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Campus sex ratios and college intimacy: new evidence from linked student and institutional data

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Abstract

This study examines how imbalanced college male-to-female ratios influence students' dating-related behaviors, in the context of the increasingly prevalent hookup culture on American campuses. By integrating detailed individual- and college-level data, we group all relevant outcome measures into two summary indices to capture two key channels: the dating-related opportunity index, which reflects students' likelihood of forming partnerships, and the casual sexuality index, which assesses bargaining power by gender. The comprehensive merged dataset also allows us to account for key characteristics at both levels, helping to mitigate potential self-selection bias. Consistent with theoretical predictions, the findings show that as the availability of potential male mates increases, female students are more likely to engage in on-campus dating-related activities. Additionally, both men and women reduce participation in casual sexual activities when the male-to-female ratio rises. Notably, students with prior sexual experience and those from married or cohabiting-parent families appear more responsive to shifts in college sex ratios.

Keywords: sex ratio, dating-related behaviors, casual sexuality, bargaining power

JEL Codes: J12, J13, J16

1 Introduction

Over the past half-century, the United States has witnessed a remarkable demographic shift characterized by a substantial increase in female college enrollment. In 1945, the undergraduate gender ratio stood at 2.44 males for every female. Since the early 1980s, however, women have consistently outnumbered men in American higher education—a reversal of long-standing trends. This transformation can be attributed to several interrelated factors: a rising college wage premium (Goldin et al., 2006; Parker, 2021), policy interventions such as Title IX of the Education Amendments (1972) (National Center for Education Statistics, 2022), women's higher levels of academic achievement (Goldin et al., 2006), and evolving gender norms and social expectations (Bertrand et al., 2020; Goldin and Katz, 2008). Although men remain disproportionately represented in full-time programs at four-year institutions, the overall decline in the male-to-female ratio has been both steady and pronounced, as depicted in Figure 1. The reversal of the college gender gap has exerted profound social influences. It has expanded women's career prospects and contributed to the delay of early marriage (Goldin et al., 2006; Goldin and Katz, 2008). Concurrently, dating culture on American campuses has shifted toward more casual interactions and deferred commitment, with exclusive relationships often forming later—a pattern commonly described as the "hookup culture" (Bogle, 2007; England et al., 2012; Uecker and Regnerus, 2010; Freitas, 2013; Wade, 2017). The co-occurrence of these two trends raises an important question: Is there a link between changing gender compositions on college campuses and the evolution of dating norms?

In this study, we examine how changes in college sex ratios affect dating behaviors and attitudes among U.S. students. Drawing on the theoretical frameworks of Becker (1973) and Chiappori et al. (2002), we advance two main hypotheses. First, partnership formation will vary inversely by gender depending on mate availability: a higher proportion of women on campus is expected to increase men's partnership rates while reducing women's. Second, a relative scarcity of men is likely to enhance their bargaining power in the dating market, thereby shaping norms in their favor. The college environment—where dating constitutes a central social activity—offers an ideal setting to test these mechanisms and analyze both primary and secondary outcomes in the dating market.

We construct our variables using two high-quality micro-datasets. The Online College Social Life Survey (OCSLS) provides comprehensive data on the social lives of 23,940 students across 21 U.S. uni-

versities between 2005 and 2011.[1] In addition to rich individual characteristics, the survey includes detailed questions on dating behaviors, many of which are typically private. We construct a dating opportunity indexbased on students' reported experiences with hookups, dates, and long-term relationships since entering college, and a casual sexuality indexreflecting the level of casualness in associated sexual activities. The former serves as a proxy for male–female matching in the dating market, while the latter reveals bargaining power between genders. Data on campus sex ratios come from the Integrated Postsecondary Education Data System (IPEDS), which provides comprehensive, nationally representative statistics for all U.S. institutions participating in federal student aid programs. Its college-level detail allows us to construct institution-specific sex ratios and link them to the OCSLS data. Consistent with prior studies (Angrist, 2002; Brainerd, 2017; Lafortune, 2013; Wei and Zhang, 2011), we define the sex ratio as the male-to-female ratio in the dating market.[2]

Our results show that, ceteris paribus, female students at colleges with higher sex ratios experience significantly greater dating opportunities. Specifically, as the sex ratio increases from the lowest to the median value, women's dating opportunity index rises by 0.68 standard deviations. For male students, by contrast, the sex ratio shows a negative—though statistically insignificant—association with dating opportunities. Moreover, a higher number of available men on campus significantly reduces casual sexual activity for both genders: when the sex ratio increases from the lowest to the median, the casual sexuality index declines by 0.32 standard deviations for women and 0.39 for men. Heterogeneity analyses further reveal that pre-college sexual experience and parental marital status moderate how students respond to shifts in campus sex ratios. Specifically, sex ratios have a stronger effect on the dating opportunity index for women who had pre-college sexual experience or whose parents are married or cohabiting. For men, neither factor significantly affects dating opportunities. Regarding casual sex, male students with prior sexual experience and students of both genders from intact families are more likely to reduce casual sexual activity as sex ratios rise.

This study connects two strands of literature: one on "hookup culture" in the United States (Adkins et al., 2015; Birger, 2015; Moss and Maner, 2016; Uecker and Regnerus, 2010) and another on the impact of gender ratios on marriage market outcomes (Abramitzky et al., 2011; Angrist, 2002; Brainerd, 2017; Lafortune, 2013; Mechoulan, 2011; Pestel, 2021; Posel and Casale, 2013; Wei and Zhang, 2011). Our

[1] See Appendix Figure A1 for the geographic distribution of the sampled institutions.
[2] Unless otherwise noted, "sex ratio" in this study refers to the male-to-female ratio.

work contributes to both in two key ways.

