

Young adult sexual health: current and prior sexual behaviours among non-Hispanic white US college students

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Abstract. *Background:* Less is known about the sexual health of young adults than about adolescents, despite 20 to 24-year-olds' greater risk of unintended pregnancy and sexually transmissible infections. This paper provides information on college students' prior and current sexual practices including oral sex, vaginal intercourse, anal intercourse and masturbation. *Methods:* We analysed data from a cross-sectional sexuality survey of students from two university campuses in the USA, one Mid-western and one South-western ($n = 1504$). The sample consisted of non-Hispanic white, never-married students who identified as heterosexual. *Results:* Of 16 possible combinations of four sexual activities (solitary masturbation, oral sex, vaginal intercourse and anal intercourse), only four contained more than 5% of respondents: masturbation, oral sex and vaginal intercourse (37%); oral sex and vaginal intercourse only (20%); all four (14%); and none (8%). Twenty percent had ever engaged in anal intercourse. Women were significantly less likely than men to have ever masturbated (48 v. 92%). Analyses exhibited several sexual health challenges, including lack of verbal sexual consent, alcohol use proximal to sex and lack of contraceptive use. *Conclusions:* Although few young adults are substituting it for vaginal intercourse, anal intercourse is increasingly common and safer sex efforts should encourage condom use during both sexual activities. Masturbation should be encouraged as an alternative to higher risk sexual practices and an essential aspect of sexual well being. Finally, practitioners should continue to address specific threats to college students' sexual health, including alcohol use and non-verbal consent.

Additional keywords: anal intercourse, college students, masturbation, oral sex, sexual practices, young adults.

Introduction

For decades, the sexual behaviours of young people have been of significant interest to researchers, policymakers and, not least, the general public. Surveillance studies have most consistently tracked the prevalence of vaginal intercourse over time, especially among adolescents. Among US high school students, the proportion reporting ever having had vaginal intercourse has decreased slightly in the past 15 years, from 54% in 1991 to 48% in 2007.¹ Despite small recent declines among teenagers, vaginal intercourse appears to be a strongly normative sexual experience among people in their early 20s. Data from the 2002 National Survey of Family Growth (NSFG), a nationally representative study of 15 to 44-year-olds, indicate that 87% of 20 to 24-year-olds have engaged in vaginal intercourse.²

Increasingly, research has explored non-coital activities such as oral sex³ and, most recently of all, anal intercourse. Young people may engage in these activities not only to experience pleasure but also to be sexually active while retaining their 'technical virginity'.^{4,5} Based on 2002 NSFG data, 55% of 15 to

19-year-olds and 83% of 20 to 24-year-olds have engaged in heterosexual oral sex.² Although anal intercourse is still far less ubiquitous, its prevalence within the USA sexual repertoire seems to be increasing.^{6–9} The 1994 University of Chicago study found that only 8% of 18 to 24-year-olds reported anal intercourse.¹⁰ By 2002, 11% of 15 to 19-year-olds and 32% of 20 to 24-year-olds reported the same.² Studies among college students more specifically have encountered similar reports, with anal intercourse prevalence ranging from 16%¹¹ to 32%.¹² Anal intercourse is associated with higher per-act probability of HIV transmission compared with vaginal intercourse,¹³ but evidence suggests that young people are less likely to use condoms during anal intercourse than vaginal intercourse.^{14,15}

Solitary masturbation is another sexual activity common to young people, but masturbation has been comparatively unexplored in the literature, undoubtedly due to a focus on negative sexual outcomes such as sexually transmissible infections (STIs) and unintended pregnancy.¹⁶ Despite a few exceptions,¹⁷ even less has been written about masturbation among young women,¹⁸ who are especially likely to struggle

with masturbation-related guilt.^{19,20} This lack of research attention is unfortunate, given masturbation's potential association with greater self-efficacy, enjoyment and self-care,²¹ or even its substitution for higher risk sexual practices.¹⁷ Based on the 1994 Chicago study, 29% of men aged 18–24 reported masturbating at least once a week, compared with 9% of women the same age.¹⁰ The Chicago investigators also found that this age group was more likely to feel guilty about masturbating than any other age group.

The studies cited above demonstrate a reasonably clear picture of the patterns and pervasiveness of these sexual activities individually: vaginal intercourse, oral sex, anal intercourse and masturbation. However, despite a recent analysis that differentiated between coital and non-coital activities,²² we know comparatively little about the ways in which these four sexual activities are most commonly clustered or concentrated among young people. Understanding the most common combinations could provide a better overall discernment of young people's sexual scripts and sexual well being. It could also supply information on how to better package our sexual health promotion and risk-reduction efforts and messages.

