



Sex and Relationships Pre- and Early- COVID-19 Pandemic: Findings from a Probability Sample of U.S. Undergraduate Students

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Abstract

In the wake of the COVID-19 pandemic, most U.S. colleges closed their campuses—including residence halls—causing significant disruption to students' lives. Two waves of data were collected from undergraduate students enrolled at a large U.S. Midwestern university: Wave 1 was a confidential online survey of 4989 randomly sampled undergraduate students collected in January/February 2020; Wave 2 was collected in April/May 2020 following campus closure. Our research aimed to: (1) assess how the COVID-19 related campus closure affected college students' romantic/sexual relationships, (2) examine students' past month sexual behaviors prior to the pandemic in comparison with their sexual behaviors during campus closure, and (3) compare participants' pre-pandemic event-level sexual behaviors with those occurring during campus closure. Of 2137 participants who completed both waves (49.8% women, mean age = 20.9), 2.6% were living at home in Wave 1 compared to 71.0% at Wave 2. Of those in relationships, 14.5% experienced a breakup and 25.3% stayed in their relationship but returned home to different cities. There were no statistically significant differences in participants' prior month reports of solo masturbation or sending/receiving nude/sexy images between Waves 1 and 2; however, participation in oral, vaginal, and anal sex significantly decreased across waves. Examining participants' most recent sexual events, Wave 2 sex more often occurred with a cohabiting or relationship partner and was rated as more wanted, emotionally intimate, and orgasmic. Implications for sexual health professionals are discussed.

Keywords Coronavirus · COVID-19 · College students · Sexual behavior · Relationships · Living arrangements

Introduction

In late 2019 and early 2020, as the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) spread globally, daily life—as many people knew it—changed enormously. To mitigate infection and corresponding illness and loss of life, many countries ordered non-essential businesses to close, schools to move online or to close, and issued stay-at-home orders (e.g., lockdown, shelter in place) and physical distancing guidance (Crawford et al., 2020; World Health Organization, 2020). On March 11, 2020, the World Health Organization declared the SARS-CoV-2 outbreak to be a global pandemic (World Health Organization, 2020). By March 26, 2020 at least 1,102 U.S. colleges and universities closed their campuses and moved classes online, affecting 14 million college students (e.g., Hess, 2020; McGee, 2020). As of April 3, 2020, about half of the global human population was estimated to be in lockdown (Sandford, 2020). By April 7, 2020 most U.S. states were under stay-at-home orders (Mervosh et al., 2020).

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With businesses closed, schools closed or moved online, and an estimated 3.9 billion people worldwide being asked or ordered to stay home, journalists and researchers alike began to speculate about how the COVID-19 pandemic might affect people's intimate relationships and sexual behaviors (e.g., Gunter, 2020; Nagendra et al., 2020; Ryckaert, 2020). Many studies examined adolescents' and adults' romantic and sexual experiences. However, with few exceptions of longitudinal research that had begun pre-pandemic (e.g., Linnemayr et al., 2020), most studies used online cross-sectional convenience surveys, with participants frequently recruited through social media (e.g., Gouvernet & Bonierbale, 2020; Li et al., 2020; Nelson et al., 2020; Panzeri et al., 2020; Platero & Lopez-Saez, 2020; Ruprecht et al., 2020; Schiavi et al., 2020). Though limited in their generalizability, these studies provided timely insights on dyadic quality, cognitions during intercourse, sexual function, physical distancing behaviors, sexual behavior changes, quality of life, and health disparities related to sexual identity, gender, and race/ethnicity, shedding light on intimacy during a time of upheaval.

The 2020 National Survey of Sexual and Reproductive Health during COVID-19 (NSRHC) also examined romantic relationships and sexual behavior but used a U.S. nationally representative probability survey of adults, conducted in April 2020 when most of the USA was under stay-at-home orders. The NSRHC has provided unique insights into how the pandemic exacerbated loneliness and depressive symptoms, affected romantic relationship conflict, was associated with both stability and change in partnered sexual behaviors, as well as how individuals were connecting for affection and sexual expression during stay-at-home guidance (Hensel et al., 2020; Luetke et al., 2020; Rosenberg et al., 2021). However, like most studies of sex and relationships during the pandemic, the NSRHC focused on adults in the U.S. general population.

Here, we focus on understanding the impact of the COVID-19 pandemic and campus closure on college students' romantic relationships and sexual lives. The abrupt shift by colleges to primarily virtual learning and closure of residence halls during Spring 2020 created significant strain for many college students (Liu et al., 2020). In the USA, residential college campuses are where students attend classes, eat meals, exercise, receive healthcare, hang out with friends, and meet potential partners. Thus, when campuses closed, students' lives were directly and substantially impacted. Researchers have examined how those disruptions have affected college students' mental health (Adenubi et al., 2020; Cohen et al., 2020; Ding et al., 2020; Hamza et al., 2021; Ji et al., 2020; Tang et al., 2020). Less attention has been paid to changes in college students' sexual and romantic lives.