First, we offer a sex-ratio perspective on the sociological observation that hookup culture has become increasingly prevalent on U.S. campuses (Adkins et al., 2015; Birger, 2015; Moss and Maner, 2016; Uecker and Regnerus, 2010). We argue that in a context of growing female enrollment, increased mate availability and shifts in inter-gender bargaining power may help explain the rise of casual dating norms. These insights provide policymakers with a new understanding of how gender ratios can rapidly influence premarital behavior, with potential long-term implications for marital outcomes.

Second, we extend existing research by examining how gender ratios reshape dynamics in the dating (premarital) market, leveraging the distinctive social environment of university campuses. Although prior studies have shown that sex ratios affect marital outcomes and premarital investments, none have directly investigated their impact on dating market outcomes (Abramitzky et al., 2011; Angrist, 2002; Brainerd, 2017; Lafortune, 2013; Mechoulan, 2011; Posel and Casale, 2013; Wei and Zhang, 2011). By focusing on universities—where, as Filser and Preetz (2021) notes, individuals exhibit heightened perceptions of "subjective partner availability"—we provide novel evidence on how sex ratios shape dating behaviors and attitudes.

The remainder of the paper proceeds as follows: Section 2 outlines the theoretical framework; Section 3 describes the data and measures; Section 4 presents the identification strategy; Section 5 discusses the main results and robustness checks; Section 6 explores heterogeneity; and Section 7 concludes.

2 Theoretical Analysis

Building on Becker (1973)'s seminal supply-demand model of marriage markets, we conceptualize college dating markets through an analogous framework where sex ratios determine partner availability. Our analysis employs a comparative statics approach that examines how equilibrium outcomes change when holding all else constant. Specifically, we model the observed decline in campus male-to-female ratios as resulting from an exogenous increase in female supply. Figure 2 illustrates this theoretical relationship: with demand for female partners held constant, the supply shift leads to higher equilibrium partnership rates for men (who face more potential partners from Q_0 to Q_1 on x-axis) and lower rates for women (who face increased competition). This theoretical prediction yields our first testable hypothesis:

H1: As the college sex ratio increases, men experience fewer dating-related opportuni-

ties, while women face a corresponding increase.

Beyond affecting partnership rates, Becker (1973)'s model also implies that sex ratios influence the distribution of utility within partnerships, which is represented by the utility level on the y-axis in Figure 2. As the supply of available women on campus increases, the utility women receive within partnerships declines from U_0 to U_1. Since the total utility distributed between men and women in the dating market is assumed to be fixed, this reduction in women's utility translates into an equivalent gain for men, increasing their utility by $U_0 - U_1$. This redistribution of utility reflects a shift in relative bargaining power. With lower bargaining power, women face greater challenges in securing their preferred dating outcomes (Chiappori et al., 2002). A similar logic applies to men when they are in the minority. With greater bargaining power, men may be more inclined toward casual, uncommitted sex (England et al., 2012; Moss and Maner, 2016) or challenge traditional dating norms, which impose financial burdens and contribute to anxiety and fear of rejection (Lamont, 2014; Samardzic et al., 2022). Based on this theoretical analysis, we propose the following hypothesis:

H2: As the college sex ratio increases, the dating market tilts in women's favor.

Table 1 summarizes the theoretical predictions of both hypotheses across outcome measures. As the sex ratio increases, men's partnership rates decline while women's rise. Simultaneously, the dating market shifts in women's favor, reducing casual sexual encounters.

3 Data and Measurements

3.1 Data and the sample of analysis

Our analysis draws on individual-level data from the Online College Social Life Survey (OCSLS), which encompasses 23,940 students across 21 four-year U.S. institutions surveyed between 2005-2011. The OCSLS provides exceptionally detailed measures of college dating behaviors and attitudes, including sensitive items about hookup frequency, specific sexual behaviors, and number of intercourse partners. These comprehensive measures, combined with demographic information and pre-college sexual histories, establish OCSLS as the most authoritative dataset on U.S. college dating behaviors (Adkins et al., 2015; Pham, 2019).

The survey also achieves remarkable participation rates through course credit incentives, with near-

complete response rates in recruited classes while maintaining broad academic diversity - only 11% of respondents were sociology majors despite some recruitment through sociology courses. The sample spans 35 distinct fields of study, mitigating concerns about disciplinary bias.

Institutional diversity represents a key strength of the data, as shown in Table 2. Participating schools range from elite private institutions like Harvard and Stanford to regional public universities such as Middle Tennessee State, and include research-intensive doctorate-granting universities (e.g., University of California-Santa Barbara) alongside small liberal arts colleges (e.g., Whitman College). This institutional heterogeneity, combined with broad geographic coverage across major U.S. regions (Appendix Figure A1), ensures substantial variation in campus gender ratios to support our analysis of dating market dynamics. The combination of sensitive behavioral measures, high response rates, and diverse institutional representation makes OCSLS uniquely suited for examining how shifting college sex ratios influence college dating cultures.

To ensure the validity of comparisons across these diverse institutions and to focus on a population actively engaged in undergraduate campus life and dating, we apply several sample restrictions. Students who are married or at graduate-level are excluded so that every participant has enough campus life or has incentives to participate in the dating market. Students who are gay and transgender are also excluded to ensure that participants' dating-related behaviors and attitudes can be interpreted under the same cultural norm. Besides, any college with fewer than ten observations in any survey year is dropped. Since only four-year colleges are kept, students from Foothill college are excluded. Finally, 19,209 students are kept in the sample of analysis. The college sex ratios range from 0.53 to 1.15 with a mean of 0.92, as shown in Column (1) of Table 2, which is slightly higher than the national level of college sex ratios between 2005 and 2011 as a whole but still fits the current gender gap of American colleges (see Figure 1). The dating market's prosperity on campus can be shown by the number of hookups, dates, and relationships after entering colleges in Columns (2) to (4) of Table 2. The number of participants in each school is also presented in Column (5) of Table 2. Most schools in the sample have an active dating market. Students in 10 out of 21 schools have more than four hookups on average. Students in 16 out of 21 schools have more than three dates on average. The average 6-month relationships are smaller and around 0.5 for each student in the sample.