In one of the few studies to explore the overlap between various sexual activities, Lindberg *et al.* used 2002 NSFG data to explore the relationships between vaginal intercourse and 'non-coital behaviour' (anal intercourse and oral sex) among 15 to 19-year-olds.²³ The investigators found large differences in the rates of oral sex and anal intercourse according to whether adolescents had engaged in vaginal intercourse. Not only were vaginal intercourse and oral sex strongly associated with one another, but the likelihood of engaging in anal intercourse increased significantly with extended duration of time after first vaginal intercourse. The study found little evidence that adolescents were using oral sex or anal intercourse as a 'substitution' for vaginal intercourse as a way to retain technical virginity.⁴ Despite the comprehensiveness of this study, the analyses did not include masturbation, which can be an important aspect of overall sexual well being. Furthermore, few comparable studies have been conducted among older youth. In the study by Lindberg *et al.*, 1 in 10 young people aged 15–19 years reported having had anal intercourse. However, based on the literature cited above,^{6–9} the prevalence of anal intercourse, as well as vaginal intercourse and oral sex, are likely to increase as young people enter their 20s.

Indeed, most researchers and policymakers who monitor young people's sexual behaviour have focussed overwhelmingly on adolescents, but there are compelling reasons to concentrate on young adults. Although 'teenage pregnancy' dominates the policy landscape, 20 to 24-year-olds are significantly more likely to experience an unintended pregnancy than women aged 19 or younger.²⁴ STI rates are twice as common among 20 to 24-year-olds as 15 to 19-year-olds (7 v. 3%).² Stage-of-life influences on sexuality differ decidedly among young adults compared with adolescents; young adulthood ushers in far less adult supervision, often with a living situation removed from parent(s), factors that contribute to new sexual openness and possibilities for exploration.

College students face unique challenges in their pursuit of sexual health and enjoyment. They are more likely than their non-student counterparts (as well as more likely than adolescents) to have multiple sexual partners and use drugs and alcohol proximal to sexual activity.¹² Alcohol use during the college years is more common than during any other phase of life and alcohol use tends to be strongly associated with multiple or casual sex partners (although it is inconsistently associated with condom use).^{25,26}

This paper presents results from a study of 1504 college students, exploring which sexual activities tend to be most commonly clustered together among individual students. One of our objectives was to explore the degree to which college students may be engaging in oral and anal sex *instead* of vaginal sex as a way of retaining their technical virginity.⁴ We also sought to provide a more detailed look at masturbation and several other current and previous sexual practices (e.g. contraceptive use, sex under the influence of alcohol or drugs, sex with new or casual acquaintances and type of sexual consent) than those available in other studies of college students.^{26–28}

Methods

Procedures

Data originate from an anonymous questionnaire administered to students in October and November 1999 at two public universities in the USA: one in Texas and one in Wisconsin. These data derive from a larger study of sexual behaviour and attitudes among students at four universities;¹⁹ at two of these universities, certain questions on sexual behaviour were not asked, making their data unusable for this study. Human subjects protocols for the study were reviewed and approved by the Institutional Review Boards (IRBs) of all four universities. The remaining procedures relate only to the two universities (Texas and Wisconsin) on which this paper is based.

In the data collection process, the principal investigators at Wisconsin (Davidson) and Texas (Moore) obtained cooperation from a wide array of professors at their respective universities. During the class period devoted to the survey, students were informed by the investigators that they were conducting a study concerning the sexual attitudes and behaviours college students that had been approved by the IRB on their campus. Lower and upper division classes in general education, social sciences, business and family studies were used. During the class period devoted to the survey, using a script, the primary investigators explained the survey procedures for the study, assuring potential respondents that their participation was voluntary and anonymous. They were then given a cover letter, certifying IRB approval and a copy of the questionnaire. Students were instructed that if they did not wish to participate, they were to return the questionnaire uncompleted. After completion of questionnaire, which took ~45 min, it was deposited by the student into a ballot box at the front of the room before exiting. A research assistant monitored the return of the questionnaires. The response rate was 97.8% at Texas and 99.4% at Wisconsin. No incentives of any kind were offered for participation.

The questionnaire consisted of both open- and close-ended questions pertaining to demographic information, sexual history, contraceptive practices, STI history, sexual attitudes, sexual guilt and sexual satisfaction. Some questions requested that students write in their numeric answer – e.g. their age or number of sexual partners. Other questions asked students to circle the appropriate categorical response.

