ($M = 2.45$, $SD = .74$) compared to those who had not ($M = 1.90$, $SD = .70$) and higher acceptance of partner norms ($M = 2.71$, $SD = 1.26$) relative to those who had not ($M = 2.06$, $SD = 1.05$).

Table 8 One-Way ANOVA comparing participants who met someone off an app during the pandemic to those who had not across all measures

	Met Someone off an App	Did Not Meet Someone off an App	
Positive Condom Outcome Expectancies	<i>M</i> =3.45 <i>SD</i> =.68	<i>M</i> =3.83 <i>SD</i> =.67	<i>F</i> (1, 186)=8.27**
Negative Condom Outcome Expectancies	<i>M</i> =2.46 <i>SD</i> =.74	<i>M</i> =1.90 <i>SD</i> =.70	<i>F</i> (1, 186)=16.25***
Condom Partner Norms	<i>M</i> =2.71 <i>SD</i> =1.26	<i>M</i> =2.06 <i>SD</i> =1.05	<i>F</i> (1, 186)=9.52**
Condom Peer Norms	<i>M</i> =3.12 <i>SD</i> =.93	<i>M</i> =3.77 <i>SD</i> =.92	<i>F</i> (1, 186)=6.61*
Condom Self-Efficacy Negotiation	<i>M</i> =3.67 <i>SD</i> =1.00	<i>M</i> =4.01 <i>SD</i> =.99	<i>F</i> (1, 186)=3.16
Condom Self-Efficacy Use	<i>M</i> =3.43 <i>SD</i> =.95	<i>M</i> =3.93 <i>SD</i> =.79	<i>F</i> (1, 186)=10.15**
STI Testing Attitudes	<i>M</i> =5.55 <i>SD</i> =1.61	<i>M</i> =5.95 <i>SD</i> =1.00	<i>F</i> (1, 186)=3.46
STI Testing Intention	<i>M</i> =2.75 <i>SD</i> =1.20	<i>M</i> =2.17 <i>SD</i> =1.13	<i>F</i> (1, 186)=7.02**
STI Stigma	<i>M</i> =2.90 <i>SD</i> =1.04	<i>M</i> =2.81 <i>SD</i> =.92	<i>F</i> (1, 186)=.21
STI Shame	<i>M</i> =2.52 <i>SD</i> =1.10	<i>M</i> =2.18 <i>SD</i> =.95	<i>F</i> (1, 185)=3.34
STI Knowledge	<i>M</i> =9.79 <i>SD</i> =6.46	<i>M</i> =11.64 <i>SD</i> =6.47	<i>F</i> (1, 186)=2.22

p<.001***

p<.01**

p<.05*

An additional exploratory One-way ANOVA was conducted to compare those who had not been participating in social isolation to those that had across the STI prevention and testing measures. While they did not differ across STI testing intention, $F(1, 323) = .08, p = .78$, STI testing attitudes, $F(1, 323) = .10, p = .75$, positive condom outcome expectancies, $F(1, 323) = 3.46, p = .06$, negative condom outcome expectancies, $F(1, 323) = .67, p = .42$, condom partner norms, $F(1, 323) = 2.43, p = .12$, or condom self-efficacy negotiation, $F(1, 323) = .79, p = .37$. they did significantly differ across STI related knowledge $F(1, 323) = 9.22, p < .01$ with those who had been participating in social isolation ($M = 10.80, SD = 6.79$) having lower scores compared to those who had not been participating in social isolation ($M = 14.00, SD = 6.01$). Additionally, they differed across condom peer norms, $F(1, 323) = 4.09, p < .05$, with those who had been participating in isolation ($M = 3.70, SD = .96$) having significantly higher acceptance of positive peer norms than those who had not been isolating ($M = 3.39, SD = 1.02$).

Table 9 One-Way ANOVA comparing participants who had been participating in social isolation to those who had not across all measures

	Participated in Social Isolation	Did Not Participate in Social Isolation	
Positive Condom Outcome Expectancies	<i>M</i> =3.81 <i>SD</i> =.68	<i>M</i> =3.60 <i>SD</i> =.73	<i>F</i> (1, 323)=3.46
Negative Condom Outcome Expectancies	<i>M</i> =1.91 <i>SD</i> =.69	<i>M</i> =2.00 <i>SD</i> =.79	<i>F</i> (1, 323)=.66
Condom Partner Norms	<i>M</i> =2.05 <i>SD</i> =1.09	<i>M</i> =2.33 <i>SD</i> =1.37	<i>F</i> (1, 323)=2.43
Condom Peer Norms	<i>M</i> =3.70 <i>SD</i> =.96	<i>M</i> =3.39 <i>SD</i> =1.02	<i>F</i> (1, 323)=4.09*
Condom Self-Efficacy Negotiation	<i>M</i> =3.95 <i>SD</i> =1.00	<i>M</i> =3.80 <i>SD</i> =1.13	<i>F</i> (1, 323)=.79
Condom Self-Efficacy Use	<i>M</i> =3.88 <i>SD</i> =.84	<i>M</i> =3.84 <i>SD</i> =.93	<i>F</i> (1, 323)=.12
STI Testing Attitudes	<i>M</i> =5.58 <i>SD</i> =1.12	<i>M</i> =5.87 <i>SD</i> =1.08	<i>F</i> (1, 323)=.10
STI Testing Intention	<i>M</i> =2.14 <i>SD</i> =1.18	<i>M</i> =2.09 <i>SD</i> =1.14	<i>F</i> (1, 323)=.08
STI Stigma	<i>M</i> =2.83 <i>SD</i> =.92	<i>M</i> =2.72 <i>SD</i> =.93	<i>F</i> (1, 323)=.54
STI Shame	<i>M</i> =2.22 <i>SD</i> =1.00	<i>M</i> =2.29 <i>SD</i> =1.00	<i>F</i> (1, 322)=.19
STI Knowledge	<i>M</i> =10.80 <i>SD</i> =6.79	<i>M</i> =14.00 <i>SD</i> =6.01	<i>F</i> (1, 323)=9.22**

