Winter 2021

Examining perception of STI and pregnancy risk and prevention among a sample of college students during the COVID-19 pandemic

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Senior Honors Capstone Project

Western Washington University

March 23, 2021

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Acknowledgements

This project was supported by grant funding from the Western Washington University Office of Research and Sponsorship Programs.

Abstract

Introduction: College students tend to engage in higher risk sexual behaviors. However, contraception use varies by prevention focus (STI vs pregnancy prevention) and a person's perception of themselves as a contraceptive user. Research questions pertained to three main topics: sexual behaviors, STI perception and prevention, and pregnancy perception and prevention. This study examined if college students' gender identity, sexual orientation, and relationship status affected their perception of STI and/or pregnancy prevention efforts.

Methods: We recruited a convenience sample of college students (N=924) at a mid-sized Pacific Northwest university to take an online survey during the months of October to January of the COVID-19 pandemic. Questions addressed STI and pregnancy prevention perceptions and behaviors. The majority of participants identified as white (77%); additional demographic breakdowns included: 68% women, 21% men, 10% gender expansive (e.g., genderfluid, nonbinary); 52% heterosexual, 24% bisexual, 24% LGQ+; 57% single, 43% in a relationship. Data were analyzed with chi-squares and Wilcoxon signed ranks tests.

Results: External condoms were the most common choice for STI (80%) and pregnancy (67%) prevention methods. There were significant differences in contraceptive use by gender identity, sexual orientation, and relationship status. LGBTQ individuals were more likely to use regular testing for STI prevention and external condoms for pregnancy prevention compared to their cis-gender or heterosexual peers.

Discussion: Differences in types of prevention methods and utilization frequencies may indicate discrepancies in how individuals see themselves as contraceptive users. The pandemic also may have impacted perception of risk and prevention use. These data have implications for more inclusive sex education approaches.

Introduction

College students are an important demographic to study in the field of sexual health because they tend to engage in more risky sexual behaviors than the general population. These risky behaviors can result in an unintended pregnancy or contraction of a sexually transmitted infection (STI), both of which are costly and can have life-long consequences (Guttmacher Institute, 2015; Owusu-Edusei et al., 2013). While college students do not represent the entire population of young people, studies on college students can provide insight on how their attitudes about sex and sexuality affect their behavior. This literature review will include research on college student sexual behaviors, stigmas and perceptions that impact those behaviors, and how young people protect themselves against the risk of STIs and unintended pregnancy. The information in this literature review will provide context for the current study on college student sexual behaviors at Western Washington University.

College Student Sexual Behavior

Overview

By age 18, about 55% of people have had intercourse, suggesting that about half of young people have some sexual experience by the time they get to college (Abma & Martinez, 2017). According to the National College Health Assessment survey, 64.8% of college students report being sexually active in the past year (American College Health Association, 2019). College students who had at least one partner in the last year reported an average of 2.31 sexual partners. The survey also found that 42.4%, 44.9%, and 5.6% of students reported having had oral, vaginal, and anal sex in the last 30 days, respectively.

Risky sexual behaviors are those in which there is an increased risk for acquiring an STI or an unintended pregnancy (Centers for Disease Control, 2020c). Such behaviors include inconsistent or no condom use, casual sex, and having multiple sexual partners. Several social factors common for young adults in college, such as party and hookup culture, dating apps, and peer perception contribute to higher incidence of risky behaviors.

Party and Hookup Culture

College is a unique setting in which certain social dynamics and behaviors may facilitate these higher-risk sexual behaviors. For example, college party culture, including attending fraternity parties and other large private parties, is conducive to risky sexual behaviors (Hittner et al., 2016). Frequent and heavy drinking are also associated with unplanned sex and a greater number of sexual partners (Mair et al., 2016).

Hookup culture is another social and behavioral phenomenon associated with college student life. Although there is debate around the extent to which hookup culture has changed student sexual networks (Monto & Carey, 2014), even the perception of its effect merits its place in the discussion of risky behaviors on college campuses. According to the Online College Social Life Survey (OCSLS), nearly three quarters of both male and female college students report having engaged in a hookup by their senior year (Orenstein, 2016). Garcia et al. (2012) defines "hooking up" as "brief uncommitted sexual encounters among individuals who are not romantic partners or dating each other" (pp. 161). A hookup event may consist of a variety of behaviors including kissing, touching above or below the waist, oral sex, and intercourse (Fielder & Carey, 2010; Reiber & Garcia, 2010). The use of protection during hookups varies. A survey of first-year female students reported that at their most recent hookup, none had used condoms during

oral sex and 69% had used condoms during vaginal intercourse (Fielder & Carey, 2010). In another study, 53% of students reported having had oral, vaginal, or anal sex during their most recent hookup but only 46.6% of those reported using a condom (Lewis et al., 2012).

Hookup and dating apps (i.e., Tinder, Bumble, Grindr) are also relatively new factors in students' sexual networks. Although some users report using the apps to find a committed relationship (Sumter et al., 2017), young people are more likely to perceive them as a tool for initiating hookups rather than relationships (LeFebvre, 2017). Dating app use is associated with risky sexual behaviors such as multiple sexual partners and unprotected sex (Sawyer et al., 2018). Considering that about 50% of Tinder users are ages 18 to 25 (Tinder Newsroom), these apps are another important factor in understanding how and when young people engage in risky behaviors.

Peer Perception

College students are particularly attuned to peer perception and acceptance. This environment of comparison often causes them to overestimate the amount of sex their peers are having (American College Health Association, 2008). This phenomenon can be explained in relation to social norms theory. Social norms theory was first used in 1986 to describe drinking culture on college campuses (Perkins & Berkowitz, 1986). The researchers found that when students believed their peers were engaging in more risk behaviors such as heavy drinking, they themselves were more inclined to drink heavily. A similar effect occurs with sexual behaviors. College students tend to overestimate the risky sexual behaviors of their peers which contributes to the social normalization of risk behaviors (Scholly et al., 2005).