Sample

Altogether, 1971 students were surveyed: 897 at Texas and 1074 at Wisconsin. These exclusion and inclusion criteria created a final sample size of 1504 students, with 922 from Wisconsin (626 women, 296 men), and 582 from Texas (400 women, 182 men). The sex ratio was a function of the classes available in which to conduct the survey, including psychology, sociology and family studies courses, which have a disproportionate number of female students. Given our interest in premarital sexual activity in this analysis, the sample was limited to those students who had never been married (which excluded 166 married, divorced, separated or widowed students). Students were asked to indicate their ‘current sexual orientation’ and those who answered ‘bisexual’ or ‘gay/lesbian’ ($n=65$, or 2% of the sample) were also excluded. Due to the prohibitively few respondents from sexual minority populations, we decided to focus on those respondents who identified as heterosexual. Students older than age 23 ($n=257$) were also excluded, as were those who gave no response ($n=2$) or wrote ‘not applicable’ ($n=16$) to the question about class standing (freshman, sophomore, junior, senior). There was overlap between some of these cases; e.g. if a respondent was 24 and circled ‘not applicable’ under class standing, she or he would appear in two different exclusion categories.

Compared with non-Hispanic white students ($n=1504$), the sample contained exceedingly small numbers of black ($n=45$), Hispanic ($n=121$), Asian ($n=29$), American Indian ($n=5$) or multiracial ($n=10$) students to conduct separate analyses by gender and race/ethnicity. Moreover, both black and Hispanics students report substantially different rates of oral sex and anal intercourse than non-Hispanic white students.²⁵ Thus, the analyses were restricted to non-Hispanic white students only, which consisted of 1026 women and 478 men.

Statistical analyses

Given the strong and persistent effect of gender on sexual attitudes and practices, we stratified all analyses by gender in order to examine men’s and women’s results separately. Preliminary analyses indicated significant differences between the two locations for some of the sexuality variables, so subsequent analyses were stratified by school location as well. Young men and women at the two universities were compared with respect to sexual behaviours using χ^2 -tests, analysis of variance (ANOVA) and t -tests as appropriate.

Results

Descriptives

Table 1 displays several descriptive and socio-demographic characteristics of the sample. Respondents’ mean age was 20.0 years. Three-quarters of respondents (77%) lived with

both parents while growing up, 16% lived with their mother only, 11% lived with at least one stepparent and 2% lived with their father only. The majority of students were reared in either mainline Protestant (38%) or Catholic (37%) households, with 8% reporting a Baptist background, 8% reporting no religious background and 7% reporting a Fundamentalist background (less than 1% reported a non-Christian or Institutional Sect). About half of respondents (47%) reported that they were ‘about as religious’ as others, while 38% said they were less religious and 15% more religious.

Prevalence and combinations of solitary masturbation, oral sex, vaginal intercourse and anal intercourse

Eighty-three percent reported ever experiencing oral sex and 76% reported vaginal intercourse (Table 2). One in five students (20%) reported engaging in anal intercourse since age 14, a figure with almost no variation across gender or school. Approximately two-thirds of students had ever masturbated while alone (62%), although significantly fewer women (48%) than men (91%) had done so.

We created a 16-category ‘sexual activity matrix’ that grouped respondents by which combination of four sexual activities they had ever experienced: solitary masturbation, oral sex, vaginal intercourse and anal intercourse. Notably, only four categories contained greater than 5% of respondents. These categories were masturbation, oral sex, and vaginal intercourse only (37%); oral sex and vaginal intercourse only (20%); all four activities (14%); and none of these four activities (8%).

Less common but still relatively prevalent categories included the following: oral sex, anal intercourse, and vaginal intercourse only (5%); masturbation only (5%); oral sex only (4%); and oral sex and anal intercourse only (5%). Most of students who had engaged in anal intercourse had also had vaginal intercourse.

Although sexual activity groupings did not differ significantly by school, they differed by gender, mainly due to women’s lower prevalence of masturbation. More than 50% of men had engaged in vaginal intercourse, oral intercourse and masturbation but not anal intercourse, while the same was true of only 28% of women. Whereas approximately a quarter (27%) of women had only experienced oral sex and vaginal intercourse but not masturbation or anal intercourse, the same was true for only 4% of men. Men were slightly more likely to have experienced all four activities (18% of men v. 12% of women), whereas women were more likely to have experienced none of them (10% of women v. 2% of men).