p<.01**
p<.05*

DISCUSSION

The present study assessed differences between dating app users and non-app users across various STI prevention and testing measures. Results not only reaffirm previous findings regarding dating app use and sexual behaviors but expand understanding of differences between dating app users and non-app users in STI testing and prevention such as STI-related knowledge, stigma, testing attitudes and testing intention as well as condom attitudes, norms, and self-efficacy. Additionally, this study evaluated dating app use and behavior within the context of the COVID-19 pandemic.

Hypothesis 1

The first hypothesis examined whether STI-related knowledge would buffer the effect of STI stigma on STI testing intention. Findings indicated that while there was no significant relationship between STI stigma and STI testing intention, the relationship between STI-related knowledge and STI testing intention was significant. To explore this relationship further a linear regression was conducted which confirmed that STI related knowledge significantly predicted STI testing intention. As STI-related knowledge increases so does STI testing intention. There are a number of possible explanations for these findings. Firstly, STI related stigma was relatively low with scores less than 3 out of a possible 5 across both VCU ($M=2.68$, $SD=.88$) and TurkPrime ($M=2.84$, $SD=.92$). While low STI stigma is preferable to high stigma when the effort is to promote positive sexual health attitudes, the restricted range could also explain why there was no relationship between STI stigma and testing intention. Additionally, these findings suggest that increasing STI-related knowledge rather than reducing stigma could contribute to an increase in STI testing intention. STI-related knowledge scores were generally low ($M=10.32$, $SD=6.12$) with the most common score being 11 out of a possible 27. This demonstrates that

even minimal knowledge of STI transmission and symptoms is an important factor in determining intention to get tested for STIs.

The findings from this study do not suggest an association between STI stigma and STI testing despite prior work suggesting the contrary. It may be of note that many of the studies assessing the role of stigma on STI testing are well over a decade old such as Fortenberry (2002), Malta et. al (2007), and Darroch et. al (2003). Additionally, many of these studies were conducted within public clinic settings and included participants of varying ages. Half of my sample was collected on a college campus and the study was limited to individuals between the ages of 18 and 24. College campuses often provide a number of resources for information on STI symptoms and testing which could contribute to the normalization of getting tested. Previous work has indicated that fear-based messages contribute to STI-related stigma and a resistance to getting tested (Wong, Chan, Boi-Doku, & McWatt, 2012). If our sample did not receive these types of messages then this might have contributed to lower STI related sigma.

Hypothesis 2

The second hypothesis examined whether dating app users compared to non app users were more likely to engage in high-risk sexual behaviors such as having unprotected sex and having multiple sexual partners. Findings indicated that dating app users were more likely to report unprotected sex and multiple partners in the past 3 months compared to non app users. Dating app use predicted these behaviors after accounting for age, race, and gender as well as survey platform (SONA or TurkPrime) and relationship status. These results supported my hypothesis that dating app users would engage in more high-risk sexual behavior relative to non app users. Furthermore, these findings are consistent with previous studies looking at differences in high-risk sexual behavior between dating app users and non app users (Saywer et. al, 2018).

findings that dating app users were 1.9 times more likely to have unprotected sex in the past 3 months were similar to previous findings that demonstrated a 2.0 increase in likelihood. However, my study found a 4.2 times greater likelihood of multiple sexual partners in the past 3 months compared to previous findings which found a 1.7 times greater likelihood (Sawyer et. al, 2018). It may be worthwhile for future research to explore attitudes of sexual permissibility in relation to STI prevention to better assess STI risk among young adults. If social acceptance of having multiple sexual partners has increased over time then it would be important to know whether engagement in safe sex practices coincides with this increase.

Exploratory Aim 1

The first exploratory aim sought to better understand the relationship among dating app use and STI prevention attitudes such as condom attitudes, norms, and self-efficacy. This was done by running multiple one-way ANOVAs comparing mean scores on the six STI prevention subscale measures between lifetime dating app users and non app users. Results from this analysis indicated that dating app users have higher agreement with partner norms compared to non-app users but did not significantly differ across condom attitudes, peer norms, or self-efficacy. Overall scores on partner norms were low with dating app users averaging a score of 2 out of a possible 5 and non app users averaging a 1.8.

Despite no significant differences across condom attitudes and self-efficacy, dating app users were still more likely than non-app users to engage in unprotected sex as demonstrated in Hypothesis 2. Positive condom attitudes across both dating app users ($M=3.88$, $SD=0.68$) and non app users ($M=3.93$, $SD=.67$) were generally high, scoring an average of approximately 4 out of a possible 5. Condom self-efficacy also did not differ between dating app users and non-users across either subscale. These findings suggest that condom attitudes and self-efficacy may be

dependent on the context of their sexual partner and intended use. For example, while young adults may generally agree that it is important to use condoms and be comfortable talking about them, the higher scores on partner condom norms suggest that exceptions might be made based on how well a person knows or trusts their partner. This sense of trust in a sexual partner may reduce the perception of risk for STIs. Therefore, if the perceived risk for STIs is not present based on the level of trust felt towards a sexual partner then the motivation for using condoms may be reduced. Recent findings have demonstrated that college students perceive condoms as a means to prevent pregnancy rather than STIs and that they do not perceive themselves to be at risk for STIs (Whiting et. al, 2017; Rooker, 2017). Future studies may want to consider assessing how to educate young people on STI-related risk and the role of partner trust and familiarity on condom use.