In conducting this study, we considered that the COVID-19 pandemic likely had different impacts on college students' romantic and sexual lives than for non-college attending adults. After all, many adults across the life course, if partnered (and especially if cohabitating), may have spent *more time* with their partner(s) during stay-at-home orders. But for college students, the COVID-19

pandemic may have introduced an abrupt disruption—and even a dissolution—to their intimate relationships. Recommended efforts to mitigate the spread of SARS-CoV-2 (e.g., distancing, staying home, limiting gatherings) likely meant that students had fewer opportunities for partnered sex following campus closure. College students who did not have romantic or sexual partners as the COVID-19 pandemic was unfolding may have also experienced unwanted changes to their romantic and sexual lives. For example, college is often seen as an important time for romantic and sexual exploration (Arnett, 2015; Jamison & Sanner, 2021). As campus was closed and many students moved back to their hometowns, single students may have lost opportunities to meet potential romantic and sexual partners and engage in romantic activities like dating.

Because sex and romance among college students are still primarily studied using risk perspectives (Manning et al., 2014), and young adults are at disproportionately greater risk of unintended pregnancy and sexually transmitted infections (STI), some may view less sex by college students as an unintended benefit of the COVID-19 pandemic (Centers for Disease Control & Prevention, 2018; Finer & Zolna, 2016). However, sexual behavior is normative for college students (Vasilenko et al., 2015) and associated with positive aspects of students' well-being (Furman & Collibee, 2014; Vasilenko & Lefkowitz, 2018), with sexual pleasure supportive of overall sexual health (World Association for Sexual Health, 2019). Although the well-being benefits of sexual behavior are often thought to be limited to sex within committed relationships, researchers have noted that college students experience intimacy and support from casual sexual partnerships (Mongeau et al., 2013, 2019). Similarly, romantic relationships also provide college students with important sources of social support (Braithwaite et al., 2010; Umberson et al., 2010). Thus, to the extent that the pandemic decreases time spent with romantic partners and/or partnered sex, students may be missing important experiences that can support their well-being. It is also possible that having to leave campus allowed students in long-distance relationships to reunite with romantic or sexual partners. For those students, returning to be geographically close to their partner(s) may have facilitated greater physical closeness and intimacy.

As we had recently completed a survey of randomly sampled undergraduate students at our university during January/February 2020, when our university closed we returned to our survey participants to conduct a follow-up survey to understand how the students were doing during the pandemic. Thus, for the present study, we used data from two waves of the 2020 Campus Sexual Health Survey (CSHS), which was conducted at a large Midwestern U.S. university. Wave 1 was completed over three weeks during January and February 2020 and was described to students as being focused on sexual health, sexual behavior, and romantic/sexual relationships. The study invitation emphasized to students that we wished to hear from students of all ages, races/ethnicities, genders, and sexual identities, whether or not they had ever kissed anyone or engaged in any kind of partnered sex. As

SARS-CoV-2 spread across the USA, and the university moved its courses online and closed its on-campus residence halls (with rare exceptions for students who successfully petitioned to remain on campus, such as if they were from outside of the USA and could not travel home), we completed a second wave of data collection over three weeks during April and May 2020. Wave 2 of the CSHS focused on understanding how the COVID-19 pandemic and the university's campus closure had affected students' relationships and sexual behaviors.

Aims

Our research aimed to: (1) assess how the COVID-19 related campus closure affected college students' romantic/sexual relationships, (2) examine students' past month sexual behaviors prior to the pandemic in comparison with their sexual behaviors during campus closure, and (3) compare participants' pre-pandemic event-level sexual behaviors with those occurring during campus closure.

Method

Participants and Procedure

The institutional review board (IRB) at the authors' university reviewed and approved study protocols and measures. For Wave 1 of the 2020 CSHS, a list of half the undergraduate student body aged 18 and older ($n = 15,478$) was sent from campus administrators to the campus survey research center; this allowed our research team to collect data without having access to participants' identifiers. Survey center staff emailed invitations to 15,432 students (46 had no associated email address); these invitations provided information about the confidential online survey, its topic (sexual health, sexual behaviors, and relationships), and provided a link to learn more. Up to three email reminders were sent to students who had not yet completed the survey. Those who clicked on the link could read an IRB-approved Study Information Sheet, indicate their consent, and proceed with the survey. Participants could enter their email address to win one of 250 electronic gift cards (values of \$20, \$50, or \$100). Data were cross-sectional and collected over three weeks in January and February 2020; survey completion time took a median of 18 min. The American Association for Public Opinion Research (AAPOR) Response Rate 2 was 32.3% ($n = 4989$) and included partial and complete surveys; the complete response rate was 27.0% ($n = 4177$). Following data collection, survey center research staff developed statistical weights to correct for non-response and over/under-coverage; they used gender/sex, year in school (first year, second year, etc.), and student category (racial/ethnic categories and international student status; see Table 1) to reflect the campus student population and enhance representativeness.

For Wave 2 of the CSHS, the sampling frame consisted of the 4989 Wave 1 participants. Students received an initial email invitation to participate in the study as well as up to three follow-up email reminders. Again, participants could enter their email address for an opportunity to win one of 104 electronic gift cards (values of \$20 and \$100). The AAPOR Response Rate 2 was 42.8% ($n = 2137$), and the complete response rate was 39.1% ($n = 1952$). As with Wave 1, the survey research center staff created statistical weights to correct for under/over-coverage based on gender/sex, year in school, and student category.