The college-level data used in this study come from the IPEDS, which provides statistics covering

institutional enrollment and completion information for more than 7,500 American universities each year. There are two key variables used to merge the two datasets. First, the UnitID, the unique six-digit identifier assigned to each college submitted data to IPEDS, is used to match students' colleges in the OCSLS data. [3] Second, the year of the survey answered in the OCSLS data is used as another key variable to match the IPEDS data in the corresponding year. Although students expose to sex ratios that vary slightly year by year for each college, many essential questions in the OCSLS ask for students' most recent behaviors. Thus, matching the two datasets via the year of the survey answered can be a good fit.

3.2 Outcome measures

The outcome measures are classified into two groups: the dating opportunity and the casual sexuality. Each group includes multiple variables that are used to construct the summary indices as the major outcomes. Specifically, the number of relationships/dates/hookups and the indicators of whether a student has the most recent relationship/date/hookup with someone from the same college are used to construct the dating opportunity index. In the OCSLS, students are instructed to use whatever definition of "hookup" they and their peers typically use, which allows for a broad interpretation of casual romantic or sexual encounters. Importantly, a hookup does not have to involve sex to be counted. Including hookups alongside relationships and dates in the construction of the dating opportunity index helps capture the full range of romantic and social interactions students experience. Since hookups often arise through the same social environments as dating—such as parties, dorms, and mutual friends—they provide meaningful insight into students' access to and participation in dating-related opportunities. The casual sexuality index includes four different measures: the level of sexual activities in the most recent date, the level of sexual activities in the most recent hookup, the number of hookups with strangers, and the indicator of whether a student has no contact with the hookup partner after the most recent hookup. These measures directly capture behavioral dimensions of non-committed sexual activity. The level of sexual activity during the most recent date and hookup reflects the extent to which sexual behavior occurs outside of long-term relationships. The number of hookups with strangers is a particularly strong

[3] Only the abbreviations of schools – i.e. Arizona, Indiana, Penn, U Mass, and Washington, are included in original data of the OCSLS. Many of them are not clear enough to identify which schools those students belong to. To avoid measurement errors, we contacted with Jonathan Bearak, who are responsible for questions about the codebook and source code of the OCSLS data, to request for the UnitID for all schools.

indicator of casual sex, as it highlights encounters that occur without prior connection or emotional intimacy. Lastly, the indicator of having no further contact with a hookup partner after the most recent encounter serves as a clear marker of one-time, non-relational sexual activity. Together, these measures provide a nuanced and behaviorally grounded assessment of students' engagement in casual sex. See Appendix Table A2 for the details on the related survey questions and outcome measures' coding method.

The dating opportunity index allows us to estimate the extent to which changes in sex ratios influence students' partnership rates by gender. Meanwhile, the casual sexuality index helps assess the effect of sex ratios on relative bargaining power in the dating market. To select the appropriate measures from the OCSLS, each question related to the indices was carefully reviewed. The selection criteria for each outcome are as follows. First, behavioral measures are prioritized over attitudinal measures. Prioritizing behaviors provides a more accurate reflection of actual actions, as attitudinal measures may be limited by respondents' awareness and willingness to report their true beliefs (Rohrer, 2022). Second, measures of activities that occurred after entering college are preferred over those without a time constraint. Focusing on behaviors occurring after entering college ensures that the data is relevant to the current study context and minimizes recall bias associated with events from earlier periods (Walentynowicz et al., 2018). Third, when attitudinal measures are included, hypothetical questions on attitudes are excluded. By omitting hypothetical scenarios, we aim to capture more reliable and valid variables, as responses to hypothetical questions may not accurately predict actual behaviors. See the Appendix notes for more details on the data selection rules and the rationale behind the inclusion of each measure in the indices.

Following Law and Marks (2020), the summary index is computed as the unweighted sum of the z-scores for each variable within the index. The z-scores of variables with missing values are normalized to equal 0. Only observations with missing values across all variables within the index are coded as missing for the indices constructed. Specifically, the z-score for variables is built as:

$$Z_{dist} = \frac{(X_{dist} - \mu_{ds})}{\sigma_{ds}} \tag{1}$$

where X_{dist} denotes the specific measure of outcome d for student i of sex s answered the survey in year t. μ_{ds} and σ_{ds} denote the mean and standard deviation of the same measure by gender. Z_{dist} tells that how much a given variable d varies relative to the mean in gender-years in standard deviation units.

After computing Z_{dist} for each variable, we sum Z_{dist} across all variables related to dating opportunities to construct the dating opportunity index. The same method applies to construct casual sexuality index. Each normalized variable within indices receives an equal weight. Since variables within each index are coded differently according to specific survey questions, measurement errors will arise if we construct the index by merely summing all related variables without normalizing them. [4]

Summary statistics in Table A3 suggest that college sex ratios are correlated with dating opportunities and casual sexuality with the relationship differing for men and women. Women in colleges with higher sex ratios are more likely to form relationships within their college but do not engage in dating or hookups more frequently. In contrast, men in these environments experience fewer dating opportunities overall. Sex ratios are also linked to casual sexual behaviors. Women in high sex-ratio colleges engage in fewer casual sexual activities, aligning with theoretical predictions. However, the effects for men are mixed, with no clear pattern in hookup frequency or sexual activity levels. To further investigate the potential effects of college sex ratios, a well-structured identification strategy and regression analysis are necessary.