Exploratory Aim 2

The second exploratory aim examined the relationship among dating app use and STI testing attitudes and intention. Dating app users scored significantly higher than non app users on both testing attitudes and intention indicating more positive attitudes towards getting tested for STIs and greater intention to get tested for STIs in the next 6 months. Testing attitudes were generally high for both dating app users ($M=6.03$, $SD=1.05$) and non-app users ($M=5.77$, $SD=.98$) scoring approximately a 6 out of 7 while testing intention was on the lower side for both dating app users ($M=1.91$, $SD=1.26$) and non-app users ($M=1.48$, $SD=1.20$) scoring slightly less than 2 out of a possible 4. However, 48.2% of dating app users reported getting tested in their lifetime and 30.0% reported getting tested in the past 6 months while only 27.5% of non-app users reported getting tested in their lifetime and only 14.0% reported getting tested in the

past 6 months. These findings are indicative of positive sexual health attitudes and behaviors with regards to STI testing among dating app users.

Although positive testing attitudes and greater testing intention are ideal among this population, STI prevention is still a topic of concern. The CDC has reported an increase in STI infections among young adult Americans since 2016 with cases of Syphilis nearly doubling since 2013 (CDC, 2018). The CDC cites decreased condom use among vulnerable groups, such as young people, and cuts to STI programs at state and local levels as some of the factors that have driven this increase in cases (CDC, 2019). When considering this information in light of the findings from this study it is evident that STI prevention, rather than testing, is the area in need of improvement. Based on previous findings that have demonstrated the use of behavioral intention as a predictor for condom use it may be worthwhile to explore ways of increasing the intention to use condoms rather than increasing positive attitudes about condoms (Albarracin et al, 2001). Although there is typically a strong relationship between attitudes and intention, as demonstrated by the Theory of Planned Behavior, the focus may need to be shifted towards emphasizing an increase in intention since attitude precedes intention on the progression towards a behavior (Friedman, 2014).

Love in the time of Coronavirus

Out of the six months spent collecting data approximately four and a half of those months occurred in the midst of a global pandemic. As COVID-19 spread across the United States, states began to shut down businesses and place restrictions on public gatherings in an attempt to control the virus. In turn, people were advised to stay at home to avoid interacting with others and limit their social interactions (CDC, 2020). Given that a key component of this study was the assumption that people would be meeting each other off of dating apps it was necessary to adapt

the study to include assessments of how dating app activity occurred for app users in the midst of this pandemic. Upon IRB approval, additional items were included in surveys administered after June 23rd to approximately half (N=324) of the participants. The majority of participants indicated they had been engaging in social isolation, their dating app activity had decreased a lot or some, and they had not met anyone off of a dating app in person since they had begun isolating. However, 14.5% of participants indicated they had not been participating in social isolation and 17.6% indicated they had met someone off a dating app during the pandemic.

Comparative analyses were conducted to examine the differences in behavior between those who had not met anyone off an app during the pandemic and those that had as well as those who had been isolating and those who had not. Across the STI prevention measures, those who had met someone off an app during the pandemic had significantly lower scores on positive condom outcome expectancies, condom peer norms, and condom self-efficacy use. Additionally, they scored higher on negative condom outcome expectancies and condom partner norms. However, those who had met someone off an app during the pandemic had significantly higher testing intention scores indicating a greater intention to get tested for STIs in the next 6 months.

Although the information on COVID-19 is constantly growing there are a number of precautions that are recommended by the CDC. The best way to prevent spreading and contracting COVID-19 is to practice social distancing. Social distancing entails limiting contact with people outside of one's household, maintaining a distance of six feet from other people when outside the home, and wearing a mask in public indoor spaces (CDC, 2019). Social distancing has been identified as one of the primary ways to avoid spreading and contracting COVID-19 since the virus is spread from person to person in close contact and is potentially airborne (CDC, 2019). The issue of being in close proximity to others raised issues for

businesses such as restaurants and bars where gathering in groups is part of the draw. These businesses were initially closed on a state by state basis beginning in mid-March until mid to late April (New York Times, 2020). However, as bars and restaurants began to open people returned to these establishments many of whom were young people in their 20's and 30's. Furthermore, young people who worked in restaurants and bars prior to the virus are now returning to work and potentially contributing to the spread of the virus (Center for Infectious Disease Research and Policy, 2020). Initially it was thought that COVID-19 would primarily impact older adults, but as the virus has progressed it has become evident that young people are often carriers of the virus (The Washington Post, 2020).

Taken together, the findings from this study and current events seem to suggest that it may be worth exploring whether there are some underlying traits that contribute to attitudes related to risk reduction. Previous work on dating apps and traits have found that sensation seeking and impulsivity were related to dating app use (Sawyer et. al, 2018; Sumter & Vandenbosch, 2019). Within our sample, dating app users who met someone off an app during the pandemic indicated lower agreement with peer condom norms but greater STI testing intention relative to dating app users who had not met someone off an app during the pandemic. This finding suggests that individuals who are not influenced by their peers to take proper precautions to protect themselves from disease, sexual or otherwise, may view testing as a way to make up for a lack of preventative measures. Furthermore, the choice to use protection, whether it be a mask or a condom, may vary given situational factors as demonstrated by the significantly higher agreement with partner norms among those who met someone off an app during the pandemic compared to those who did not. Given the context of COVID-19, future research may want to examine the role of personality traits, attitudes, and situational variables

when assessing social distancing practices particularly among young adults. It is possible that assumptions made about personal risk and likelihood of contracting COVID-19 may translate to condom use with regards to disease prevention.