Measures

Demographic Characteristics

The university provided several demographic characteristics including: class standing (first year, sophomore, junior, or senior), enrollment status (no credits, part time, less than half time, half time, three-quarter time and full time), and student category (White, Black/African American, Hispanic/Latino, American Indian/Alaska Native, Asian, two or more races, or international student). Our survey also asked students about their gender identity (man, woman, transgender woman, transgender man, gender non-binary/non-conforming or other), sexual identity (heterosexual or straight, gay or lesbian, bisexual, asexual and other), whether they had already been infected with SARS-CoV-2 and, if so, whether they had been hospitalized as a result.

Housing Characteristics

Pre-pandemic living location. In Wave 2, we asked, "Where were you living in February 2020, before Indiana University moved to online classes?" Response options were: on campus residence hall, in a fraternity or sorority house, off campus—with no roommates, off campus—with roommates, at home with family members, in a shelter, in my car, friend's house, other (describe). *Wave 2 living location.* We asked, "Where are you living now?" Response options were: currently living in the United States, off campus with no roommates, off campus with roommates, at home with family, in shelter, in car, friend's house or other. *Persons living with.* We asked, "Who is living with you right now?" Participants could select all that apply: mother, father, sibling(s), grandparent(s), aunt(s), uncle(s), cousin(s), roommate(s), romantic/sexual partner, friend(s), people you've only recently met, or other/describe. We also asked, "When Indiana University announced that they were closing on-campus housing, did you petition or file a request to stay in campus housing?" (yes/no). For those who answered yes, we asked their reason for petitioning to stay; response options were: I couldn't afford to travel back to where I am from, I don't get along well with my family, my family doesn't accept me, I don't feel safe in my family's home, I don't have a home to return to, travel was restricted to the country I would have been returning to, the place I am from had high rates

Table 1 Weighted baseline participant characteristics among those who contributed two waves of data ($N=2137$)

Characteristic	% (n)
<i>Gender identity (n = 1889)</i>	
Man	47.6 (899)
Woman	49.8 (937)
Transgender woman	0.6 (12)
Transgender man	0.4 (8)
Gender non-binary/non-conforming	1.1 (22)
Prefer to describe	0.5 (11)
<i>Sexual identity (n = 1883)</i>	
Heterosexual or straight	77.2 (1454)
Gay or lesbian	5.9 (111)
Bisexual	13.5 (254)
Asexual	1.0 (19)
Other	2.4 (45)
<i>Class standing (n = 2137)</i>	
First year	16.0 (342)
Sophomore	24.5 (524)
Junior	23.7 (507)
Senior	35.7 (764)
<i>Enrollment Status (n = 2137)</i>	
Part time	0.1 (6)
Less than half-time	0.1 (3)
Half time	1.0 (21)
Three-quarter time	1.9 (40)
Full time	96.6 (2065)
No unit load	0.1 (2)
<i>Student category (n = 2137)</i>	
White	69.1 (1477)
Black/African American	4.3 (93)
Hispanic/Latino	7.1 (152)
American Indian/Alaska Native	0.01 (1)
Asian	6.6 (140)
Two or more races	4.6 (98)
International student	7.6 (163)
Currently living in United States (yes) (n = 2043)	97.2 (1986)
<i>Overall happiness level with partner (n = 1156)</i>	
Very unhappy	2.5 (29)
Fairly happy	1.9 (22)
A little unhappy	6.7 (77)
Happy	17.6 (203)
Very happy	19.7 (228)
Extremely happy	33.8 (391)
Perfect	17.8 (206)
<i>Sexual Attraction to partner (n = 1091)</i>	
A lot	826 (75.6)
Some	234 (21.4)
A little	26 (2.4)
Not at all	7 (0.4)
<i>How safe do you feel where you are currently living? (n = 2114)</i>	
Very unsafe	0.3 (5)
Somewhat unsafe	1.8 (38)
Somewhat safe	18.2 (385)

Table 1 (continued)

Characteristic	% (n)
Very safe	79.7 (1685)
<i>How cared for do you feel where you are currently living (n=2114)</i>	
Very uncared for	1.1 (2)
Somewhat uncared for	4.5 (96)
Somewhat cared for	19.4 (410)
Very cared for	75.0 (1583)
<i>Time 2—Current living location (n=2119)</i>	
On campus, residence hall	1.8 (38)
In a fraternity or sorority house	0 (0.0)
Off campus, with no roommates	6.8 (144)
Off campus, with roommates	17.2 (364)
At home with family members	71.0 (1505)
In a shelter	0 (0.0)
In my car	<.01% (1)
Friend's house	0.7 (15)
Other	2.5 (52)
<i>Time 2 household members (n=2006)</i>	
Mother	68.5 (1373)
Father	59.7 (119)
Sibling(s)	52.7 (1056)
Grandparent(s)	3.9 (78)
Aunt(s)	1.2 (23)
Uncle(s)	1.4 (28)
Cousin(s)	2.0 (40)
Roommate(s)	13.7 (275)
Romantic/sexual partner	11.7 (234)
Friend(s)	5.0 (101)
People you've only recently met	0.6 (13)
Other	7.9 (158)
<i>Relationship status when school moved online (n=2134)</i>	
In a serious/committed relationship	42.8 (912)
Dating one or more people	5.0 (107)
Hooking up or doing friends with benefits with 1 + people	20.3 (431)
Single and not dating/hooking up with anyone	33.6 (718)

of SARS-CoV-2, and other/describe. Additionally, at Wave 2 we asked participants to what extent they felt safe (very unsafe, somewhat unsafe, somewhat safe, very safe) and cared for where they were living (very uncared for, somewhat uncared for, somewhat cared for, very cared for).