4 Identification

To determine the relationship between college sex ratios and students' dating behaviors and attitudes, we design the specification as following:

$$y_{igjt} = \beta R_{jt} + \gamma Size_{jt} + \delta Tier_j + \mu Region_j + \lambda Year_t + X'_{ig}\alpha + \epsilon_{igjt} \tag{2}$$

The dependent variable in this regression, y_{igjt} indicates outcomes for the student i, with gender g, attending school j, observed in year t. We estimate the regression separately for every outcome as described in previous section and for the summary indices. Men and women are estimated independently due to the theoretical model's predictions on the impact of sex ratios that might go in the opposite direction.

The primary independent variable of interest, R_{jt}, is the male-to-female ratio of college j in year t. It is calculated using the number of male undergraduates divided by female undergraduates enrolled in

[4] If we simply aggregate all variables without normalizing them, the variable coded higher will take a larger weight in indices compared to variables with lower values. As shown in Table A3, the mean of number of hooking up with strangers is larger than the mean of the probability of no contact after hooking up for all groups.

each school in the corresponding fall term obtained from the IPEDS.[5]

The size of the dating market is controlled via $Size_{jt}$, which is the total fall enrollment for college j in year t.[6] Since the academic quality of institutions may also influence students' dating-related behaviors, we include tier fixed effects, denoted by $Tier_j$.[7] To address potential endogeneity from students self-selecting colleges based on dating preferences or sexual attitudes, we control for pre-college demographics (age, race, parental background), sexual histories (virginity status, age at first intercourse), academic/social factors (major, on-campus housing, Greek life), and attitudinal variables (political ideology, views on homosexuality/abortion) in X_{ig}. These account for selection linked to social environments or ideological sorting. Besides, year fixed effect $Year_t$ and regional fixed effect $Region_j$ are included in all regressions. Standard errors are clustered at the college level to allow for serial correlation within colleges.[8]

5 Empirical Results

5.1 Main Results

Panel A of Table 3 shows estimates of how college sex ratios affect women's dating-related opportunities. Each column represents a separate regression following Equation (2). Columns (1) and (3) indicate that higher sex ratio is positively associated with the number of relationships and dates since entering college, although no significant effect is found for hookups. Specifically, increasing the sex ratio from the lowest, 0.51, to the median, 0.91, results in 0.09 additional relationships and 0.4 additional dates per student, economically meaningful relative to their means, 0.45 and 3.02 respectively. The sex ratio coefficient is also positive and statistically significant for the likelihood that women's most recent long-term relationship, date, and hookup occurred on the same campus—21 percent, 21 percent, and 18 percent respectively—as shown in Columns (2), (4), and (6). These magnitudes are economically substantial given their respective means of 35 percent, 33 percent, and 15 percent. Finally, using the

[5]IPEDS has the corresponding fall enrollment by gender and students' study level (undergraduate/graduate). The fall enrollment is the unduplicated head count of students enrolled in the fall of each year. Both full- and part-time enrollments are included. Appendix Table A1 shows the variation of sex ratio across universities over years

[6]As shown in Appendix Table A4, the dating market's size is larger for colleges with sex ratios above the mean. Beyond differences in dating market size, colleges in higher academic tiers typically have lower sex ratios.

[7]This variable classifies schools into three tiers based on the 2000 Carnegie Classification of Institutions of Higher Education from the IPEDS dataset: Tier 1 (Doctoral/Research Universities–Extensive), Tier 2 (Doctoral/Research Universities–Intensive), and Tier 3 (Masters or Baccalaureate Colleges).

[8]Although our regression models account for a series of control variables—including those at the school, cohort, and individual levels—representing a significant advance over existing sociological literature, unobserved omitted variable bias (OVB) may still be present. Therefore, the findings of this study should be interpreted as causal with caution.

dating opportunity index as the dependent variable, as shown in Column (7), we find a large, positive, and statistically significant effect: an increase in the sex ratio by 0.4—from the lowest value to the median—raises women's dating opportunities by 0.68 standard deviation units. This corresponds to 19 percent of the index's standard deviation, which is 3.61. Panel B of the same table shows the estimated results on men's dating-related opportunities. Although none of outcomes is precisely estimated, the opposite sign of the coefficient of dating-related opportunity index for men versus women suggests that the empirical model might have controlled the omitted variables that signal the same in the dating market for both genders (i.e., race, religion, and Greek organization membership). The channel of available partners can explain the estimated results that the increase of supply of men in a college leads to more dating-related opportunities at the same campus for women.

Table 4 shows the coefficient estimates for the impact of college sex ratios on students' casual sexual behaviors for women in Panel A and men in Panel B. As shown in Panel A, the coefficient on the college sex ratios is negative for all four measures of casual sex but only statistically significant for the level of sexual activities in the last date, as shown in Column (1), and for the numbers of hooking up with strangers, as shown in Column (3). Similarly, Panel B shows that the coefficient on college sex ratios is negative across all four measures for men, although only the effect on the indicator of "no contact after the last hookup" is statistically significant, as shown in Column (4). Since all regressions have the same negative sign on estimated coefficients, the statistical power might be improved using the summary index as the dependent variable. The coefficients for the casual sexuality index are negative and statistically significant for both women and men. With the same increase in sex ratios from the lowest to the median, which is 0.4, the magnitude of the casual sexuality index decreases by 0.32 standard deviation units for women and by 0.39 standard deviation units for men, as shown in Column (5) of Panel A and Column (5) of Panel B. Compared to the standard deviation of the index, 1.82 for women and 1.95 for men, the magnitude of reduction has an economically significant magnitude for both genders. The estimates for both genders provide some supportive evidence for the channel of bargaining power. Theoretically, when men become numerically dominant on campuses such that their bargaining power is lessened in the dating market, the "hookup" culture will be weakened, given that men prefer to engage in casual sex than women on average. When women participate in casual sex, their primary motivation is still the expected increased probability of long-term commitment from their sexual partners (Regan and Dreyer,

1999).