Prevention Behaviors

Contraceptive and STI prevention methods are essential to mediating the adverse effects of these risky behaviors. Although condoms are still reported as the most common primary contraceptive, recent data show that young people may be shifting away from condoms and toward hormonal and long-acting reversible contraceptive (LARC) options (e.g., intrauterine devices (IUDs) and implants; Szucs et al., 2020; Witwer et al., 2018). In recent years, the Guttmacher Institute reported an increase in teens' contraceptive use, specifically hormonal contraceptives, dual methods, and LARC methods (Boonstra, 2018). A report by the Center for Disease Control (CDC) found that among female contraceptive users aged 15-24, the most common choice was the pill (Daniels et al., 2015). The uptick in LARC and hormonal contraceptive methods are effective for pregnancy prevention, however, they do not protect users or their partners from STI transmission.

Sexually Transmitted Infections

Young people aged 15-24 are disproportionately affected by STIs. This age group only comprises 25% of the sexually active population; yet it is estimated that they account for half of new STI cases each year (Satterwhite et al., 2013). The most prevalent STIs among young people are chlamydia and human papillomavirus (HPV), due in part to the fact that both infections may be asymptomatic and can be passed through vaginal, anal, and oral sex (Centers for Disease Control, 2014, 2019).

STIs are surrounded by pervasive social stigmas which affect how people approach prevention and treatment. People are more likely to assign a moral judgement to infected individuals when a disease can be spread through unprotected sex (Young et al., 2007). This can

also impede their willingness to take precautionary measures. For example, anticipated HIV stigma is a barrier to pre-exposure prophylactic (PrEP) uptake (e.g., a medication to prevent or reduce HIV transmission; Centers for Disease Control, 2020b; Golub et al., 2019). Furthermore, people also reduce their estimated chance of contracting a disease when it can be spread through a stigmatized means (Young et al., 2007). As previously discussed, college students are particularly aware of peer perception so the stigmatization of STIs may contribute to a lack of testing and preventative measures (e.g., condom use) and an underestimation of their STI risk and susceptibility.

All of these factors have the potential to influence rising STI rates. In the last decade, national rates of syphilis, gonorrhea, and chlamydia have increased (National Center for Health Statistics, 2019). In addition to young people, people of color and men who have sex with men (MSM) are also subsets of the population that are particularly affected by STIs (Keller, 2020).

The CDC lists condoms, HPV vaccination, abstinence, mutual monogamy, and reducing one's number of sexual partners as recommended STI prevention methods (Centers for Disease Control, 2020a). However, this list is not comprehensive and does not necessarily address sexual behaviors between LGBTQ people. Historically, sex education and STI prevention promotion initiatives have operated within a heteronormative framework which often excludes LGBTQ people and behaviors outside of vaginal-penile intercourse (Elia & Eliason, 2010). A more inclusive list of STI prevention methods may also include internal condoms, dental dams, and HIV prevention medication such as pre-exposure prophylaxis (PrEP) (Marrazzo & Cates, 2011; Richters & Clayton, 2010).

Unintended Pregnancy

Although young people make up about half of the new STI cases each year, they may be more concerned about pregnancy prevention (Vamos et al., 2018). This aligns with the understanding that many college students feel like they are not in the right place in life to have a baby (Cabral et al., 2018).

Pregnancy rates among young women have been declining since 1990 (Kost et al., 2017) and the percentage of unintended pregnancies, or pregnancies that are "unwanted" or "wanted later," have been decreasing as well (Finer & Zolna, 2016; Guttmacher Institute, 2019). Among 20-24 year old women, the percentage of unintended pregnancies dropped from 64% to 59% between 2008 and 2011 (Parks & Peipert, 2016). While this change in percentage of unintended pregnancies may seem negligible, taking into account simultaneous declines in overall pregnancy rates shows a larger trend. In 2008 and 2011, there were about 1.7 million and 1.5 million total pregnancies among women aged 20-24, respectively (Kost et al., 2017). Using the percentages given by Parks & Peipert (2016), we can calculate that there were about 1,088,000 and 885,000 unintended pregnancies among women aged 20-24 in 2008 and 2011, respectively. Combined with declining pregnancy rates, the 5% difference over three years actually represents a difference of over 200,000 fewer unintended pregnancies.

One prominent factor in these trends is that many women are choosing to delay having children. The median age of mothers at the birth of their first child shifted from 23 to 26 between 1994 and 2018 (Livingston, 2018). Whether they make the decision for financial or education-related reasons, the fact remains that many young people are starting families later and pregnancy trends should be interpreted within that social context.

Another important factor of declining pregnancy rates is the increased use of highly effective contraception methods (e.g., hormonal, LARC), particularly in simultaneity. Dual methods includes the simultaneous use of a condom and a non-barrier contraceptive such as a LARC or the pill. Using dual methods offers protection from pregnancy and STIs. However, dual method use often requires an admission of STI risk between partners, which is subject to social stigmas (Williams & Fortenberry, 2013). When surveyed, young women reported using dual methods primarily as pregnancy prevention and secondarily as STI prevention. Young women also reported being less likely to use condoms in combination with another contraceptive if they trusted their partner more, didn't have easily accessible condoms, knew their partner's STI status, and self-reported as being immature about STI risk perception (Williams & Fortenberry, 2013).

Another factor that mitigates contraceptive use is relationship dynamics. In hookup relationships, familiarity between partners is positively associated with condom and hormonal method use (Kusunoki & Upchurch, 2011). This may be due to improved communication between people who already know each other. The same study found that in more committed relationships, women reported less condom and dual method use which may be because of the condom's association with distrust or non-monogamy.