Relationship Status Prior to Campus Closure

We asked “Before Indiana University moved to online classes, were you dating, hooking up, or in a relationship with someone?” Participants could select all that apply: Yes, I was in a serious/committed relationship; yes, I was dating one or more people; yes, I was hooking up or doing friends with benefits with one or more people; no, I was single and not dating/hooking up with anyone.

Impact on Relationship of Campus Closure

(Aim 1) We asked, “When Indiana University moved its classes online and asked students to return home, how did this affect your relationship?” Participants could select all that apply: we stayed together and remained in Bloomington, we stayed together but went home to separate cities, we stayed together and returned to the same city together, away from Bloomington, we broke up, no effect because we were already long distance and we stayed long distance and other/describe.

Past Month Solo and Partnered Sexual Behavior

(Aim 2) behaviors that we assessed were solo masturbation, partnered masturbation, any oral sex, any vaginal sex, any

anal sex, and sending/receiving nude or sexy images with someone. All items were originally measured as six-point categorical items (“In the past month, how often did you do [X]?”—not at all, once, a few times, once a week, 2–3 times a week and almost every day) that we dichotomized for analysis (not in the past month/in the past month).

Recent Sexual Event Characteristics

(Aim 3) were assessed using a series of items from an earlier survey conducted on the same campus (Herbenick et al., 2019). These included *solo and partnered sexual behaviors* (all no/yes): kissed, hugged or cuddled, mutual genital stimulation, received oral sex, gave oral sex, vaginal sex, any anal sex and condom use (with report of vaginal and/or anal sex). We also assessed whether a participant had an *orgasm* (one, more than one, no and not sure). *Emotional intimacy* was a single four-point item (not at all emotionally intimate to very emotionally intimate) and *event wantedness* was a five point item (I wanted this sexual experience very much, I wanted this sexual experience moderately, I wanted this sexual experience very much, I didn't want to have sex, but agreed/said yes anyways and I don't know if I wanted this experience; I was too drunk/high to know what was happening). We also examined *partner type* (someone you live with [spouse, boyfriend/girlfriend, or friend], someone you are in a relationship with or dating, but don't live with, an acquaintance or friend, but you don't live together, someone you didn't know or just met, someone you paid, or someone who paid you, for sex or other).

Statistical Analysis

We used descriptive statistics to understand the prevalence of key outcome variables by time period. Fisher's Exact (for 2×2 tables) and chi-square (for larger than 2×2 tables) were used to evaluate differences in these outcomes pre- and post-COVID. For Aim 3, we restricted analyses to those reporting on a recent sexual event that occurred in the prior month; for Wave 2 participants, these were all during the period of campus closure. All analyses were conducted in SPSS, version 25 (IBM Corporation, Armonk, NY). We conducted Aims 2 and 3 for the full sample, as well as stratified by participant type: unpartnered, partnered and not living with/not living close by, and partnered and living with/living close by.

Results

Participant Characteristics

As shown in Table 1, less than half the sample identified as men (47.6%) or women (49.8%), and their mean age was 20.9 (SD = 1.9, M = 20; range = 18–57). About 77% self-identified as

heterosexual, and most participants were white (69.1%). Nearly all (96.6%) were enrolled full time and they were distributed about evenly throughout all four undergraduate class standings. About 97% were living in the USA at the time of Wave 2 ($n = 1986$). In total, 0.8% of participants ($n = 17$) indicated that they had already been infected with SARS-CoV-2; none had been hospitalized.

At Wave 1, prior to campus closure, 34.6% of participants ($n = 738$) were living in an on-campus residence hall, 47.7% ($n = 1019$) were living off-campus with roommates, 7.2% ($n = 153$) off campus without roommates, 4.8% ($n = 102$) were living in a Greek house (fraternity or sorority), 2.6% ($n = 56$) had been living at home with family, and 3.1% ($n = 66$) in another housing situation. Of those who indicated “other,” most had been living abroad ($n = 36$) or living in a university owned apartment ($n = 22$).

As shown in Table 1, at Wave 2 (following campus closure), the most common living situation was at home with family members (71.0%); fewer were living off campus with roommates (17.2%). About 8% ($n = 65$) of participants had filed a request with the university to stay in campus housing even after campus closure. Their reasons included because travel was restricted to the country they would have been returning home to (58.4%, $n = 36$), they could not afford to travel home (20.7%, $n = 13$), they didn't get along well with their family (15.3%, $n = 9$), the place they are from had high rates of SARS-CoV-2 (12.8%, $n = 8$), they didn't have a home to return to (8.6%, $n = 5$), they didn't feel safe at their family's home (6.2%, $n = 4$), and their family didn't accept them (3.2%, $n = 2$). Additionally, students wrote in reasons including that they were in quarantine, they had a home to return to but not a room, and they did not have internet access at home. For 86.2% ($n = 53$) of these students, the university approved their request to remain in campus housing.