Another theoretical explanation of sociology suggests that the culture prevailing on campuses will mostly be affected by the gender of whoever is in a numerically dominant position (Adkins et al., 2015). The reasoning behind this explanation is that when women are exposed to more men's views in colleges, they will be more likely to accept men's opinions than other females. Thus, when men outnumber women on campuses, the increase of sex ratios might empower a "hookup" culture, which goes to the opposite of the prediction of the channel of bargaining power. To further identify the channel of bargaining power, we estimate the effect of college sex ratios on emotional experiences and behavioral patterns in dating-related activities: 1) Hookup partner's respect; 2) Willingness to end the last relationship; 3) Using condom at the first time of intercourse, following the identification in Equation (2). [9] Because relevant OCSLS survey questions require prior campus dating experiences (such as hookups or long-term relationships), the sample size is shrink for each outcome, and the three outcome variables examined here do not neatly align with previous casual sexuality index. Thus, we report these results separately in Table 5. Our findings show that women become more likely to end their most recent relationships, while men report the opposite, which reassures the increasing bargaining power of women with the increase of sex ratios. Additionally, as college sex ratios increase, men report receiving less respect from hookup partners afterward and become more likely to use condoms during their first intercourse. Given that women typically bear greater responsibility for pregnancy prevention (Flanagan et al., 2021), whereas men often perceive barriers to condom use related to sexual pleasure, accessibility, and motivation (Calsyn et al., 2013; Flanagan et al., 2021), this increased condom use among men provides additional evidence of women's enhanced bargaining power in dating-related interactions.

In sum, our findings indicate the positive relation between college sex ratios and dating-related opportunities for women and negative relation for men, supporting the partner availability channel. Additionally, higher sex ratios reduce casual sexual activity among both genders, consistent with the bargaining power channel. Further evidence—based on willingness to end relationships, respect from hookup partners, and condom use at first intercourse—strengthens support for the bargaining power mechanism. Table 1 summarizes the signs of the estimated coefficients for two outcome indices. All estimates align with the theoretical predictions. These findings also suggest that the increasingly preva-

[9] Appendix Table A2 present details on the corresponding survey questions and how the three outcome variables are constructed.

lent hookup culture on U.S. college campuses is likely closely linked to the reversal of gender ratios on campus.

5.2 Robustness Checks

As a robustness check, we classify control variables into four categories—college type and demographics, majors and campus life, sexual histories, and liberal attitudes—and add them sequentially to regressions on summary indices for both genders. As shown in Panel A of Table 6, the coefficient on college sex ratios for women remains stable, with improved statistical power for the dating opportunity and casual sexuality indices. Similarly, men's estimates remain consistent, except for the dating opportunity index: after adding demographics, the coefficient reverses sign. However, it stabilizes in magnitude and significance as additional controls are included. As shown in Table A4, campus life variables are positively correlated with college sex ratios, while sexual histories and liberal attitudes are negatively correlated, potentially offsetting each other's effects on the magnitudes of coefficients in the regressions.

To rule out potential measurement errors of college sex ratios, we conduct a series of regressions by applying alternative measures of college sex ratios. First of all, we construct two alternative measures of sex ratios by separately utilizing the enrollment by status (full- and part-time enrollments) in the survey year. Since part-time students have limited interaction on campus, using part-time enrollment to construct college sex ratios may not accurately reflect students' actual dating environments. Panels A and B of Table 7 present the results. As expected, estimates using sex ratios of full-time students are broadly consistent with the baseline findings. In contrast, results based on part-time student sex ratios differ, particularly for women's casual sexuality index, which shows a positive and statistically significant coefficient—opposite to the main result. Then we construct another set of alternative measures by using different four-year average sex ratios around the survey year to better capture the dating market exposure students experience during college. Panels C to E of Table 7 present the results. These alternative measures of colleges sex ratios do not provide any meaningful changes on estimates in magnitude and significance with the baseline findings.

Finally, we apply the inverse propensity score weighting (IPW) method to address the self-selection concern by reweighting individuals based on the covariates included in the baseline model. The propensity score is estimated by using the *gpscore2* command in STATA, which fits a generalized linear model

(GLM) to estimate the generalized propensity score (GPS) for each observation within each college sex ratio stratum. We then re-estimate the regression specified in Equation (2), using the inverse of the estimated GPS as probability weights. As shown in Panel F of Table 7, the estimates for women's dating opportunity index are consistent with the baseline results in both magnitude and statistical significance. For men, the estimates are consistent in sign, though not statistically significant.

6 Heterogeneous Analysis

This section examines whether the effect of college sex ratios varies by students' sexual history before age 18 and their parents' marital status—both key predictors of attitudes toward romantic and sexual relationships, which may shape how students respond to shifts in the campus dating environment. First, early sexual experience reflects prior exposure to romantic or sexual relationships, which may influence students' comfort with casual encounters, dating expectations, and perceived norms around intimacy (Collins, 1974; Syed and Seiffge-Krenke, 2013; Yu and Zheng, 2020). It is therefore important to assess whether those with prior sexual experience are more responsive to changes in partner availability or social dynamics in college. Second, parental marital status has been associated with young adults' relationship behaviors, emotional security, and trust in long-term commitment (Rhoades et al., 2012). Students from different family structures may approach dating differently. For example, McLanahan and Sandefur (1994) finds that individuals raised by a single parent are less likely to adhere to prevailing social norms, while Cui and Fincham (2010) shows that young adults with divorced parents tend to experience lower quality in their dating relationships. Whether students from different family structures respond differently to skewed sex ratios—potentially due to variations in relationship expectations or stability-seeking preferences—remains an open empirical question.