Although it may seem counterintuitive, young sexual minority women (e.g. lesbian, bisexual, and queer women) are at a higher risk of unintended pregnancy than their heterosexual peers (Goldberg et al., 2016; Lindley & Walsemann, 2015). Similar to the issue of STI prevention, heteronormative sex education creates a knowledge gap that may leave sexual minority women vulnerable to unintended pregnancy (Elia & Eliason, 2010). Sexual minority women cite various barriers to contraceptive use including less frequent vaginal-penile sex and

cultural messaging that doesn't include them as contraceptive users (Higgins et al., 2019). This further highlights the need for inclusive research and educational practices.

The Current Study

In summary, college is a time in people's lives when they may be more likely to engage in risky sexual behaviors which could result in STI transmission or unintended pregnancy. STI protection and contraceptive methods can help reduce these risks but they each present unique barriers for use such as social stigma, susceptibility perceptions, and negotiation dynamics.

These distinctive barriers factor into the current trends of STI and unintended pregnancy rates. While both can be outcomes of risky sex, STI rates are increasing while unintended pregnancy rates are decreasing (Finer & Zolna, 2016; Kost et al., 2017; National Center for Health Statistics, 2019). Due to the evolving nature of college sexual behaviors and sexual networks (i.e., hookup culture, dating apps), it is difficult to make direct comparisons of STI and pregnancy trends over time. These trends do not occur in a vacuum; there are more factors at play than just STI protection and contraceptive method choices. With this limitation in mind, the data collected from this survey may help researchers understand how college students perceive the risks of STI and pregnancy and how they utilize protection measures to prevent those outcomes.

The current study was conducted with students at Western Washington University (WWU). WWU is a public institution with about 16,000 students, the majority of which are seeking their undergraduate degree. The student population comprises 57% women and about 30% students of color. WWU does not have a Greek system or Division I athletics, both of which tend to be dominant forces in college social life and sexual climate (Armstrong et al.,

2006; Stotzer & MacCartney, 2016). Like most college campuses, one can assume prevalence of risky sexual behaviors and STI transmission. However, compared to the rest of Washington State, Whatcom County has lower STI rates and lower rates of unintended pregnancy (Washington State Department of Health, 2014, 2015).

It is important to note that data were collected during the COVID-19 pandemic when university classes were mostly online and government guidelines regulated the operation and capacity of businesses and institutions (e.g., restaurants, worship services, gyms). At WWU, less than 10% of classes were offered in a hybrid mode and dorms were only operating at a fraction of their capacity. These factors likely had a multi-faceted effect on students' lives, including their sexual behaviors.

To date, there have been no data collected about the sexual climate of WWU. Given the unique environment of WWU and considering the existing knowledge found in the literature, our study aimed to examine how college students at WWU perceive the risks associated with sexual behavior and how that may be related to their prevention method use. Survey questions on pregnancy desires, pregnancy prevention, perceived STI risk, and STI prevention may provide an insight into how college students evaluate risk and how they take prevention measures accordingly. This study was guided by three overarching categories of questions:

Research questions 1-2 pertained to general sexual behaviors at Western Washington University:

RQ1: What kinds of sexual behaviors are WWU students engaging in?

RQ2: What are students' perceptions of others' sexual behaviors?

Research questions 3-4 pertained to STI prevention methods and perceptions:

RQ3: What are students' perceptions of STI risk (for themselves and their peers)?

RQ4: What STI prevention methods do students use and how frequently do they use them?

Research questions 5-7 pertained to pregnancy prevention and perceptions:

RQ5: What percentage of students are engaging in behaviors that could result in pregnancy?

RQ6: What are students' current perceptions and intentions related to pregnancy?

RQ7: What contraceptive methods do students use and how frequently do they use them?

Methods

Procedures and Participants

We recruited a convenience sample of WWU students to take an online survey through Qualtrics. The survey was disseminated by faculty, staff, and students across campus including professors, athletic coaches, directors of resource offices, and student organizations (e.g. Be Well WWU, Honors Program). They sent out emails or posted to social media accounts (i.e., Instagram). In the first wave of recruitment, some professors offered extra credit points as an incentive and the survey was posted for the psychology department's internal research subjects pool, so some students could have earned research credits required for certain psychology courses. In the second wave of recruitment, upon securing grant funding, the research team distributed $10 Amazon e-giftcards to 250 students as an incentive.

When participants decided to take the survey, they could follow a link or QR code on promotion materials which led to the introduction page of the survey. Before starting the survey, participants read an informed consent statement and selected whether they consented or not. If they did not consent, they were directed to the end of the survey. If they consented, they

continued to the next page of the survey which confirmed eligibility. Any WWU student over the age of 18 was eligible to participate. The Institutional Review Board at WWU approved all procedures prior to data collection.

Measures

The survey instrument was developed by faculty in public health and staff members of WWU Prevention and Wellness Services to assess the attitudes and behaviors of students as they relate to sex and sexuality. Prior to instrument finalization, we piloted the survey with 3 undergraduate research assistants, 8 undergraduate peer educators, a professor in public health, and the director of the LGBTQ+ Resource Center to check for readability, timing, and language inclusivity. Survey questions relevant to the research questions included demographics, sexual behaviors, STI prevention and perception, and pregnancy desires and prevention.

Demographic Questions

In the demographic section, we asked students' gender identity, pronouns, sexual orientation, relationship status, year in school, and race/ethnicity. We computed a new variable for race/ethnicity to measure how many races/ethnicities each participant selected. The "Multiracial" category contains participants that selected more than one race/ethnicity. For cross tabular analysis, we also collapsed some variables in gender identity, sexual orientation, and relationship status. In the gender identity variable, the options agender, genderqueer/fluid, nonbinary, trans man, trans woman, two-spirit, and a gender not listed were grouped into "Gender Expansive." In the sexual orientation variable, gay and lesbian were grouped together as "Gay/Lesbian" and pansexual, queer, and an orientation not listed were grouped into "Another Orientation." In the relationship status variable, all of the variations on singleness were grouped

together as “Single” and all of the relationship types (including polyamorous, engaged, and married) were grouped together as “Relationship.”