Sexual behaviours among those who have already had intercourse

First vaginal intercourse

As Table 3 indicates, among those respondents who had experienced vaginal intercourse, a sizeable minority did not use contraception at first intercourse (25% total, but almost 40% of Texas men). Of those who did use contraception, condoms were the overwhelming method of choice: over 80% reported using condoms alone. Lack of contraceptive use at first vaginal intercourse may be explained in part by non-verbal consent and

Table 1. Descriptive characteristics, college students aged 18–23 years at two universities located in Wisconsin and Texas, USA (n = 1504)
 a, significant ($P < 0.05$) gender differences within location (e.g. Wisconsin women v. Wisconsin men); b, significant ($P < 0.05$) location differences within gender (e.g. Wisconsin women v. Texas women)

	Total	Wisconsin		Texas	
		Women (n = 625)	Men (n = 296)	Women (n = 400)	Men (n = 183)
I. Age characteristics		Mean	Mean	Mean	Mean
Age	20.0	19.9	20.5	19.9	20.1
Age at time of first date	14.7	14.9	14.5	14.8	14.2
Age at time of first vaginal intercourse experience	16.8	17.0	17.1	16.5	16.7
		%	%	%	%
II. Class standing		a,b	a,b	b	b
Freshman	30.2	32.7	22.3	30.2	34.4
Sophomore	20.1	15.3	15.5	26.8	29.0
Junior	26.1	24.0	25.0	30.5	30.1
Senior	23.1	28.0	37.2	12.5	6.6
III. Current dating status		a,b	a,b	b	b
Not dating	22.8	25.2	29.2	14.9	21.8
Casual dating	29.1	24.6	26.1	34.0	39.1
Exclusive dating	29.6	31.2	28.2	30.5	24.6
Engaged, pre-engaged, cohabiting	18.4	19.1	28.2	20.7	14.5
IV. When respondent drinks, how drunk usually get		a,b	a	a,b	a
Very intoxicated	8.0	5.2	15.5	5.1	11.6
Moderately intoxicated	49.5	48.6	51.2	47.3	54.3
A little intoxicated	31.1	35.6	21.6	35.2	24.3
Not intoxicated at all	11.1	10.5	11.7	12.4	9.8
V. Whom did respondent live with while growing up					
Mother	16.2	13.7	15.6	20.1	17.5
Father	1.7	1.4	1.0	1.8	3.3
Mother and father	77.1	80.4	80.3	71.2	73.8
Step parents	5.0	4.5	3.1	7.0	5.5
VI. Perceived adequacy of sexuality education					
<i>Adequacy of sex education in school before college</i>		b	b	b	b
Inadequate	19.1	14.8	15.2	25.3	26.7
Adequate	71.3	78.1	74.7	63.6	58.1
Neither	9.7	7.1	10.0	11.1	15.1
<i>Perceived adequacy of sex education from parents</i>					
Inadequate	30.2	29.9	32.4	29.3	29.8
Adequate	56.2	58.6	51.4	58.1	51.9
Neither	13.5	11.5	16.2	12.6	18.2
VIII. Self-assessed level of self-esteem		a	a	a	a
Excellent or very good	46.8	41.4	56.9	43.1	57.4
Good	35.4	37.7	31.9	37.8	27.9
Fair, poor, or very poor	17.8	20.9	11.2	19.0	14.8
IX. Religion					
<i>Religious denomination reared in</i>		b	b	b	b
Mainline Protestant	38.3	41.1	41.2	33.3	35.0
Baptist	8.4	1.1	0.3	21.5	17.5
Catholic	36.8	46.8	43.0	24.0	20.9
Institutional Sect	0.9	0.5	0.3	2.0	1.1
Fundamentalist	6.9	3.7	5.8	9.3	14.1
Non-Christian	0.9	0.5	0.7	2.0	0.0
None	7.8	6.3	8.6	7.8	11.3
<i>Religious compared with others</i>		a	a	a	a
Less religious	38.1	34.6	44.7	34.2	47.8
About as religious	47.0	49.4	39.3	52.0	40.0
More religious	15.0	16.1	15.9	13.8	12.2
<i>Current level of religious commitment</i>		a	a		
Not devout	30.1	29.1	39.8	24.4	30.4
Moderately devout	55.7	57.0	47.3	59.2	56.9
Devout	14.2	13.9	12.9	16.4	12.7