To employ the heterogeneous analysis, we split the sample based on these two indicators and estimate the effects using the identification strategy outlined in Equation (2). [10] As shown in Table 8, students with exposure to sexual activities before entering colleges are more responsive to shifts in environment of college dating market. In particular, Panel A of Table 8 suggests that as college sex ratios increase, women with prior sexual experience report greater dating-related opportunities than those without such experience. Although the estimates for men's dating opportunities are not precisely estimated, the

[10] As suggested by Baker et al. (2025), compared to including interaction terms in the regression, sample splitting can reduce potential bias arising from the nonlinearity of interaction effects.

direction of the effects among sexually experienced men aligns with theoretical predictions related to partner availability. These findings suggest that students with early sexual experience are more sensitive to changes in the dating market, as theory would expect. Regarding casual sexuality, women show no significant differences based on prior sexual experience, as indicated by the coefficient magnitudes in Panel B of Table 8. However, men with pre-college sexual experience significantly reduce their casual sexual activity as sex ratios rise, suggesting greater responsiveness to shifting social norms and possibly a heightened respect for partners in more competitive dating environment. Overall, these results highlight that prior sexual experience is an important factor shaping how students respond to changes in campus dating dynamics with the increase of college sex ratios.

Students whose parents are currently married or cohabiting appear more responsive to changes in partner availability on campus, particularly female students. As shown in Panel A of Table 9, women with married or cohabiting parents report greater dating-related opportunities than their peers from separated or divorced families. While the coefficients for men are not statistically significant, they have the expected sign for those with married or cohabiting parents. In addition, both women and men from intact families are more likely to reduce casual sexual activity in response to rising sex ratios, consistent with the bargaining power channel, as shown in Panel B of Table 9. These patterns may imply greater emotional security, commitment orientation, or trust in long-term relationships among students from stable family backgrounds. Overall, these findings suggest that students with married or cohabiting parents are more likely to behave in ways aligned with theoretical predictions in the college dating market.

7 Conclusion

Taking advantage of the affluent individual-level data on students' dating-related information on campus, we estimate the relationship between college sex ratios and four groups of outcomes with regard to dating behaviors and attitudes. Our findings suggest that the increase of college male-to-female sex ratios is positively correlated with dating-related opportunities for women on campus and reduce casual sexual activities for both gender. We also find that students, especially women, who are more sexually active or come from intact families are more responsive to shifts in college sex ratios. Our findings, on the one hand, provide a gender-ratio-based explanation for the increasingly prevalent hook-up culture

on U.S. college campuses. Moreover, we extend the analysis of the impact of gender ratios on marital outcomes, commonly explored in the economics literature, to the pre-marital (i.e., dating) market.

Although our regression model includes a series of control variables at the school, cohort, and individual levels, unobserved omitted variable bias (OVB) may still exist. Therefore, the findings of this study should be interpreted as causal with caution. Future research could employ strategies such as a well-validated instrumental variable approach to further strengthen the causal interpretation of the relationship between sex ratios and dating behavior. Besides, future research could explore the mechanisms behind these patterns—for example, whether prior sexual experience shapes dating behavior and attitudes through channels such as self-confidence or social skills, or whether young adults' dating-related attitudes and behaviors reflect intergenerational influences. More importantly, the college dating market serves as a critical foundation for future marriage markets, shaping individuals' relationship experiences, preferences, and expectations. Understanding these early-stage dynamics can help develop strategies to address potential future disparities in marriage markets. While research on the long-term impact of sex ratios on marriage market outcomes is necessary, it remains scarce and warrants future investigation.

Disclosure of Interest

There are no relevant financial or non-financial competing interests to report.

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Figures and Tables

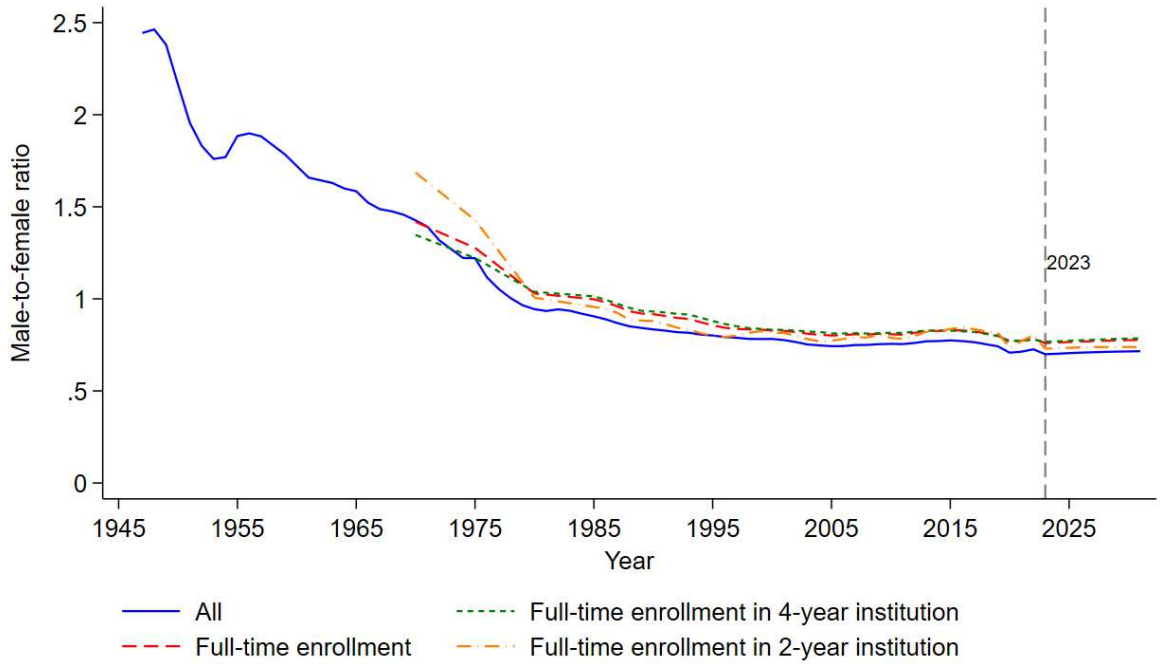


Figure 1: The national trend of male-to-female ratios for undergraduates in the U.S.