Sexual Behaviors

Research questions 1 and 2 pertained to the general sexual behaviors of WWU students and how they perceived their peers’ sexual behaviors. There were three questions in this section. First, we asked them to estimate how many partners WWU students had had in the last 12 months. Then the survey asked participants how many partners *they* had had in the last 12 months and how many of those were one-time experiences. Answer options to all three questions were “0,” “1,” “2-3,” “4-7,” and “8 or more.”

STI Prevention and Perception

Research questions 3 and 4 pertained to how students perceived the risk of STIs for themselves and other students and their use of STI prevention methods. There were four questions in this section. First, we asked participants to select from a list all of the methods they had used to prevent STIs in college. The list was comprehensive, including answers such as “knowing my partner’s STI status,” “taking PrEP or PEP,” and “managing an STI that I have (maintenance check-ups, treatments, taking medication).” The list also included “none” and two “not applicable” options (has never had sex or is in a monogamous relationship with STI-negative partner). The following question asked how often they used their chosen STI prevention method(s) with answer options as “always/very frequently,” “somewhat frequently,” “somewhat infrequently,” and “never/very infrequently.”

The next two questions asked participants to estimate risk of contracting an STI in college on a 5-point Likert scale with 1 being “Very Likely” and 5 being “Very Unlikely.” The

first question asked them to estimate their own risk and the second question asked them to estimate the risk for other students at WWU.

Pregnancy Intentions and Prevention

Research questions 5, 6, and 7 pertained to students' desires for pregnancy and their use of contraceptives. There were five questions in this section that were only administered to participants who indicated they engage in sexual behaviors that could result in pregnancy even if they use protection. If they answered "No," they were directed to the subsequent section.

First, we asked participants which statement they most related to regarding their current pregnancy desires with answer choices including wanting pregnancy, indifference, not wanting pregnancy, and uncertainty. Then we asked what they would do if they or their partner got pregnant at this time. Answers included wanting to terminate the pregnancy, leaning toward terminating the pregnancy, looking at the options, leaning toward keeping the pregnancy, and wanting to keep the pregnancy.

Finally, the survey asked participants to select from a list of methods they used to prevent pregnancy (e.g., external condoms, birth control pill, withdrawal, fertility awareness). The following question asked how often they used their chosen pregnancy prevention method(s) with answer options as "always/very frequently," "somewhat frequently," "somewhat infrequently," and "never/very infrequently."

Analyses

After closing the survey, we downloaded data from Qualtrics for analysis. There were a total of 1064 participant responses. We excluded responses that did not fulfill the eligibility requirements (i.e., under 18, not a WWU student; N=14) or were left entirely blank (N=91).

Since the scope of this study is focused on young adults, we also excluded responses of participants who were 25 or older (N=34), resulting in a final analytic sample of 924 people.

We used SPSS 27 to perform descriptive statistics on the data. First, we ran frequencies on all of the survey questions that pertained to our research questions. Then, we ran chi-square tests on the most commonly selected STI and pregnancy prevention methods to compare method choices by gender identity, sexual orientation, and relationship status. We combined Gay/Lesbian, Asexual, and Another Orientation into "LGQ+" for the chi square tests on sexual orientation to ensure cell sizes of 5 or more. We reported a Cramer's *V* for our chi-square tests as a measure of effect size and followed up with Fisher's Exact tests on significant chi-square tests to determine where significant differences were.

Finally, to test for significant differences between self and peer STI risk estimations, we ran a Wilcoxon signed ranks test.

Results

Demographics

The majority of participants identified as white (76.7%), women (68.3%), and used she/her pronouns (68.5%). About half of the participants identified as heterosexual and about a quarter identified as bisexual. The average age of participants was 19.91 (SD=1.317). The majority of participants (57.4%) reported their relationship status as single (See Table 1 for all demographic characteristics).