Table 2. Sexual behaviours of respondents who reported ever having vaginal intercourse, by gender and school, college students aged 18–23 years at two universities located in Wisconsin and Texas, USA (n = 1145)a, significant ($P < 0.05$) gender differences within location (e.g. Wisconsin women v. Wisconsin men); b, significant ($P < 0.05$) location differences within gender (e.g. Wisconsin women v. Texas women)

	Total	Wisconsin		Texas	
		Women (n = 625)	Men (n = 296)	Women (n = 400)	Men (n = 183)
I. Ever experienced individual sexual activity	%	%	%	%	%
1. ever masturbated while alone	61.7	48.1a	91.6a	47.9a	90.1a
2. ever experienced oral/genital sex	83.4	78.6a,b	85.0a	86.2b	91.0
3. ever experienced vaginal-penile intercourse	76.1	72.0b	75.3b	79.4b	84.2b
4. ever engaged in anal intercourse since age 14	19.8	19.0	18.1	21.3	21.3
II. Sexual activity matrix		a	a	a	a
1. masturbation only	5.3	5.4	9.4	1.6	6.3
2. oral sex only	4.2	6.1	0.3	5.3	1.7
3. vaginal intercourse only	1.2	1.9	0.3	1.3	0.0
4. anal intercourse only	0.0	0.0	0.0	0.0	0.0
5. oral and vaginal only	19.7	25.9	4.2	28.6	4.6
6. oral and anal only	4.7	2.7	11.5	2.9	4.0
7. oral and masturbation only	0.1	0.0	0.0	0.0	0.0
8. vaginal and anal only	0.0	0.2	0.0	0.3	0.0
9. vaginal and masturbation only	0.6	0.8	1.0	0.3	0.0
10. anal and masturbation only	0.0	0.0	0.0	0.0	0.0
11. oral, anal, vaginal only	4.9	6.7	0.7	7.2	0.6
12. oral, vaginal, masturbation only	37.1	27.1	53.1	30.2	59.4
13. vaginal, anal, masturbation only	0.1	0.0	0.7	0.0	0.0
14. oral, anal, masturbation only	0.3	0.2	0.7	0.2	0.0
15. all four sexual activities	14.3	12.1	16.0	13.3	21.1
16. none of the sexual activities	7.5	10.9	2.1	8.8	2.3
Total	100.0	100.0	100.0	100.0	100.0

alcohol use. Although approximately half of students (48%) said they provided verbal consent for their first vaginal intercourse, a strikingly large proportion said they *implied* consent non-verbally, ranging from 35% (Wisconsin women) to 61% (Texas men). Intoxication at first vaginal intercourse was also common across gender and location (22%). Students who provided non-verbal consent and who were intoxicated at the time were significantly less likely to have used a contraceptive method during first vaginal intercourse (data not shown).

Number of sexual partners and sexual frequency

Among students who already had engaged in vaginal intercourse at least once, the average number of lifetime sexual partners ranged from 3.6 (Wisconsin women) to 6.4 (Texas men). Numbers were significantly higher for male students at both schools, and both Texas men and women reported significantly more partners than Wisconsin men and women, respectively. But the mean number of partners reported in the last year (1.8) was almost identical across school and gender. Respondents also reported frequent vaginal intercourse, with a mean ranging from 2.8 (Wisconsin women) to 3.4 (all other groups) sexual episodes in the last week.

Casual sex and alcohol

About a third (30%) of sexually active students reported having vaginal intercourse with someone they just met, with men significantly more likely to have done so. Of those who did

report casual sex, ~80% said they had done so at least once under the influence of alcohol, a figure that was similar across gender and location.

Contraception

Among respondents who had intercourse, the large majority reported using contraception at their last sexual intercourse (80%), with women at both schools significantly more likely than men to do so.

However, a surprisingly large minority of students *did not* use contraception at every sexual episode. Twenty-two percent of the total sample answered 'sometimes' or 'almost always' to the question, 'How often do you have intercourse without contraception?', with men and women at Texas (37 and 27%, respectively) significantly more likely to do so than men and women at Wisconsin (24 and 14%).

Pregnancy and STIs

Given the large minority of students reporting that they 'sometimes' or 'almost always' have vaginal intercourse without using contraception (22%), the percent reporting involvement in a pregnancy was small but in keeping with national figures: 5% of Wisconsin women; 8% of Wisconsin men; 14% of Texas women; 7% of Texas men. Approximately 7% of women and 4% of men reported that they had been diagnosed with an STI.