Limitations

Although many of these findings are in line with previous research and present some novel observations, there are a number of limitations to consider. Firstly, the sample is a combination of half undergraduate students at a mid-Atlantic university and half online participants across the country. Although the difference in location was controlled for in the analyses there still exists the confound of the increasing presence of COVID-19 over time. As previously stated, the majority of our participants who responded to the COVID-19 items indicated that their activity on dating apps decreased during the pandemic. Furthermore, social interaction was largely discouraged during this time so dating app users may not have been interacting with the apps or their matches as they would have under normal circumstances.

Additionally, the measures used in this study were reliant on self-report measures for sensitive and personal topics such as sexual partners, frequency of condom use, etc. While the issue of self-report bias ought to be considered, the literature on this suggests that an increase in anonymity corresponds with a higher likelihood that people will provide a fuller report of sensitive or stigmatized health behaviors (Newman et. al, 2002). Therefore, the fact that our survey was administered privately over the internet supports the validity of our data. Finally, this study was cross-sectional so we cannot establish causation among any of the variables. While the findings in this and prior studies have demonstrated that dating app users engage in more high-risk sexual behaviors it must be noted that this may be a bi-directional relationship. Additionally, prior work has considered the role of personal traits and motivations for using dating apps but

these also establish correlational relationships rather than causal ones (Sawyer et. al, 2017, Sumter & Vandenberg, 2019).

General Implications

The findings from this study indicate that although dating app users engage in more high-risk sexual behaviors such as unprotected sex and multiple partners, they are also more likely to get tested for STIs. Although dating app users and non-app users did not differ across condom attitudes or self-efficacy, dating app users were more likely express agreement with the norms described in the partner condom norms subscale. More specifically, dating app users tend to agree with the idea that the better you know someone the less necessary it is to use a condom. All the items on the partner condom norms measure expressed the idea that the more familiar you are with someone the more acceptable it is to forgo using a condom. Future studies may want to consider if and how dating apps breed a sense of familiarity among users and how this may relate to sexual behaviors. Furthermore, condom attitudes and self-efficacy were generally high in this sample so future research may want to explore why these positive attitudes do not always carry over into practice. It may be worthwhile to qualitatively explore dating app users' opinions around protected sex to better understand their thinking behind engaging in unprotected sex with someone they met off a dating app.

Findings from this study also explored the relationship among STI stigma, knowledge, and testing. While there was no relationship between STI stigma and testing there was a relationship between STI-related knowledge and testing whereby as STI-related knowledge increased so did STI testing intention. Although this was a weak finding within this study, this finding is in line with previous work indicating that efforts to increase STI testing should focus on an educational approach rather than a stigma reduction approach (Wong et. al, 2012). Given

that only 16.8% of dating app users in this sample reported ever seeing an ad promoting STI or HIV testing, the presence of educational STI ads on dating apps could be an advantageous method of promoting STI testing. Similar methods have been successfully utilized among the MSM population using MSM-specific apps (Cao et. al, 2017; Kirby & Thornber-Dunwell, 2014). Therefore, it would be worthwhile to explore this method of STI knowledge dissemination among non-MSM populations. Future studies may want to investigate the use of STI testing and prevention ads among dating app users as well as the effectiveness of different types of ads such as knowledge-based ads compared to stigma reduction-based ads.

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APPENDIX A:**RESEARCH PARTICIPANT INFORMATION AND CONSENT FORM**

STUDY TITLE: Dating App Use, Sexual Behaviors, and Health Beliefs

VCU INVESTIGATOR: Eric G. Benotsch

VCU IRB NO.: HM20018376

ABOUT THIS CONSENT FORM

You are being invited to participate in a research study. It is important that you carefully think about whether being in this study is right for you and your situation.

This consent form is meant to assist you in thinking about whether or not you want to be in this study. Please contact the investigator to explain any information in this content document that is not clear to you.

Your participation is voluntary. You may decide not to participate in this study. If you do participate, you may withdraw from the study at any time. Your decision not to take part or to withdraw will involve no penalty or loss of benefits to which you are otherwise entitled.

AN OVERVIEW OF THE STUDY AND KEY INFORMATION**WHY IS THIS STUDY BEING DONE?**

The purpose of this research is to find out about how the use of dating apps might pose unique health risks to their users particularly those who use dating apps to meet other people. We believe that there may be different health risks for individuals who use dating apps compared to individuals who do not or have never used dating apps. This study will allow us to learn more about it.

WHAT WILL HAPPEN IF I PARTICIPATE?

In this study, you will first be asked to respond to a brief demographic survey. Depending on your responses to this survey, the subsequent surveys may vary. After the demographic survey, you will respond to various surveys that will ask you about your sexual behavior, beliefs related to sexual health, and dating app usage. Your participation in this study will last up to about 30 minutes. Approximately 875 individuals will participate in the study.

WHAT ALTERNATIVES ARE AVAILABLE?

There are no alternatives to taking part in this survey. If you do not wish to participate you may decide not to proceed to the survey.

WHAT ARE THE BENEFITS OF BEING IN THE STUDY?

This study is not likely to help you. However, it may help the investigators understand how dating app usage might contribute to specific sexual health risks and vulnerabilities.

WHAT RISKS AND DISCOMFORTS COULD I EXPERIENCE FROM BEING IN THE STUDY?

Questionnaires may contain questions that are personal, sensitive, or upsetting such as questions about your number of past sexual partners and unprotected sex. You may refuse to answer any question that makes you uncomfortable.

WHAT ARE THE COSTS?

There are no costs to participating in the study other than the time you will spend completing the study

WILL I BE PAID TO PARTICIPATE IN THE STUDY?