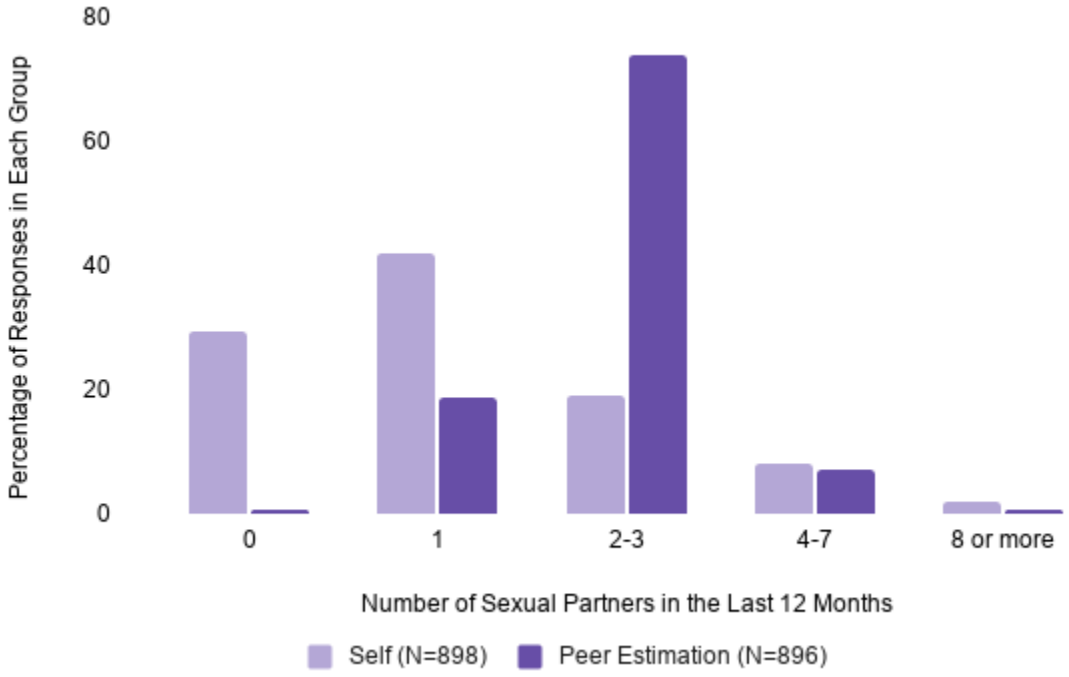
Sexual Behaviors

The majority of participants reported having engaged in kissing, giving and receiving manual stimulation, giving and receiving oral sex, and vaginal-penile intercourse. Less than half of participants had engaged in giving and receiving anal sex and using a sex toy with a partner (See Table 2).

Most participants reported having had zero (29.2%) or one (42.0%) sexual partner in the last 12 months and the majority (72.2%) reported having had zero one-time sexual partners in the last 12 months. However, nearly three-fourths of participants estimated that the average student at WWU had had 2-3 sexual partners in the last 12 months (see Figure 1).

Figure 1.

Distribution of reported number of sexual partners for self and estimated number of sexual partners for peers in the last 12 months.

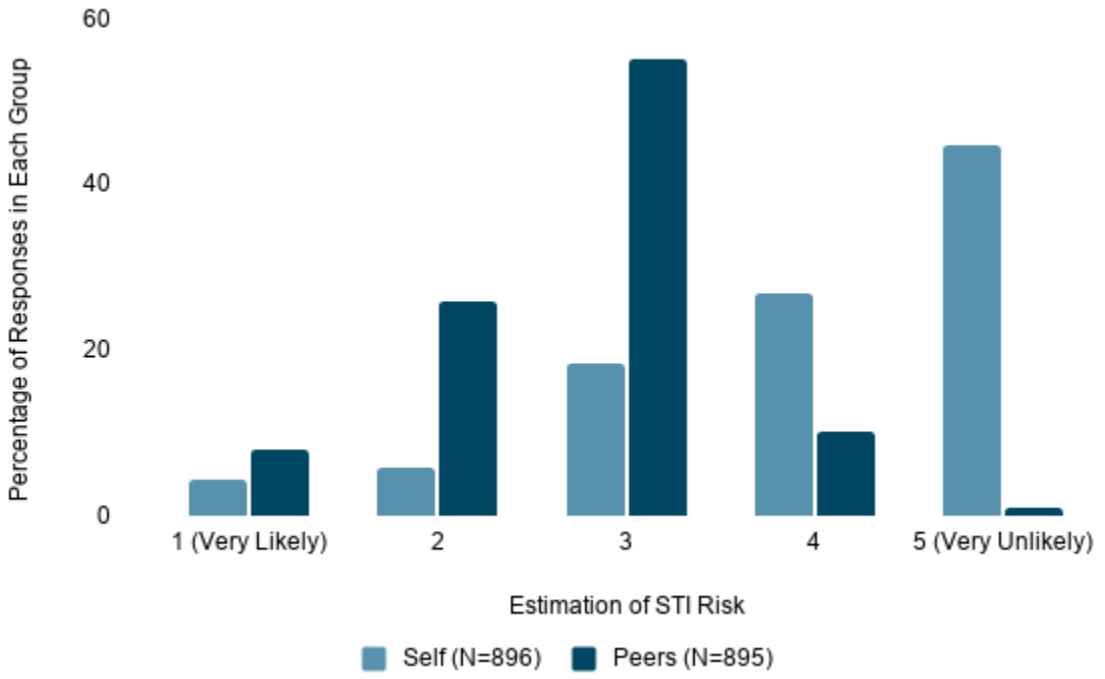


STI Perception and Prevention

Most participants estimated that they had a low risk of contracting an STI in college. On a Likert scale from 1 (STI very likely) to 5 (STI very unlikely), 44.8% selected a 5. Using the same scale, over 80% of participants selected a 2 or 3 to estimate their peers' risk of contracting an STI indicating that participants were more likely to estimate that their peers had a higher STI risk than themselves (see Figure 2). A Wilcoxon signed ranks test showed that the difference was statistically significant, $z = -21.199$, $p < .001$.

Figure 2.

Distribution of estimated STI risk for self and peers.



Of the total sample, 60.6% of participants reported using at least one STI prevention method out of a list of options. Forty-three percent of the total sample selected "Not applicable," either because they have never engaged in sexual activity (23.8%) or they are in a monogamous

relationship with a STI-negative partner (19.5%). About 3% of participants reported using no STI prevention method. The percentage between all of these groups adds up to be over 100% because the question structure allowed participants to select multiple answers (e.g., a participant could choose "external condoms" and "Not applicable" and be counted in both groups).

Among those who selected at least one STI prevention method, the most common choices were external condoms (80.4%), knowing partner's STI status (61.8%), limiting their number of sexual partners (55.5%), and regular STI testing (37.5%). Chi-square tests showed that there were significant differences in external condom use by sexual orientation [$X^2(2, N=560) = 16.647, p < .001$]. Post-hoc pairwise Fisher's exact tests indicated that a higher proportion of bisexual individuals reported using external condoms compared to LGQ+ individuals ($p < .001$). There were also significant differences in regular STI testing as a prevention method by gender identity [$X^2(2, N=557) = 20.050, p < .001$] and sexual orientation [$X^2(2, N=560) = 12.065, p = .002$]. Post-hoc tests indicated that higher proportions of women ($p < .001$) and gender expansive individuals ($p <.001$) reported using regular testing compared to men. Post-hoc tests also indicated that higher proportions of LGQ+ individuals ($p = .002$) reported using testing compared to their heterosexual counterparts. There were no significant differences in STI prevention method use by relationship status. Most participants (62.4%) reported always using their selected STI prevention method(s).