Table 3. Sexual behaviours among those who have already had vaginal intercourse, by gender and school, college students aged 18–23 years at two universities located in Wisconsin and Texas, USA (n = 1145)a, significant ($P < 0.05$) gender differences within location (e.g. Wisconsin women v. Wisconsin men); b, significant ($P < 0.05$) location differences within gender (e.g. Wisconsin women v. Texas women)

	Total	Wisconsin		Texas	
		Women (n = 625)	Men (n = 296)	Women (n = 400)	Men (n = 183)
I. First vaginal intercourse					
1. Contraceptive used during first vaginal intercourse (%)	75.9	83.0a,b	72.9a,b	75.3a,b	60.8a,b
2. OF THOSE: Which method used (n = 869) (%)		a	a,b		b
<i>Condom</i>	80.0	78.9	69.7	86.3	86.9
<i>Oral contraception</i>	5.2	3.6	12.3	3.1	4.8
<i>Condom and oral contraception</i>	13.1	15.1	16.8	10.1	6.0
<i>Other</i>	1.7	2.5	1.3	0.4	2.4
3. Under the influence of alcohol or drugs (%)	22.0	18.6a	26.6a	22.4	24.2
4. First sexual intercourse voluntary? (%)		a,b	a	b	
<i>Yes, implied consent</i>	46.5	34.6	52.0	52.5	60.8
<i>Yes, verbal consent</i>	48.3	58.3	45.7	42.7	34.6
<i>No, against will</i>	2.3	4.2	0.0	1.9	0.7
<i>Don't remember</i>	2.9	2.9	0.0	2.8	3.9
II. Frequency of sex and number of partners					
1. Weekly average of intercourse episodes, past year	3.2	2.8a,b	3.4a	3.4b	3.4
2. Mean number of lifetime partners	4.6	3.6a,b	4.4a,b	5.1a,b	6.4a,b
3. Mean number of partners in the past year	1.8	1.7b	1.8b	1.9b	2.1b
III. Casual sex and alcohol use					
1. Ever had vaginal intercourse with someone just met (%)	30.3	24.2a	36.6a	27.2a	45.0a
2. OF THOSE (194 women, 147 men): Ever under the influence of alcohol when engaging in vaginal intercourse with someone just met (%)	80.9	83.6	81.0	79.8	77.9
IV. Current contraception and condom use					
1. Used contraception at last vaginal intercourse (%)	79.8	89.0a,b	73.9a	75.6a,b	69.8a
2. How often engage in vaginal intercourse without contraception (%)		a,b	a	a,b	a
<i>Almost always</i>	10.0	4.6	11.7	13.4	16.0
<i>Sometimes</i>	12.3	9.0	12.1	13.1	20.7
<i>Rarely</i>	24.2	21.8	32.4	20.7	26.7
<i>Never</i>	53.5	64.6	43.7	52.8	36.7
3. Ever provided a condom for a sex partner (%)	61.9	65.3b		57.0b	
V. Pregnancy and sexually transmissible infection (STIs)					
1. Ever been pregnant/gotten someone pregnant (%)	8.2	4.8b	8.0	13.8a,b	6.9a
2. Ever been diagnosed with an STI (%)	6.5	7.0	4.2	8.5	4.0
VI. Sexual coercion and assault					
1. Ever fondled or had clothes removed against will (%)	14.1	15.6a	5.4a,b	19.5a	10.9a,b
2. Ever had vaginal intercourse against will on a date (%)	15.4	19.7a	3.2a	24.8a	1.3a

Sexual coercion and violence

Women were significantly more likely than men to report having been fondled or had clothes removed against their will (17% of women v. 7% of men) and having had intercourse against their will on a date (22% of women v. 2% of men).

Solitary masturbation

Table 4 presents findings on masturbation practices. Most students at both locations masturbate regularly and most started several years before initiating intercourse. Despite significant gender differences in the expected direction, women displayed a striking frequency of masturbation. Only one in two women (48%) had ever masturbated compared with 91% of men. Those who do masturbate started the practice within 2 years of young men's initiation (15.0 years of age in women v. 13.2 years of age

in men) and now masturbate relatively frequently. Of those who had masturbated, ~88% of women and 98% of men had done so in the past year. In terms of a weekly composite, women had masturbated an average of two times per week compared with men's three times.

Guilt related to masturbation was prevalent and significantly more so for Wisconsin students and for women than men at both locations. A sizeable fraction, especially Wisconsin women (47%) and men (33%), reported that they occasionally, frequently or always experience guilt about masturbating.