You will gain .50 credit in one of your psychology courses for participating. This credit will show up on the SONA website shortly after completing the survey. There is no penalty to withdraw from the survey.

CAN I STOP BEING IN THE STUDY?

You can stop being in this study at any time. However, compensation for participation is subject to approval therefore incomplete surveys may not receive full financial compensation.

HOW WILL INFORMATION ABOUT ME BE PROTECTED?

Data being collected only for research purposes. What we find from this study may be presented at meetings or published in papers, but your personal information will not be collected from this survey, and as a result will not be presented in any form. A unique ID number generated by the SONA system will identify your data. No paper records will be kept, and access to all data will be limited to study personnel.

We will not tell anyone the answers you give us; however, information from the study may be looked at or copied for research or legal purposes by Virginia Commonwealth University. Personal information about you might be shared with or copied by authorized officials of the Department of Health and Human Services or other federal regulatory bodies.

WHOM SHOULD I CONTACT IF I HAVE QUESTIONS ABOUT THE STUDY?

The investigator named below is the best person to contact if you have any questions, complaints, or concerns about your participation in this research:

Dr. Eric Benotsch
808 W. Franklin St., #208
Richmond, VA 23284
E-mail: ebenotsch@vcu.edu
Phone: 804-828-0133

If you have any general questions about your rights as a participant in this or any other research, or if you wish to discuss problems, concerns, or questions, to obtain information, or to offer input about research, you may contact:

Virginia Commonwealth University Office of Research
800 East Leigh Street, Suite 3000, Box 980568, Richmond, VA 23298
(804) 827-2157; https://research.vcu.edu/human_research/volunteers.htm

Do agree to this consent form unless you have had a chance to ask questions and have received satisfactory answers to all of your questions.

STATEMENT OF CONSENT

I have been provided with an opportunity to read this consent form carefully. All of the questions that I wish to raise concerning this study have been answered. By signing this consent form, I have not waived any of the legal rights or benefits to which I otherwise would be entitled. My signature indicates that I freely consent to participate in this research study.

- I choose to participate in this study.
- I choose to not participate in this study.

APPENDIX B**STUDY QUESTIONNAIRE**

Instructions: Please answer the following questions to the best of your ability:

1. Age: ____

2. Gender:

- Male
- Female
- Transgender Male
- Transgender Female
- Gender Non-Conforming
- Not listed (please specify) _____

3. Which race best describes you:

- Caucasian
- Black or African American
- Latino, Latina, or Latinx
- Asian
- American Indian or Alaskan Native
- Native Hawaiian or Other Pacific Islander
- Middle Easter
- Not listed (please specify) _____

4. Do you consider yourself Hispanic?

- Yes
- No

5. Sexual Orientation:

- Heterosexual/ Straight
- Homosexual/ Gay
- Bisexual
- Pansexual
- Asexual
- Not listed (please specify) _____

6 Relationship Status:

- Not currently dating or in a relationship
- In a newer relationship with 1 person (less than 12 months)
- In a long-term relationship with 1 person (12 months or longer)
- Married
- Dating/ in a relationship with more than 1 person

7. (If in a relationship) Please enter the duration of your relationship in months _____

8. Please report the number of female partners you've had sex with in the past 3 months. This includes vaginal, anal, and oral sex _____

9. Please report the number of male partners you've had sex with in the past 3 months. This includes vaginal, anal, and oral sex _____

10. Please report your total number of lifetime sexual partners. This includes vaginal, anal, and oral sex _____

11. Please report the total number of times you have had unprotected (no condom used) oral sex in the past 3 months _____

12. Please report the total number of times you had unprotected (no condom used) vaginal sex in the past 3 months

13. Please report the total number of times you had unprotected (no condom used) anal sex in the past 3 months

14. Have you ever been tested for an STI (sexually transmitted infection) in your lifetime?

Yes No Not Sure

15. Have you been tested for an STI in the past 6 months?

Yes No Not Sure

16. Do you know where to go if you wanted to get tested for STIs?

Yes No Not Sure

17. Have you ever been diagnosed with an STI in your lifetime?

Yes No Not Sure

18. Have you been diagnosed with an STI in the past 6 months?

Yes No Not Sure

19. Have you received part of the HPV vaccination series?

Yes No Not Sure

20. (If Yes) About how old were you when you received the first vaccine? Please provide your best estimate: _____ years old

21. Have you completed the HPV vaccination series?

Yes

No

Not Sure

PrEP is when HIV-negative people take anti-HIV medications (anti-retrovirals like Truvada) BEFORE HAVING SEX to prevent HIV infection

20. Do you currently take medications (PrEP, Pre-exposure prophylaxis, Truvada, Descovy) to help prevent you from getting HIV?

Yes

No

22. (If Yes) How long have you taken PrEP? _____ months

23. Do you own a smartphone?

Yes

No

24. Have you ever been active on a dating app?

Yes

No

25. If yes, which dating apps have you used? (check all that apply)

- Tinder
- Bumble
- Hinge
- Her
- Lex
- Grindr
- Scruff
- OKCupid
- Ship
- Other (please specify): _____
- I have never use a dating app

26. Have you been active on a dating app in the last 3 months?

Yes

No

27: If yes, which dating apps have you used in the last 3 months? (check all that apply)

- Tinder
- Bumble
- Hinge
- Her
- Lex
- Grindr

- Scruff
- OKcupid
- Ship
- Other (please specify): _____
- I have never use a dating app

28. How often are you active on dating apps?

- Less than once a month
- 1-2 times a week
- 3-4 times a week
- 5-7 times a week
- Multiple times a day
- I have never used a dating app

29. Please enter the total number of people you have met off dating apps who you have had **protected** vaginal, anal, or oral sex with in the past 3 months _____