Pregnancy Desires and Prevention

Of the total sample, 61.2% of participants (N=556) reported that they engage in behaviors that could result in pregnancy (even if they use contraceptives). In this subset, most participants identified as women (70.3%), heterosexual (58.9%), and reported being in a relationship

(56.7%). Of these 556 participants, 98.0% reported that they do not desire a pregnancy at this time and 51.6% reported that they would want to terminate a pregnancy if they or their partner got pregnant.

Of participants who reported engaging in sexual behaviors that could result in pregnancy, 99.3% reported using at least one method of pregnancy prevention from a list of options. The most common methods were external condoms (66.8%), the pill (40.9%), withdrawal (39.7%), and an IUD (26.1%). There were significant differences in the use of external condoms by gender identity [$X^2(2, N=551) = 10.472$, $p = .005$], sexual orientation [$X^2(2, N=552) = 12.998$, $p = .002$], and relationship status [$X^2(1, N=552) = 53.899$, $p < .001$]. Post-hoc tests indicated that higher proportions of gender expansive individuals reported using external condoms compared to women ($p = .004$). Post-hoc tests also indicated that higher proportions of bisexual ($p = .006$) and LGQ+ individuals ($p = .006$) reported using external condoms compared to heterosexual individuals. There was also a significant difference in the use of the pill by gender identity [$X^2(2, N=551) = 11.694$, $p = .003$]. Post-hoc tests indicated that higher proportions of men indicated using the pill as a contraceptive method compared to gender expansive individuals ($p = .003$). Most participants (88.4%) reported always/very frequently using their selected contraceptive method(s).

Discussion

STI and Pregnancy Perception and Prevention

The purpose of this study was to examine how college students perceive and protect themselves against STIs and pregnancy interpreted in the context of current decreasing rates in

pregnancy and increasing rates of STI among young people (Kost et al., 2017; National Center for Health Statistics, 2019).

From our study, it is clear that this sample of college students feels strongly about preventing pregnancy right now and that if they became pregnant, over half would choose or lean toward choosing having an abortion. This could make them highly motivated to prevent a pregnancy which may lead to the high method use frequency among our sample. We did not ask participants about pregnancy history so we cannot compare pregnancy desire to pregnancy rates but low desire and high contraceptive use could be contributing factors aligning with the declining unintended pregnancy rate among young people.

Compared to pregnancy prevention, our sample reported less frequently using methods aimed to prevent STI. This may be because they estimate that they have a relatively low risk of contracting an STI in college. While our data cannot measure the accuracy of their estimates for themselves or their peers, previous research has shown that people are more likely to underestimate their risk of contracting a disease when it can be spread through stigmatized behaviors such as unprotected sex (Young et al., 2007).

External condoms were the top choice for both pregnancy and STI prevention so, at a minimum, they should be made readily available through university services. However, participants in a relationship were less likely to report using condoms for pregnancy prevention, perhaps because they choose to use another long-term contraceptive option. To ensure that they are still protecting themselves and their partners from STI, educational initiatives could provide more information and resources that support behavioral STI prevention decisions like regular testing and managing an existing STI among all students. This approach would also aim to

destigmatize STIs and normalize behaviors such as regular STI testing and communicating with partners about STI status.

LGBTQ Prevention Method Choices

There were also significant findings relating to differences by sexual orientation and gender identity which have implications for more inclusive and tailored sexual health programming, particularly for bisexual people. Our sample comprised nearly a quarter bisexual individuals which reflects the rising identification of bisexuality (Lehmiller, 2019).

First, LGBTQ individuals were more likely to report using behavioral STI prevention methods compared to their cis-gender and heterosexual peers. Since external condoms may not always apply to LGBTQ sexual behaviors, they may prefer other behavioral methods. Instead of only focusing on external condoms, sexual health initiatives can support other method preferences by including more information and resources on behavioral methods so that everyone can have the knowledge to pursue prevention methods that apply to them.

Interestingly, LGBTQ individuals engaging in behaviors that could result in pregnancy were more likely to report using external condoms for pregnancy prevention compared to their cis-gender and heterosexual peers. This may indicate that although external condoms may not *always* apply to LGBTQ sexual activity, they may be the preferred method when the sexual behaviors could result in a pregnancy.

Or they may be the most temporary option; there is the possibility that LGBTQ individuals are engaging less often in pregnancy-causing sexual behavior so they don't want to invest in or commit to a long-term option like an IUD or the implant.

Particularly when it comes to pregnancy prevention, sexual minority women (i.e., lesbian, bisexual, queer) report that they do not see themselves reflected in the media as users of long-term contraceptives (Higgins et al., 2019) so they may perceive external condoms as their primary option. Additionally, some participants in the study by Higgins et al. (2019) described LARCs as "overkill" or a "hassle" because they may not be having vaginal-penile sex as often as their heterosexual counterparts. While the perceived practicality may not be solved by sex education alone, health programming can work to be more inclusive in their conversation about LARC benefits and drawbacks for people of all orientations and identities so that LGBTQ individuals consider it as an option.

Sexuality During the COVID-19 Pandemic

Although it was not the original intention of the study, our data were collected during the COVID-19 pandemic. While we cannot draw any firm conclusions about the impact of the pandemic on sexual behavior, many students were living at home with their parents instead of living with roommates as they would in a typical year and going out into social situations less frequently. These factors could have affected perception of STI and pregnancy risk and frequency of sexual behaviors. While our data do not address specific pandemic perceptions, there is the potential that a heightened awareness of disease transmissibility could have impacted STI prevention behaviors. If people were more aware of the possibility of one virus (SARS-CoV-2), perhaps it translated to an overall increased awareness of disease transmission and incorporation of prevention behaviors into our daily lives.