Discussion

In this analysis of sexual activities and behaviours among non-Hispanic white, heterosexual college students at two large universities, we have added another layer of understanding to

Table 4. Solitary masturbation characteristics and behaviours by gender and school, college students aged 18–23 years at two universities located in Wisconsin and Texas, USA (n = 1504)a, significant ($P < 0.05$) gender differences within location (e.g. Wisconsin women v. Wisconsin men); b, significant ($P < 0.05$) location differences within gender (e.g. Wisconsin women v. Texas women)

	Total	Wisconsin		Texas	
		Women (n = 625)	Men (n = 296)	Women (n = 400)	Men (n = 183)
I. Ever masturbated while alone (%)	61.7	48.1a	91.6a	47.9a	90.1a
II. Characteristics and behaviours among those who have masturbated (n = 923)					
1. Age first masturbated while alone	14.3	15.0a	13.6a	15.0a	13.2a
2. Masturbated alone in past year (%)	92.6	86.6a	98.1a	89.5a	98.1a
3. How often feel guilty about masturbating (%)		a,b	a,b	b	b
<i>Never</i>	41.5	30.2	40.7	48.0	55.7
<i>Seldom</i>	22.8	22.8	25.9	21.2	19.6
<i>Occasionally</i>	23.2	28.8	24.0	20.1	15.2
<i>Frequently, very frequently, or always</i>	12.5	18.2	9.4	10.7	9.5

what we currently know about the sexual activities of young adults, especially compared with adolescents. Twice as many college students in this study (20%) have engaged in anal intercourse compared with the adolescents in a recent analysis by Lindberg *et al.* (10%).²³ Our one-in-five figure also represents a sizeable increase from the 8% of 18 to 24-year-olds who reported anal intercourse in a nationally representative study of sexual behaviours by Laumann *et al.*¹⁰ Although anal sex is still practiced by a minority of young adults, public health practitioners need to recognise that its practice appears to be increasing among youth and safer sex promotion efforts should respond appropriately.^{6,29} However, consistent with the findings of Lindberg *et al.* very few college students (5%) in our sample appear to be engaging in oral sex or anal intercourse in place of vaginal intercourse. The overwhelming majority of respondents who have had anal intercourse have also had vaginal intercourse, and usually in conjunction with oral sex and, for men in particular, masturbation. Most students who have had vaginal intercourse have also had oral sex.

Out of 16 possible combinations of four sexual activities (masturbation, oral sex, vaginal intercourse and anal intercourse), only four categories contain more than 5% of the total sample. The most common combination for men is masturbation, oral sex and vaginal intercourse; for women, oral sex and vaginal intercourse only. Fourteen percent of all students had taken part in all four activities, and 8% had not yet taken part in any of them.

Our data also allowed us a closer look at the masturbation practices of college students. At first glance, a striking (albeit expected) gender imbalance marks these practices: 48% of women v. 91% of men reported having ever masturbated. These figures are nearly identical to a study by Pinkerton *et al.* of college students where 44% of women and 98% of men reported ever having masturbated.³⁰ Significant evidence indicates that USA women engage in much less sexual self-exploration than men, and girls' earliest experiences of arousal are more likely to occur in heterosexual dating situations. Consequently, young women are less likely than young men to learn how to arouse themselves and have not experiences the

sensation of an orgasm.^{21,31} However, from another angle, findings from this study indicate a less striking gender disparity: young women's mean age of first solo masturbation was only 1.5 years later than young men's (15.0 years for women v. 13.5 years for men), and both female and male respondents with any history of masturbation had masturbated frequently in the past year (88% of women, 98% of men).

Regular masturbation can be an important aspect of overall sexual well being, given its associations with greater sexual enjoyment and self awareness, especially among women.^{17,21} Future analyses should explore whether regular masturbation is also associated with more frequent safer sex practices, as preliminary research suggests.²¹ Public health practitioners would be wise to promote masturbation as an essential aspect of sexual health and safer sex. But challenges to this strategy certainly exist, given the guilt and stigma associated with the practice, especially for women. Although 42% of respondents in our sample reported 'never' experiencing guilt while masturbating, over a third experience guilt at least occasionally and women are disproportionately affected by guilt. Laumann *et al.* found that 18 to 24-year-olds were more likely than any older age group to feel guilty about masturbating.¹⁰ Thus, we agree with other scholars and practitioners who advocate for the reduction of social stigma around masturbation as an important step in the improvement of young people's mental and sexual health.^{17,21,32}