Most students reported living with their parent(s) (mother: 68.5%; father: 59.7%) and/or siblings (52.7%), or with roommates (13.7%). About one in ten students were living with their romantic/sexual partner. About half of students reported being in a committed relationship at the time that campus closed; 20% had been hooking up with one or more people. A third of students were not romantically/sexually involved with anyone.

Aim 1: Effect on Participants' Living Situation and Romantic/Sexual Relationships

Our first aim was to understand the impact that moving classes online had on college students' romantic/sexual relationships. Of students who reported having been in a romantic/sexual relationship when the campus closed ($N = 1703$; see Table 2), 25.3% ($n = 353$) reported that they stayed in their relationship but returned home to separate cities, 17.2% ($n = 241$) stayed together in the university's city, 14.5% ($n = 203$) stayed long-distance, and 7.8% stayed in their relationship and returned to the same city together, though away from the Bloomington. Fewer students, 14.5% ($n = 203$) reported they broke up with their partners.

Table 2 Participants' reports of the impact of campus closure on their romantic/sexual relationships (n = 1703)

	% (n)
We stayed together and remained in Bloomington	17.2 (241)
We stayed together but went home to separate cities	25.3 (353)
We stayed together and returned to the same city together, away from Bloomington	7.8 (250)
We broke up	14.5 (203)
No effect because we were already long distance and we stayed long distance	13.9 (195)
Other	16.9 (235)

Finally, about 16.0% described some other impact on their relationship (e.g., they were in a friends with benefits situation and therefore didn't actually "break up," even though they were no longer together).

Aim 2: Comparison of Participants' Sexual Behaviors Across Time Periods

Our second study aim was to compare the prevalence of past month solo and partnered sexual behaviors across the two study waves. As shown in Table 3, for the full sample, only solo masturbation did not change between Wave 1 and Wave 2 (75.1% Wave 1 vs. 77.2%, $p = .205$). The prevalence of partnered masturbation (46.5% vs. 21.9%), giving or receiving oral sex (52.2% vs. 30.7%), vaginal sex (53.4% vs. 29.0%), anal sex (7.5% vs. 4.6%) and sending/receiving a sexy or nude picture (37.5% vs. 40.2%) significantly *decreased* from Wave 1 to Wave 2 (all $p < .01$). For students who were unpartnered, solo masturbation remained stable (75.2% vs. 75.0%, $p = .396$), while partnered masturbation (29.5% vs. 14.6%), oral sex (34.1% vs. 19.3%), and vaginal sex (34.5% vs. 19.5%) were all less prevalent (all $p < .001$). However, anal sex (4.1% vs. 8.1%) and sexting (29.6% vs. 32.2%) were more prevalent at wave 2 ($p < .010$). For students who had a partner, but did not live close to or with them, solo masturbation (75.2% vs. 75.1%, $p = 1.000$) and anal sex (11.0% vs. 9.5%, $p = .115$) were stable across the two waves. Among the other sexual behaviors, partnered masturbation (63.4% vs. 25.8%), oral sex (69.5% vs. 32.9%), and vaginal sex (69.8% vs. 29.8%) were less common among these students. Sexting, however, increased in prevalence (49.4% vs. 61.0%) for students with a geographically distant partner. Finally, among students with a partner who lived close to, or with, them prevalence of vaginal sex was stable (83.0% vs. 78.9%, $p = .066$) while solo masturbation (74.2% vs. 66.8%), partnered masturbation (71.3% vs. 55.9%), oral sex (79.8% vs. 77.5%), anal sex (13.9% vs. 15.0%), and sexting (46.1% vs. 38.7%) became less prevalent.

Table 3 Participants' reports of any solo or partnered sexual behaviors in the past month, pre- and post-COVID-19 pandemic by partner and cohabitation status

	Full Sample (n = 2137)			Unpartnered (n = 1129)			Partnered, but not living close by or with partner (n = 470)			Partnered and living close by or with partner (n = 407)		
	W1 (%)	W2 (%)	p^a	W1 (%)	W2 (%)	p^a	W1 (%)	W2 (%)	p^a	W1 (%)	W2 (%)	p^a
Solo masturbation	75.1	77.2	.205	75.2	75.0	.396	75.2	75.1	1.00	74.2	66.8	<.001
Partnered masturbation	46.5	21.9	<.001	29.5	14.6	<.001	63.4	25.8	<.001	71.3	55.9	<.001
Gave and/or received oral sex	52.2	30.7	<.001	34.1	19.3	<.001	69.5	32.9	<.001	79.8	77.5	.024
Vaginal sex	53.4	29.0	.006	34.5	19.5	<.001	69.8	29.8	.014	83.0	78.9	.066
Insertive and/or receptive anal sex	7.5	4.6	<.001	4.1	8.1	.010	11.0	9.5	.115	13.9	15.0	.043
Sent/received a sexy or nude picture	37.5	40.2	<.001	29.6	32.2	<.001	49.4	61.0	<.001	46.1	38.7	.049

W1 = Wave 1, pre-Covid-19 Pandemic; W2 = Wave 2, post-COVID-19 Pandemic; ^aFisher's Exact p -value

Aim 3: Characteristics of Participants' Most Recent Partnered Sexual Experience in the Past Month

Our third aim was to compare the characteristics of students' most recent partnered sexual experiences, that had occurred with the last month, across the two waves. About twice as many students reported a partnered sexual event in the past month at Wave 1 (62.5%; $n = 1242$) than at Wave 2 (38.2%; $n = 761$) ($p < .001$). Supplemental analyses suggested that reporting different recent sex behaviors post-COVID was more common among those in committed relationships (e.g., dating/in relationship with one person or engaged/married) than those not in a relationship (90.1% vs. 42.2%; $p < .001$), those who were living off campus (72.9%–73.7%) than those living elsewhere (52.5%–65.5%; $p < .001$) and among female students (64.4%) as compared to male students (59.5%; $p < .001$) (data not shown).