Note: The male-to-female ratio is calculated by using male undergraduates divided by female undergraduates. The total fall enrollments of undergraduates in degree-granting postsecondary institutions over the years are obtained from Tables 303.10 and 303.70 of 2023 Digest of Education Statistics at National Center for Education Statistics (NCES). Enrollment statistics after 2023 are projected using the Degree-Granting Institutions Projection Model by NCES.

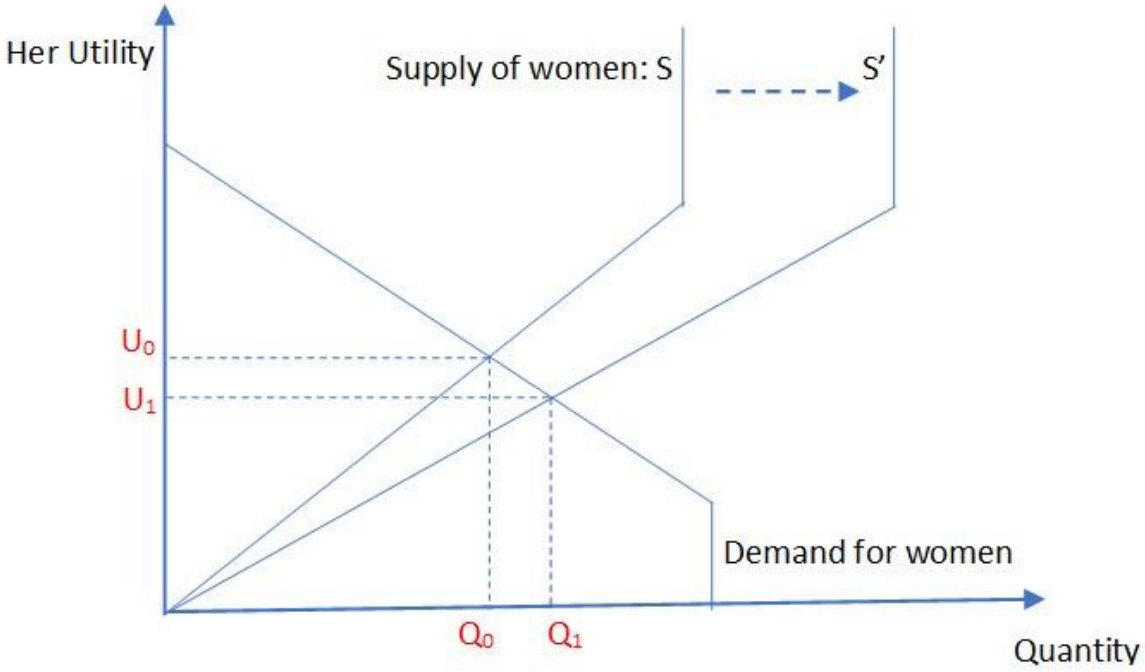


Figure 2: The dating market model with the increase of supply of women

Note: This figure presents a toy model of the dating market, illustrating the graphical results of increasing the supply of women on campus.

Table 1: Theoretical predictions for the signs of two index measures and corresponding estimates

Measures	With the increase of sex ratios					
	The channel of available mates		The channel of bargaining power		Estimated results	
	Men	Women	Men	Women	Men	Women
Dating-related opportunity	−	+			−	+
Casual sexuality			−	−	−	−

Note: The table presents the theoretical predictions for the signs of two index measures in this study, based on Becker (1973)'s theory. The last two columns report the corresponding signs of the estimated coefficients in main regressions.

Table 2: Sex ratios and dating-related opportunities by schools

School	(1) Male-to-female ratio	(2) Relationship	(3) Date	(4) Hookup	(5) Counts
Framingham State University	0.53	0.52	2.64	3.19	927
Carroll College	0.73	0.48	3.81	3.62	149
Radford University	0.75	0.33	3.97	4.31	101
Whitman College	0.75	0.45	3.28	3.82	1,025
Beloit College	0.77	0.80	3.22	4.73	147
Evergreen State College	0.80	0.64	3.45	3.04	53
Ithaca College	0.81	0.36	2.50	4.98	448
University of California-Santa Barbara	0.84	0.34	3.17	5.05	2,830
University of Illinois at Chicago	0.90	0.68	5.15	5.75	1,815
University of Arizona	0.90	0.49	2.55	2.26	1,361
Middle Tennessee State University	0.91	0.60	4.20	3.22	334
University of Pennsylvania	0.92	0.23	2.77	4.52	441
University of California-Riverside	0.92	0.54	3.40	2.44	1,060
Harvard University	0.93	0.47	4.09	3.81	158
University of Washington-Seattle Campus	0.93	0.41	4.53	3.85	533
Indiana University-Bloomington	0.94	0.42	4.07	4.57	1,043
University of Massachusetts-Amherst	1.01	0.30	2.76	4.28	3,355
Stony Brook University	1.02	0.61	3.91	4.72	844
University of California-Merced	1.05	0.64	3.65	2.35	142
Stanford University	1.07	0.46	4.47	4.80	1,227
Ohio State University-Main Campus	1.15	0.45	3.44	3.61	1,216
All	0.92	0.44	3.41	4.12	19,209

Note: The table reports the mean values of male-to-female ratios and numbers of relationships, dates, and hookups after attending colleges. The male-to-female ratio is calculated via the fall undergraduate enrollment by gender for each college and corresponding survey year. The relationship, date, and hookup variables are generated based on how many people a student has hooked up, dated, or had a relationship with since starting college. Counts refer to the total number of students who answered the survey questions in each college. The data on fall enrollment is extracted from the Integrated Postsecondary Education Data System (IPEDS). The data on students' relationship, date, and hookup behaviors is extracted from the Online College Social Life Survey (OCSLS).