30. Please enter the total number of people you have met off dating apps who you have had **unprotected** vaginal or anal sex with in the past 3 months _____

31. Please enter the number of **times** you have had **unprotected** vaginal, anal, or oral sex with someone you met off a dating app in the past 3 months _____

32. Please enter the total number of times you have had vaginal, anal, or oral sex with someone you have met off a dating app in your lifetime _____

Condom Attitudes, Norms, and Self-Efficacy

Instructions: For the following items, please indicate how likely is if that you would:

33. Be protected against STIs with condoms?

1. Not at all likely
2. Somewhat not likely
3. Somewhat likely
4. Likely
5. Very likely

34. Be protected against unplanned pregnancy with condoms?

1. Not at all likely
2. Somewhat not likely
3. Somewhat likely
4. Likely
5. Very likely

35. Enjoy sex if you use condoms?

1. Not at all likely
2. Somewhat not likely
3. Somewhat likely
4. Likely
5. Very likely

36. Please select Very likely

1. Not at all likely
2. Somewhat not likely
3. Somewhat likely
4. Likely
5. Very likely

37. Try new things sexually with a condom?

1. Not at all likely
2. Somewhat not likely
3. Somewhat likely
4. Likely
5. Very likely

38. Think using a condom would be easy?

1. Not at all likely
2. Somewhat not likely
3. Somewhat likely
4. Likely
5. Very likely

39. Think your partner felt you trusted him or her with a condom?

1. Not at all likely
2. Somewhat not likely
3. Somewhat likely
4. Likely
5. Very likely

40. Think your partner would be happier with a condom?

1. Not at all likely
2. Somewhat not likely
3. Somewhat likely
4. Likely

5. Very likely

41. Think your partner would be ok with condoms if you requested?

1. Not at all likely
2. Somewhat not likely
3. Somewhat likely
4. Likely
5. Very likely

42. Think your partner would be willing to talk about a condom?

1. Not at all likely
2. Somewhat not likely
3. Somewhat likely
4. Likely
5. Very likely

43. Be embarrassed to buy a condom?

1. Not at all likely
2. Somewhat not likely
3. Somewhat likely
4. Likely
5. Very likely

44. Think sex would feel unnatural with a condom?

1. Not at all likely
2. Somewhat not likely
3. Somewhat likely
4. Likely
5. Very likely

45. Think your partner would be angry if you asked them to use a condom?

1. Not at all likely
2. Somewhat not likely
3. Somewhat likely
4. Likely
5. Very likely

46. Think using a condom would ruin the sexual mood?

1. Not at all likely
2. Somewhat not likely

3. Somewhat likely
4. Likely
5. Very likely

47. Think your partner would think you are having sex with another person if you asked them to use a condom?

1. Not at all likely
2. Somewhat not likely
3. Somewhat likely
4. Likely
5. Very likely

48. Think your partner would leave you if you said you had to use a condom?

1. Not at all likely
2. Somewhat not likely
3. Somewhat likely
4. Likely
5. Very likely

49. Think your partner would refuse to have sex if you said you had to use a condom?

1. Not at all likely
2. Somewhat not likely
3. Somewhat likely
4. Likely
5. Very likely

Instructions: For the following items please indicate how true or untrue the statements are of you:

50. If you love someone, you do not have to use a condom.

1. Not at all true of me
2. Somewhat untrue of me
3. Somewhat true of me
4. True of me
5. Very true of me

51. If you trust someone, you do not have to use a condom.

1. Not at all true of me
2. Somewhat untrue of me
3. Somewhat true of me

4. True of me
5. Very true of me

52. If you know a person very well, you do not have to use a condom.

1. Not at all true of me
2. Somewhat untrue of me
3. Somewhat true of me
4. True of me
5. Very true of me

53. I have 17 fingers on my left hand

1. Not at all true of me
2. Somewhat untrue of me
3. Somewhat true of me
4. True of me
5. Very true of me

Instructions: For the following items please indicate how important it is to you that people like you engage in these behaviors.

54. Use condoms in one-night stands/flings

1. Not at all important
2. Somewhat not important
3. Somewhat important
4. Important
5. Very important

55. Will get condoms during the next month

1. Not at all important
2. Somewhat not important
3. Somewhat important
4. Important
5. Very important

56. Always have condoms handy during the next month?

1. Not at all important
2. Somewhat not important
3. Somewhat important
4. Important
5. Very important

57. Always discuss condoms with a new partner

1. Not at all important
2. Somewhat not important
3. Somewhat important
4. Important
5. Very important

58. Use condoms every time you have sex in the next month

1. Not at all important
2. Somewhat not important
3. Somewhat important
4. Important
5. Very important

Instructions: For the following items please indicate how confident you feel that you could perform the following behaviors.

59. Introduce a condom to your partner

1. Not at all confident
2. Somewhat not confident
3. Somewhat confident
4. Confident
5. Very confident

60. Discuss using condoms with your partner

1. Not at all confident
2. Somewhat not confident
3. Somewhat confident
4. Confident
5. Very confident

61. Suggest using a condom with your partner to prevent pregnancy?

1. Not at all confident
2. Somewhat not confident
3. Somewhat confident
4. Confident
5. Very confident

62. Suggest using a condom with your partner to prevent STIs

1. Not at all confident
2. Somewhat not confident
3. Somewhat confident
4. Confident
5. Very confident

63. Use a condom without having it break the sexual mood

1. Not at all confident
2. Somewhat not confident
3. Somewhat confident
4. Confident
5. Very confident

64. Put on a condom correctly

1. Not at all confident
2. Somewhat not confident
3. Somewhat confident
4. Confident
5. Very confident

65. Use a condom without having it break

1. Not at all confident
2. Somewhat not confident
3. Somewhat confident
4. Confident
5. Very confident

66. Use a condom each and every time you have sex with a non-main partner

1. Not at all confident
2. Somewhat not confident
3. Somewhat confident
4. Confident
5. Very confident

STI Testing Intention

Instructions: The way in which an STI test is complete depends on the type of infection that is being screened for. STI tests can be completed via urine sample, blood draw, cheek swab

(collecting saliva from the inside of the cheek), or physical exam by a physician that involves examining the genital area and anal areas. Please answer the following questions about getting tests for STIs.