Our findings illustrate some of the major obstacles to optimal sexual health among college students, including alcohol use and non-verbal consent for vaginal intercourse. In terms of alcohol use, more than one in five respondents (22%) were under the influence of alcohol or drugs at the time of first sexual intercourse, and 81% of those who had ever vaginal intercourse with someone they just met said they were under the influence of alcohol or drugs at least once while doing so. In terms of consent, approximately one in two students (47%) indicated that their consent was 'non-verbal' during their first vaginal intercourse. In other analyses with these data, we found that couples who did not verbally discuss whether to initiate intercourse were significantly less likely to have used contraception.³³ Unfortunately, this survey provides us with

no measures of consent during more recent sexual episodes. Nonetheless, we wonder if implied *v.* verbal consent in students' current sexual lives (which could be exacerbated when paired with alcohol use; over half of students reported becoming 'very' or 'moderately' intoxicated when they do drink) might explain at least some of the startlingly high prevalence of students who do not use contraceptives regularly, even though one would expect college students to be strongly motivated to avoid unintended pregnancy. The issue of consent and sexual ambiguity, especially when combined with alcohol use, could be an important focus in future studies of young adults' sexual health.³⁴

Limitations

The descriptive nature of this study and the large number of 'outcome' variables prohibited multivariate analyses of each of the behaviours described (e.g. we could not share results from 16 separate regressions for each of the categories described in the sexual activity matrix, Table 2). Thus, we did not have adequate space to explore the factors most strongly associated with various sexual behaviours or to describe the socio-demographic profile of those respondents most likely to have engaged in each of the behaviours. However, our intention here was to present a wide-angle sexual snapshot of these college students' sexual histories and behaviours and to achieve a level of detail not available in previous large studies of college student,^{26–28} especially regarding practices such as anal sex, masturbation, non-verbal consent, etc.

There was insufficient space in the scope of this paper to extensively explore possible explanations for significant differences between the locations. Several factors could have explained slight sexual differences between the two universities, including sexuality education history, social drinking norms on the respective campuses, different levels of religiosity between the student bodies, as well as regional differences in sexual attitudes and behaviours.¹⁰ Future studies could more deeply investigate the extent to which campuses comprise different sexual cultures that shape students' behaviours.

Any study of sexual behaviour is subject to reporting bias, given both social stigma and recall issues. For example, people are likely to under-report more taboo practices such as masturbation³⁵ and anal sex. Studies have also shown that respondents can misclassify earlier reports of their age at first intercourse^{36,37} and the issue of consent may also be prone to misclassification. But other studies have found very strong consistency of reports of early sexual experiences, especially among younger adults.³⁸ Early sexual experiences such as first sexual intercourse are likely to be vivid events for many respondents^{39,40} and the time gap between first intercourse and the reporting of this event will be shorter in a sample of college students than in a sample of older adults. Furthermore, information on sexual behaviours always depends on self-report, so the assessing sexual health practices necessitates the use of this type of data collection and its potential bias.⁴¹

Given this study's use of a non-random sample of non-Hispanic white, heterosexual students at only two universities, results cannot be extrapolated to all college students in the USA, but rather to universities with similar

demographic characteristics. We encourage future studies of the sexuality of young adults to explore whether the sexual combinations most common in these data would emerge from more diverse, representative samples. That said, our findings are notably similar to more nationally representative college student samples. For example, in both our sample and in the National College Health Risk Behaviour Survey,^{26,28} among those respondents with at least some history of vaginal intercourse, exactly 80% reported using at least some form of contraception at last intercourse. In the American College Health Association's 2007 National College Health Assessment,²⁷ women reported 1.8 partners in the last year and men reported 2.3; in our own study, these figures were 1.8 for women and 1.9 for men.

The analyses were also limited by the sexual information collected. Unlike the instrument used by Lindberg *et al.*,²³ this survey instrument did not ask respondents to indicate the time period in which they began engaging in some sexual activities. Thus, it is impossible to document sexual trajectories; e.g. the degree to which oral sex precedes vaginal intercourse, or how frequently anal intercourse occurs after *v.* before vaginal intercourse. Further, the oral sex variable did not distinguish between oral sex *received* or *given*, which could hide a gender disparity. Young women may be slightly but significantly more likely than men to have given rather than received oral sex.⁴² The lifetime sexual partners variable did not specify the kinds of sex implicated with the exception of vaginal intercourse.

Despite its limitations, this study has expanded the public health field's understanding of young adult sexual health, adding an important layer to our existing knowledge of adolescent sexuality. This study has outlined both historical and current sexual behaviours and highlighted some of the challenges and potential advances in optimising sexual health in young people, especially college students.

Conflicts of interest

None declared.

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