As shown in Table 4, hugging/cuddling (83.3% vs. 87.1%; $p < .001$), receiving oral sex (51.1% vs. 64.6%; $p < .001$), giving oral sex (53.9% vs. 57.8%; $p < .001$), and vaginal sex (74.4% vs. 80.9%; $p < .001$) were all significantly *more common* during Wave 2 as compared to Wave 1. That pattern was the same regardless of partnership status and proximity. There were no significant differences in the proportion of participants who indicated they had kissed (96.2% vs. 96.4%) or had anal sex at their most recent sexual event (4.0% vs. 5.1%). These patterns held across partnership status and proximity. Manual-genital stimulation was significantly *less common* (83.3% vs. 63.6%; $p < .001$) in Wave 2. For the full sample, fewer participants reported that they used a condom during vaginal and/or anal sex (37.5% in Wave 2 vs. 46.4% in Wave 1; $p = .013$). However, among students with a partner who was not geographically close, condom use increased (57.4% vs. 64.8%, $p = .05$). For unpartnered students and those with a partner who lived geographically close, condom use was similar at both waves. Having experienced one or more orgasms during the partnered sexual experiences did not significantly differ between Wave 1 and Wave 2, and this was the same regardless of partnership status and proximity. In terms of subjective ratings, participants generally rated sex as more emotionally intimate and more wanted (both $p < .001$) at Wave 2 as compared with their experiences at Wave 1; these patterns were the same for unpartnered students, students with a partner who was not geographically close, and students with a geographically close partner. Finally, we examined who students' sexual partners were (see Table 4). For the full sample and all three subgroups, sexual experiences at Wave 2 were more likely to have occurred with someone they were living with. Except for students with a partner who was not geographically close, non-cohabiting relationship partners were less common partners at Wave 2. Further, students (both the full sample and each subgroup) were less likely to say their sexual partner had been someone they had just met, someone they paid (or paid them) for sex, or select other to describe their partner at Wave 2.

Discussion

The present research examined college students' intimate relationships and sexual behaviors at two time points—before SARS-CoV-2 had significantly impacted daily life in the USA (Wave 1) and in April 2020, which was the first month after campus closure when most of the country was under stay-at-home orders (Wave 2). As these students' campus closed, many found themselves living with family members (2.6% at Wave 1 vs. 71.0% at Wave 2). Returning home may have led to a loss of privacy and autonomy students enjoyed on campus (Cohen et al., 2020; Nagata, 2020). Our results illustrate how students' romantic and sexual lives were disrupted (and ways in which they were not) during the early phase of the COVID-19 pandemic. Key among the potential disruptions is proximity to romantic and sexual partners as well as the potential for instability in those partnerships. Although most students who had a partnership before their university closed were still with their partners at Wave 2, about 25% of students experienced their partnerships becoming long-distance while another 14.5% reported they and their partners had broken up. The potential changes in proximity to partners can also be seen in the changes in past-month partnered sexual behaviors. Overall, fewer students had engaged in partnered sex during the past month in Wave 2 than in Wave 1. The exception to this was that sexting appears to have become more common for all students except those with a geographically close partner. Finally, we also observed important differences in the characteristics of students' most recent, past month partnered sexual experiences. In general, these experiences appeared to be more emotionally intimate and wanted during Wave 2 and to be occurring with partners with whom they were living.

Unlike many partnered adults (who are more likely to be married or cohabiting) who may have found themselves spending more time together during the pandemic, many college students may have found that the pandemic created distance from their partners. This was most pronounced among approximately 25% of students whose partnerships became long-distance and the 14.5% of college students who broke up with their partners. For the students who found themselves in long-distance relationships, absent the pandemic, they would have been physically around one another for about another six weeks until the end of the semester. Even among students who remained geographically close to their partners, the reality of stay-at-home orders, travel restrictions, and choices many families made about limiting contact with non-household members likely translated into less in-person time with partners. Not being able to spend time with partners may have meant they were missing out on important sources of support as they were trying to navigate stress and anxiety brought on by the pandemic. Breaking up represents another way that students experienced disruptions in their romantic and sexual partnerships. Although the prevalence of breaking up was lower among these students than in other samples of college students (e.g., Liang &

Table 4 Characteristics of most recent partnered sexual experience, within the past 30-days, pre- and post-COVID-19 pandemic by partner and cohabitation status