67. To what extent do you plan to get tested for STIs in the next 6 months?

0. Not at all
1. Unlikely
2. Somewhat unlikely
3. Likely
4. Very Likely

68. To what extent do you plan to get tested for HIV, by a cheek swab or blood draw in the next 6 months?

0. Not at all
1. Unlikely
2. Somewhat unlikely
3. Likely
4. Very Likely

69. To what extent do you plan to get tested for HIV, by cheek swab or blood draw, in the next 6 months?

0. Not at all
1. Unlikely
2. Somewhat unlikely
3. Likely
4. Very Likely

70. Please select Not at all

0. Not at all
1. Unlikely
2. Somewhat unlikely
3. Likely
4. Very likely

71. To what extent do you plan to get tested for chlamydia, by providing a urine sample, in the next 6 months?

0. Not at all
1. Unlikely
2. Somewhat unlikely
3. Likely
4. Very Likely

72. To what extent do you plan to get tested for gonorrhea, by providing a urine sample, in the next 6 months?

0. Not at all
1. Unlikely
2. Somewhat unlikely
3. Likely
4. Very Likely

73. To what extent do you plan to get tested for genital herpes, by a physical exam or blood draw, in the next 6 months?

0. Not at all
1. Unlikely
2. Somewhat unlikely
3. Likely
4. Very Likely

74. To what extent do you plan to get tested for Human Papillomavirus (HPV), by a physical exam, in the next 6 months?

0. Not at all
1. Unlikely
2. Somewhat unlikely
3. Likely
4. Very Likely

75. To what extent do you plan to get tested for syphilis, by a blood draw or physical exam, in the next 6 months?

0. Not at all
1. Unlikely
2. Somewhat unlikely
3. Likely
4. Very Likely

76. To what extent do you plan to get tested for trichomoniases, by physical exam, in the next 6 months?

0. Not at all
1. Unlikely
2. Somewhat unlikely
3. Likely
4. Very Likely

77. To what extent do you plan to get tested for Hepatitis B virus (HBV), by blood draw, in the next 6 months?

0. Not at all
1. Unlikely
2. Somewhat unlikely
3. Likely
4. Very Likely

STI Stigma and Shame Scale

Please indicate the degree to which you agree or disagree with the following statements.

78. I would feel dirty if a doctor examined me for sexually transmitted disease.

1. Strongly disagree
2. Disagree
3. Neither agree nor disagree
4. Agree
5. Strongly agree

79. Getting a sexually transmitted disease would make me feel lonely.

1. Strongly disagree
2. Disagree
3. Neither agree nor disagree
4. Agree
5. Strongly agree

80. Getting a sexually transmitted disease makes people think I have poor morals.

1. Strongly disagree
2. Disagree
3. Neither agree nor disagree
4. Agree
5. Strongly agree

81. Most people I know think that a sexually transmitted disease is a sign of a weak character.

1. Strongly disagree
2. Disagree
3. Neither agree nor disagree
4. Agree
5. Strongly agree

82. Getting a sexually transmitted disease means I have poor morals.

1. Strongly disagree
2. Disagree
3. Neither agree nor disagree
4. Agree
5. Strongly agree

83. People with a sexually transmitted disease have been hanging with the wrong crowds.

1. Strongly disagree
2. Disagree
3. Neither agree nor disagree
4. Agree
5. Strongly agree

84. Getting a sexually transmitted disease means I do not keep myself clean.

1. Strongly disagree
2. Disagree
3. Neither agree nor disagree
4. Agree
5. Strongly agree

85. People with sexually transmitted diseases should be ashamed of themselves.

1. Strongly disagree
2. Disagree
3. Neither agree nor disagree
4. Agree
5. Strongly agree

86. Getting a sexually transmitted disease means a person is dirty.

1. Strongly disagree
2. Disagree
3. Neither agree nor disagree
4. Agree
5. Strongly agree

87. Getting a sexually transmitted disease means I do not take care of myself.

1. Strongly disagree
2. Disagree
3. Neither agree nor disagree
4. Agree

5. Strongly agree

88. Getting examined for a sexually transmitted disease means I am not clean.

1. Strongly disagree
2. Disagree
3. Neither agree nor disagree
4. Agree
5. Strongly agree

STI Testing Attitude

Please indicate how strongly you agree or disagree with the following statements.

89. STI testing lets me know that I am clean.

1. Strongly disagree
2. Disagree
3. Disagree a little
4. Neither agree nor disagree
5. Agree a little
6. Agree
7. Strongly agree

90. STI testing is the responsible thing to do.

1. Strongly disagree
2. Disagree
3. Disagree a little
4. Neither agree nor disagree
5. Agree a little
6. Agree
7. Strongly agree

91. STI testing may mean I cannot hook up.

1. Strongly disagree
2. Disagree
3. Disagree a little
4. Neither agree nor disagree
5. Agree a little
6. Agree
7. Strongly agree

92. Please select Disagree

1. Strongly disagree
2. Disagree
3. Disagree a little
4. Neither agree nor disagree
5. Agree a little
6. Agree
7. Strongly agree

93. STI testing may make me feel embarrassed.

1. Strongly disagree
2. Disagree
3. Disagree a little
4. Neither agree nor disagree
5. Agree a little
6. Agree
7. Strongly agree

STI Related Knowledge

For each statement below, please select *true*, *false*, or *I don't know*. If you do not know, please do not guess; instead, please select *I don't know*.