Early research from the Kinsey Institute (collected from March to April 2020) shows that on average, sexual behavior decreased during the pandemic (Lehmiller et al., 2020). However,

our data were collected further into the pandemic so the long-term effect on sexuality behaviors may be different with the onset of "pandemic fatigue" (World Health Organization Regional Office for Europe, 2020).

Study Strengths and Limitations

Our study added new data and findings to the literature and had several strengths. For example, this study intentionally used inclusive language (e.g., gender-neutral questions). relevant questioning for certain purposes (e.g., pregnancy questions only administered to people who indicated engaging in pregnancy-resulting behaviors), and comprehensive lists of prevention behaviors for people who engage in all types of sexual behaviors. Our demographic questions also included many options for gender identity and sexual orientation. Using inclusive, specific labels also enabled us to analyze prevention behaviors in the LGBTQ community.

However, there were also several limitations of note. As with all convenience samples, our sample of college students is not necessarily generalizable to the entirety of campus or all college students in general. Our sample comprised high proportions of women and white students. While the student population of WWU comprised majorities of women and white students, our sample does not proportionally represent the demographics of WWU. Due to survey recruitment methods and snowball sampling, there may have been self-selection bias with proportions of Honors students, psychology students, peer educators, and students taking classes in the Department of Health and Human Development. These students, especially those in Health and Human Development and peer educators, may have had a heightened awareness of sexual health and their own sexual behaviors.

There are also inherent limitations imposed by using labels to group individuals. Labels are personal and do not necessarily follow strict associations of gender identity, pronouns, or sexual orientation. For example, the survey question on sexual orientation included the options "gay" and "lesbian." While no men identified as lesbian, multiple women identified as gay, so we combined the two groups into one titled "Gay/Lesbian." Sexual and gender diversity do not always fit into discrete groups. In our study, we strategically combined related groups for the purposes of analyses while still maintaining the integrity and visibility of those in sexual and gender minority groups.

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Footnote

1. We acknowledge that there are people who can become pregnant that do not identify as women. However, most statistical reports do not take this into account.

Appendix: Tables

Table 1. Participant Demographics (N=924)

Characteristic	n (%)
Age	
18	128 (13.9)
19	252 (27.3)
20	270 (29.2)
21	167 (18.1)
22	78 (8.4)
23-24	29 (3.1)
Year in School	
First Year	193 (20.9)
Second Year	254 (27.5)
Third Year	270 (29.3)
Fourth Year	165 (17.9)
Fifth Year or Above	40 (4.3)
Gender Identity	
Man	196 (21.4)
Woman	626 (68.3)
Gender Expansive	94 (10.3)
Pronouns	
He/Him	207 (22.4)
She/Her	633 (68.5)
They/Them	44 (4.8)
Another Pronoun Combination	40 (4.3)
Sexual Orientation	
Heterosexual	481 (52.1)
Gay/Lesbian	60 (6.5)

Table 1. (Continued)

Bisexual	222 (24.0)
Asexual	37 (4.0)
Another Orientation	124 (13.4)
Relationship Status	
Single	529 (57.4)
Relationship	392 (42.6)
Race/Ethnicity	
Asian	64 (7.0)
Black/African American	9 (1.0)
Caucasian	696 (76.7)
Hispanic/Latinx	25 (2.8)
Native American	2 (0.2)
Pacific Islander	1 (0.1)
Multiracial (Selected more than one)	111 (12.2)
First Generation College Student	
Yes	167 (18.1)
College of Major	
Business and Economics	58 (6.3)
Fine and Performing Arts	39 (4.2)
Humanities and Social Sciences	308 (33.3)
Science and Engineering	185 (20.0)
Fairhaven College of Interdisciplinary Studies	25 (2.7)
Graduate School	1 (0.1)
Huxley College of the Environment	56 (6.1)

Table 1. (Continued)

Woodring College of Education	43 (4.7)
Don’t Know/Undeclared	209 (22.6)
Living Situation	
On-campus	120 (13.0)
Off-campus	621 (67.2)
Permanent residence	141 (15.3)
Other	42 (4.5)

Table 2. Sexual Behavior Engagement, Number of Partners, and Perceptions

	n (%)
Behavior engaged in	
Kissing	790 (85.5)
Giving manual stimulation	699 (75.6)
Receiving manual stimulation	712 (77.1)
Giving oral sex	637 (68.9)
Receiving oral sex	640 (69.2)
Vaginal-penile intercourse	595 (64.4)
Giving anal sex	46 (5.0)
Receiving anal sex	176 (19.1)
Using a sex toy with a partner	294 (31.8)
Number of sexual partners in the last 12 months (N=898)	
0	262 (29.2)
1	377 (42.0)
2-3	170 (18.9)
4-7	73 (8.1)
8 or more	16 (1.8)
Number of *one-time* sexual partners in the last 12 months (N=891)	
0	643 (72.2)
1	149 (16.7)
2-3	70 (7.9)
4-7	26 (2.9)
8 or more	3 (0.3)
Estimated number of peers' sexual partners in the last 12 months (N=896)	
0	7 (0.8)
1	167 (18.6)

Table 2. (Continued)

2-3	653 (73.7)
4-7	63 (7.0)
8 or more	6 (0.7)

Table 3. Perception of STI Risk for Self and Peers

Perceived Risk	1 (STI Very Likely)	2	3	4	5 (STI Very Unlikely)
	Estimate (%)				
Self (N=896)	4.4	5.7	18.3	26.9	44.8
Peers (N=895)	8.0	25.9	55.0	10.1	1.0

Table 4. STI Prevention Method Choice and Frequency of Use Among Participants Who Indicated Using At Least One Method (N=560)

	n (%)
Method	
External condom	450 (80.4)
Internal condom	11 (2.0)
Dental dam	8 (1.4)
Limiting number of partners	311 (55.5)
Knowing partner STI status	346 (61.8)
Regular STI testing	210 (37.5)
PrEP/PEP	7 (1.3)
Managing existing STI	15 (2.7)
Other method	5 (0.9)
Frequency of Use (N=558)	
Always/Very frequently	348 (62.4)
Somewhat frequently	131 (23.5)
Somewhat infrequently	47 (8.4)
Never/Very infrequently	32 (5.7)

Note: Participants could choose multiple STI prevention methods so the percentage total is over 100%.