	Full Sample		Unpartnered		Partnered, but not living close by or with partner		Partnered and living close by or with partner	
	W1 (n = 1242)	W2 (n = 761)	W1 (n = 472)	W2 (n = 196)	W1 (n = 407)	W2 (n = 188)	W1 (n = 337)	W2 (n = 367)
<i>Sexual behaviors</i>								
Kissed	96.2%	96.4%	95.0%	93.8%	96.1%	97.3%	97.4%	97.3%
Hugged or cuddled	83.3%	87.1%	75.9%	81.9%	89.1%	92.1%	86.5%	86.9%
Mutual genital stimulation	83.8%	63.6%	80.9%	59.6%	81.6%	59.6%	88.7%	67.3%
Received oral sex	51.1%	64.6%	51.9%	66.8%	50.4%	71.1%	50.9%	59.7%
Gave oral sex	53.9%	57.8%	55.9%	59.1%	52.6%	69.8%	52.7%	50.7%
Vaginal sex	74.4%	80.9%	68.6%	76.6%	72.5%	78.1%	82.0%	84.3%
Insertive and/or receptive anal sex	4.0%	5.1%	3.9%	6.1%	2.2%	3.4%	4.7%	5.5%
Used a condom	46.4%	37.5%	47.3%	60.2%	57.4%	64.8%	63.6%	63.3%
Had orgasm								
Yes, one orgasm	44.7%	29.2%	33.6%	40.0%	44.7%	48.1%	56.2%	68.4%
Yes, more than one orgasm	17.2%	11.0%	16.0%	22.1%	16.6%	23.8%	19.1%	11.9%
No	35.1%	56.2%	47.4%	34.1%	34.7%	24.2%	22.3%	18.0%
Not sure	3.0%	3.7%	3.0%	3.8%	3.9%	3.3%	2.4%	2.0%
Emotional intimacy								
Not at all emotionally intimate	10.1%	5.7%	22.2%	20.6%	3.5%	0.4%	1.7%	0.7%
A little emotionally intimate	18.2%	11.3%	38.2%	30.0%	7.5%	2.5%	5.3%	6.1%
Somewhat emotionally intimate	25.2%	20.4%	23.0%	29.6%	25.0%	15.0%	28.0%	18.6%
Very emotionally intimate	46.5%	62.6%	16.8%	19.9%	64.0%	82.1%	65.0%	74.6%
Wantedness								
I wanted this sexual experience very much	66.5%	79.6%	50.1%	66.1%	73.5%	87.7%	79.2%	83.0%
I wanted this sexual experience moderately	26.1%	14.8%	35.5%	19.7%	23.7%	10.1%	17.3%	13.8%
I wanted this sexual experience a little bit	5.4%	4.5%	10.9%	11.4%	1.8%	1.5%	2.6%	2.6%
I didn't want to have sex, but agreed or said yes anyways	1.6%	0.8%	2.7%	2.7%	1.0%	0.7%	0.7%	0.3%
I don't know if I wanted this experience, I was too drunk or high to know what was happening	0.4%	0.1%	0.8%	0.7%	0.0%	0.0%	0.3%	0.4%
Who was your sexual partner?								
Someone you live with (e.g., a spouse, boyfriend or girlfriend, or a friend)	8.5%	27.1%	0.6%	5.1%	3.0%	5.3%	22.7%	43.9%
Someone you are in a relationship with or dating, but do not live with	70.4%	58.5%	48.3%	28.0%	93.0%	94.7%	76.0%	56.0%

Table 4 (continued)

	Full Sample		Unpartnered		Partnered, but not living close by or with partner		Partnered and living close by or with partner	
	W1 (n = 1242)	W2 (n = 761)	W1 (n = 472)	W2 (n = 196)	W1 (n = 407)	W2 (n = 188)	W1 (n = 337)	W2 (n = 367)
An acquaintance or friend, but you don't live together	11.6%	13.3%	27.8%	51.0%	1.9%	0.0%	1.1%	0.2%
Someone you didn't know or just met	8.5%	4.0%	20.9%	15.6%	1.9%	0.0%	0.3%	0.0%
Someone you paid, or someone who paid you, for sex	0.4%	0.1%	1.0%	0.3%	0.0%	0.0%	0.0%	0.0%
Other	0.6%	0.0%	1.3%	0.0%	0.2%	0.0%	0.0%	0.0%

W1 = Wave 1, pre-Covid-19 Pandemic; W2 = Wave 2, post-COVID-19 Pandemic^a Chi-square or McNemer's *p*-value

van Horn, 2020; Waterman et al., 2017), we were only assessing partnership stability over approximately one-month, whereas other studies have focused on break ups in the past year. We do not know why students decided to end their partnerships after their university closure. However, we speculate that the reality of geographic separation over an indefinite period of time may have led some students to see this was an appropriate time to end their relationships. Subsequent qualitative research might be, especially helpful for understanding how the ongoing pandemic influenced breaking up.

We examined participants' past month sexual behaviors as a way of understanding their overall sexual repertoire. What kinds of sex were students generally having pre-pandemic as compared with April 2020? We found that solo masturbation was stable over Waves 1 and 2, with about three-quarters of students indicating they had masturbated in the prior month. This finding underscores the role of masturbation in sexual health and repertoire, as a behavior that is both a complement to and yet unique from partnered sex. Indeed, solo masturbation is a form of sexual expression that is available to people regardless of their partnership status and even in a global pandemic when they may be isolated from potential sexual partners.