94. Genital Herpes is caused by the same virus as HIV.

False True I don't know

95. Frequent urinary infections can cause chlamydia.

False True I don't know

96. There is a cure for gonorrhea.

False True I don't know

97. It is easier to get HIV if a person has another sexually transmitted infection.

False True I don't know

98. Human Papillomavirus (HPV) is caused by the same virus that causes HIV.

False True I don't know

99. Having anal sex increases a person's risk of getting Hepatitis B.

- | | False | True | I don't know |
|--|-------|------|--------------|
| 100. Soon after infection with HIV a person develops open sores on his or her genitals (penis or vagina). | | | |
| | False | True | I don't know |
| 101. There is a cure for chlamydia. | | | |
| | False | True | I don't know |
| 102. A woman who has genital herpes can pass the infection to her baby during childbirth. | | | |
| | False | True | I don't know |
| 103. A woman can look at her body and tell if she has gonorrhea. | | | |
| | False | True | I don't know |
| 104. The same virus causes all of the sexually transmitted infections. | | | |
| | False | True | I don't know |
| 105. Human Papillomavirus (HPV) can lead to genital warts. | | | |
| | False | True | I don't know |
| 106. Using a natural skin (lambskin) condom can protect a person from getting HIV. | | | |
| | False | True | I don't know |
| 107. Human Papillomavirus (HPV) can lead to cancer in women. | | | |
| | False | True | I don't know |
| 108. A man must have vaginal sex to get genital warts. | | | |
| | False | True | I don't know |
| 109. Sexually transmitted infections can lead to health problems that are usually more serious for men than women. | | | |
| | False | True | I don't know |
| 110. A woman can tell that she has chlamydia if she has a bad smelling odor from her vagina. | | | |

- | | False | True | I don't know |
|---|-------|------|--------------|
| 111. If a person tests positive for HIV the test can tell how sick the person will become. | | | |
| | False | True | I don't know |
| 112. There is a vaccine available to prevent a person from getting gonorrhea. | | | |
| | False | True | I don't know |
| 113. A woman can tell by the way her body feels if she has a sexually transmitted infection. | | | |
| | False | True | I don't know |
| 114. A person who has genital herpes must have open sores to give the infection to his or her sexual partner. | | | |
| | False | True | I don't know |
| 115. There is a vaccine that prevents a person from getting chlamydia. | | | |
| | False | True | I don't know |
| 116. A man can tell by the way his body feels if he has Hepatitis B. | | | |
| | False | True | I don't know |
| 117. If a person has gonorrhea in the past he or she is immune (protected) from getting it again. | | | |
| | False | True | I don't know |
| 118. I have the ability to walk through walls | | | |
| | False | True | I don't know |
| 119. Human Papillomavirus (HPV) can cause HIV. | | | |
| | False | True | I don't know |
| 120. A man can protect himself from getting genital warts by washing his genitals after sex. | | | |
| | False | True | I don't know |
| 121. There is a vaccine that can protect a person from getting Hepatitis B. | | | |
| | False | True | I don't know |

Instructions: Please answer the following questions to the best of your ability:

122. Have you ever seen an ad promoting STI or HIV **prevention** on a dating app?

Yes

No

123. If you answered **Yes** to the previous question please indicate all the apps you have seen this kind of ad being promoted (please check all that apply)

- Tinder
- Bumble
- Hinge
- Her
- Lex
- Grindr
- Scruff
- OKCupid
- Ship
- Other (please specify): _____
- I have never use a dating app

124. Have you ever seen an ad promoting STI or HIV **testing** on a dating app?

Yes

No

125. If you answered **Yes** to the previous question please indicate all the apps you have seen this kind of ad being promoted (please check all that apply)

- Tinder
- Bumble
- Hinge
- Her
- Lex
- Grindr
- Scruff
- OKCupid
- Ship
- Other (please specify): _____
- I have never use a dating app

COVID-19 Dating App Items

Below are some items that ask about your dating app activity with regards to the current COVID-19 pandemic. Please answer the questions as they relate to the current social changes brought on by the presence of COVID-19

126. What state do you currently reside in? _____

127. Have you been participating in social isolation?

YES

NO

128. About how many days **in total** have you been isolating? _____

129. Did you have a dating app on your phone prior to isolation?

YES

NO

130. Have you downloaded a dating app since you began isolating?

YES

NO

131. How has your activity on dating apps changed since you began isolating?

1. Decreased a lot
2. Decreased some
3. Has stayed the same
4. Increased some
5. Increased a lot

132. How interested were you to meet people off a dating app in person **prior to when you began isolating?**

1. Not at all interested
2. Not very interested
3. Somewhat interested
4. Interested
5. Very interested

133. How interested are you to meet people off a dating app in person **DURING** isolation?

1. Not at all interested
2. Not very interested
3. Somewhat interested
4. Interested
5. Very interested

134. Have you met anyone off a dating app in person **since you began isolating**?

YES

NO

135. How many people have you met in person since you began isolating? _____

Vita

Shelby Ann Smout was born on October 16th, 1995 in Arlington VA and is an American citizen. She earned her Bachelor of Science degree in psychology and her Bachelor of Arts degree in gender, sexuality, and women's studies at Virginia Commonwealth University in December of 2016. She entered the Health Psychology doctoral program at Virginia Commonwealth University in August of 2018 and completed her Masters of Science in November of 2020.