Table 5. Chi-Square Results for Commonly Selected STI Prevention Methods and Demographic Characteristics Among Participants Who Selected At Least One Method (N=560)

	External Condom				Knowing Partner STI Status				Regular STI Testing			
	Yes n(%)	No n(%)	X^2	Cramer's V	Yes n(%)	No n(%)	X^2	Cramer's V	Yes n(%)	No n(%)	X^2	Cramer's V
Gender Identity			6.503*	.108			3.706	.082			20.050***	.190
Man	109 (85.8)	18 (14.2)			71 (55.9)	56 (44.1)			27 (21.3)	100 (78.7)		
Woman	297 (80.3)	73 (19.7)			232 (62.7)	138 (37.3)			151 (40.8)	219 (59.2)		
Gender Expansive	42 (70.0)	18 (30.0)			42 (70.0)	18 (30.0)			30 (50.0)	30 (50.0)		
Sexual Orientation			16.647***	.172			9.151*	.128			12.065**	.147
Heterosexual	240 (80.3)	59 (19.7)			170 (56.9)	129 (43.1)			93 (31.1)	206 (68.9)		
Bisexual	136 (88.9)	17 (11.1)			97 (63.4)	56 (36.6)			65 (42.5)	88 (57.5)		
LGQ+	74 (68.5)	34 (31.5)			79 (73.1)	29 (26.9)			52 (48.1)	56 (51.9)		
Relationship Status			.779	.037			2.966	.073			.275	.022
Single	242 (81.8)	54 (18.2)			173 (58.4)	123 (41.6)			114 (38.5)	182 (61.5)		
Relationship	208 (78.8)	56 (21.2)			173 (65.5)	91 (34.5)			96 (36.4)	168 (63.6)		

Note: With Bonferroni correction, $\alpha = .05/9 = .006$. *$p < .05$, **$p < .01$, ***$p < .001$.

Table 6. Pregnancy Desire and Post-Pregnancy Decision of Participants Who Reported Engaging in Behaviors that Could Result in Pregnancy

	n (%)
Current Pregnancy Desire (N=553)	
Don't want to be pregnant	542 (98.0)
Indifferent	5 (0.9)
Want to be pregnant	0 (0)
Unsure about pregnancy desire at this time	6 (1.1)
Current Post-Pregnancy Decision (N=552)	
Want to terminate in event of pregnancy	285 (51.6)
Lean terminate in event of pregnancy	122 (22.1)
Unsure/Explore options in event of pregnancy	104 (18.8)
Lean keep in event of pregnancy	22 (4.0)
Want to keep in event of pregnancy	19 (3.4)

Note: Participants responded based on their own pregnancy capability or that of their pregnancy-capable partner.

Table 7. Pregnancy Prevention Method Choice and Frequency of Use Among Participants Who Reported Engaging in Behaviors that Could Result in Pregnancy

	n (%)
Method (N=552)	
External condom	369 (66.8)
Internal condom	10 (1.8)
The pill	226 (40.9)
Other hormonal method	116 (21.0)
IUD	144 (26.1)
Withdrawal	219 (39.7)
EC pill	102 (18.5)
Fertility awareness method	44 (8.0)
Other method	10 (1.8)
Frequency of Use (N=551)	
Always/Very frequently	487 (88.4)
Somewhat frequently	51 (9.3)
Somewhat infrequently	7 (1.3)
Never/Very infrequently	6 (1.1)

Note: Participants could choose multiple pregnancy prevention methods so the percentage total is over 100%.

Table 8. Chi-Square Results for Commonly Selected Pregnancy Prevention Methods and Demographic Characteristics Among Participants Who Selected At Least One Method (N=552)

	External Condom				Birth Control Pill				Withdrawal			
	Yes n(%)	No n(%)	X^2	Cramer's V	Yes n(%)	No n(%)	X^2	Cramer's V	Yes n(%)	No n(%)	X^2	Cramer's V
Gender Identity			10.472**	.138			11.694**	.146			2.682	.070
Man	91 (72.2)	35 (27.8)			66 (52.4)	60 (47.6)			51 (40.5)	75 (59.5)		
Woman	245 (63.1)	143 (36.9)			151 (38.9)	237 (61.1)			158 (40.7)	230 (59.3)		
Gender Expansive	32 (86.5)	5 (13.5)			9 (24.3)	28 (75.7)			10 (27.0)	27 (73.0)		
Sexual Orientation			12.998**	.153			9.086*	.128			7.156*	.114
Heterosexual	198 (60.9)	127 (39.1)			148 (45.5)	177 (54.5)			144 (44.3)	181 (55.7)		
Bisexual	116 (73.9)	41 (26.1)			59 (37.6)	98 (62.4)			51 (32.5)	106 (67.5)		
LGQ+	55 (78.6)	15 (21.4)			19 (27.1)	51 (72.9)			24 (34.3)	46 (65.7)		
Relationship Status			53.899***	.312			.453	.029			.716	.036
Single	200 (83.7)	39 (16.3)			94 (39.3)	145 (60.7)			90 (37.7)	149 (62.3)		
Relationship	169 (54.0)	144 (46.0)			132 (42.2)	181 (57.8)			129 (41.2)	184 (58.8)		

Note: With Bonferroni correction, $\alpha = .05/9 = .006$. *$p < .05$, **$p < .01$, ***$p < .001$