Additionally, we found that each of the in-person partnered sexual behaviors we assessed (i.e., partnered masturbation, oral sex, vaginal sex, and anal sex) had decreased in prevalence from Wave 1 to Wave 2. Although we did not ask participants to provide reasons for any changes in their sexual behavior, there are several possible explanations for these decreases. Some portion of the decreases in partnered sex can likely be attributed to not having partners available, such as due to a breakup or moving home to separate, geographically distant locations. Given that Wave 2 was conducted when most of the U.S. was under stay-at-home orders, decreases in partnered sex also likely reflect that—even those students who were geographically close—may have chosen, or been urged by their parents, to avoid being in close contact with one another or to enter one another's home where they could have privacy for partnered sex. A decrease in opportunities for in-person partnered sex may also explain why sexting increased among unpartnered students and those with a partner that was geographically distant.

In terms of students' most recent sexual events, we found that significantly fewer students at Wave 2 reported having had any kind of partnered sex in the prior month. For those participants who had had partnered sex, Wave 2 sex more often occurred with a relationship partner rather than acquaintances, friends, or someone they'd just met. These most recent sexual events from the prior month were rated as significantly more wanted, emotionally intimate, and were more often orgasmic. These findings resonate with earlier research conducted with college students that found that sexual orgasm and enjoyment were more consistently present in relational contexts as compared to hookups (Armstrong et al., 2012). For the full sample, fewer students reported condom use at Wave 2 (37.5%) than Wave 1 (46.4%), which may reflect

differential access or it may reflect less interest in using condoms given that Wave 2 sex was rated as significantly more wanted and emotionally intimate. Though we did not assess trust between partners at either time point, it is also possible that Wave 2 partners had higher levels of trust between one another or felt that trust was strengthened in light of the pandemic and their choice to be in close, physical contact with one another. Although there were no significant differences in kissing between waves, and mutual genital stimulation was less prevalent in Wave 2, oral and vaginal sex were more common in participants' Wave 2 sex as compared with their sex at Wave 1; this was true for students who were partnered as well as those who were not partnered.

Strengths and Limitations

The present research was subject to several strengths and limitations. Among our strengths, Wave 1 participants were randomly sampled from the undergraduate study body and our response rate was substantially higher than many college surveys, including at our own university. Also, our study fills a unique gap by being able to examine changes in relationships and sexual behavior among the same participants at two time points. We were fortunate to have surveyed college students from our university shortly before the COVID-19 pandemic affected daily life in the USA and then to be able to return to survey them again during a time when they would have otherwise (had it not been for the pandemic) been on campus and meeting through in person classes. Additionally, although online data collection is a strength in that it can facilitate the reporting of sensitive behaviors, including sexual behaviors, a limitation of Wave 2 data collection is that some students may have lost, or had more limited, access to the Internet after campus closure. Indeed, differential access to Internet connectivity (or to fast or reliable Internet connectivity), will have affected a great deal of research conducted during the COVID-19 pandemic, whether to recruit participants or for data collection. In order to minimize participant burden, we did not ask all of the questions we would have wanted to, our survey would have benefitted from the inclusion of various mental health measures, and we relied mostly on quantitative items than open-items. This may have led to some degree of social desirability in participants' responses which was not assessed.

Implications

Findings from our research have implications for college sexual health educators and clinicians. We found that college students who were not partnered were less likely to use a condom in Wave 2 as compared to Wave 1, which may speak to the importance of condom availability (especially free condom availability) for college students, who may have been used to accessing condoms through their residence hall or campus health center prior to the pandemic. Additionally, if their family was avoiding in-person

visits to grocery stores or drug stores, some students may not have felt comfortable asking for condoms to be included in their family's grocery delivery. In the event that campus closures need to be repeated in a future pandemic or for other reasons (e.g., natural disasters), college health educators and clinicians might consider creative ways to get condoms to students such as through encouraging them to pick up a condom care package prior to leaving school, or offering to mail condoms to them. Additionally, given recent U.S. nationally representative survey findings from the NSHRC demonstrating greater depressive symptoms and loneliness among adults with less in-person affection and sexual expression during the pandemic, it would be beneficial for mental health counselors and college health educators to work together to direct students to counseling resources if needed, or to otherwise offer support. This may be particularly important given the proportion of participants who experienced at a breakup, and breakups can be associated with feelings of sadness, loss, loneliness, and depression—even when not in a global pandemic (e.g., Bronfman et al., 2016; O'Sullivan et al., 2019).

Conclusions

Findings demonstrate that college students' relationships and partnered sexual lives were subject to upheaval due to the COVID-19 pandemic and resulting campus closure. Approximately one-third of students lost regular in-person contact with partners due to either breaking up or moving away from their partners. Perhaps, due to being apart from partners, having broken up, and/or following social distancing guidelines, partnered sexual activity was less prevalent among these students. As romantic and sexual experiences can enhance students' well-being, the loss of those experiences may have contributed to declines in health and well-being during the COVID-19 pandemic.

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Data Availability If accepted for publication, a limited data set may be archived at Indiana University.

Declarations

Conflict of interest The study was supported through internal support from the first author's university. The authors declare that they have no conflict of interest. The research involved human subjects and, as noted in the manuscript, the institutional review board at the authors' university reviewed and approved study protocols and measures (Protocol 1912431788). Participants reviewed an IRB-approved Study Informa-

tion Sheet and indicated consent to participate prior to completing the survey.

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