Table 3: The impact of college sex ratios on the dating-related opportunities

	Panel A: Women						
	(1) Relationship	(2) Last relationship on campus	(3) Date	(4) Last date on campus	(5) Hookup	(6) Last hookup on campus	(7) Dating-related opportunity index
Men per woman	0.227**	0.214***	1.001**	0.211***	-0.964	0.182*	1.698***
	(0.096)	(0.037)	(0.433)	(0.065)	(1.124)	(0.094)	(0.468)
Counts	13,267	13,267	13,267	13,267	13,267	13,267	13,267
Adjusted R^2	0.152	0.113	0.140	0.069	0.147	0.090	0.220
Dependent mean	0.453	0.154	3.015	0.330	3.725	0.354	0
	(0.977)	(0.361)	(4.473)	(0.470)	(5.391)	(0.478)	(3.612)
	Panel B: Men						
	(1) Relationship	(2) Last relationship on campus	(3) Date	(4) Last date on campus	(5) Hookup	(6) Last hookup on campus	(7) Dating-related opportunity index
Men per woman	0.025	0.061	0.510	0.040	-1.353	-0.122	-0.085
	(0.082)	(0.051)	(0.498)	(0.053)	(1.945)	(0.115)	(0.630)
Counts	5,942	5,942	5,942	5,942	5,942	5,942	5,942
Adjusted R^2	0.150	0.116	0.172	0.078	0.233	0.119	0.273
Dependent mean	0.411	0.166	4.280	1.280	5.009	0.420	0
	(0.926)	(0.372)	(6.010)	(0.493)	(6.874)	(0.494)	(3.709)
Year-fixed effect	✓	✓	✓	✓	✓	✓	✓
Region-fixed effect	✓	✓	✓	✓	✓	✓	✓
College and individual characteristics	✓	✓	✓	✓	✓	✓	✓

Note: This table presents the estimated results of college sex ratios on measures of dating-related opportunities separately for women and men. Panel A reports the estimated results for women, while Panel B reports the estimated results for men. Each column represents a separate regression. The dating-related opportunity index in Column (7) is the unweighted sum of the z-scores for each outcome in Columns (1) to (6). Men per woman is the primary measure of sex ratios. Relationship/date/hookup measures the frequency of activities that happened after entering college. The last relationship/date/hookup on campus measures the probability of the most recent activity happening at the same college. Year and region fixed effects are included in all regressions. The total fall enrollment controls for the size of the dating market. The indicators of college tiers control for academic qualities. Other individual characteristics include a series of indicators for living on campus, being a Greek member, being an Athletics team member, age, being US-born, race, religion, urbanicity of high school location, mother's education level, parent's marital status, major, virginity before entering college, age at first vaginal intercourse, and liberal tendency variables. The dependent mean with standard deviation in parentheses is reported. Robust standard errors are clustered at the college level. Significance levels: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table 4: The impact of college sex ratios on casual sexuality

	Panel A: Women				
	(1) Sexual activities in the last date	(2) Sexual activities in the last hookup	(3) Numbers of hooking up with strangers	(4) No contact after the last hookup	(5) Casual sexuality index
Men per woman	-0.712**	-0.055	-1.347*	-0.043	-0.801**
	(0.291)	(0.280)	(0.718)	(0.034)	(0.371)
Counts	7,825	8,162	13,267	8,113	13,267
Adjusted R^2	0.082	0.152	0.087	0.017	0.074
Dependent mean	1.741	3.334	1.451	0.147	0
	(1.926)	(1.587)	(2.860)	(0.354)	(1.828)
	Panel B: Men				
	(1) Sexual activities in the last date	(2) Sexual activities in the last hookup	(3) Numbers of hooking up with strangers	(4) No contact after the last hookup	(5) Casual sexuality index
Men per woman	-0.635	-0.030	-1.317	-0.162**	-0.968*
	(0.549)	(0.138)	(1.157)	(0.063)	(0.556)
Counts	3,754	3,845	5,942	3,809	5,942
Adjusted R^2	0.128	0.149	0.180	0.012	0.159
Dependent mean	2.261	3.571	2.233	0.156	0
	(2.109)	(1.554)	(3.651)	(0.363)	(1.946)
Year-fixed effect	✓	✓	✓	✓	✓
Region-fixed effect	✓	✓	✓	✓	✓
College and individual characteristics	✓	✓	✓	✓	✓

Note: This table presents the estimated results of college sex ratios on measures of casual sexuality separately for women and men. Panel A reports the estimated results for women, while Panel B reports the estimated results for men. Each column represents a separate regression. The casual sexuality index in Column (5) is the unweighted sum of the z-scores for each outcome in Columns (1) to (4). Men per woman is the primary measure of sex ratios. Sexual activities (date, hookup, relationship) measure the frequency of activities that happened after entering college. No contact after the last hookup measures the probability of no further contact after the most recent hookup. Year and region fixed effects are included in all regressions. The total fall enrollment controls for the size of the dating market. The indicators of college tiers control for academic qualities. Other individual characteristics include a series of indicators for living on campus, being a Greek member, being an Athletics team member, age, being US-born, race, religion, urbanicity of high school location, mother's education level, parent's marital status, major, virginity before entering college, age at first vaginal intercourse, and liberal tendency variables. The dependent mean with standard deviation in parentheses is reported. Robust standard errors are clustered at the college level. Significance levels: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table 5: The impact of college sex ratios on emotional experiences and protective behaviors

	Panel A: Women		
	(1) Hookup partner's respect	(2) Willingness to end the last relationship	(3) Using condom at the first time of intercourse
Men per woman	-0.070	0.639*	0.009
	(0.056)	(0.329)	(0.043)
Counts	8,142	2,022	6,552
Adjusted R^2	0.030	0.037	0.110
Dependent mean	0.458	3.419	0.717
	(0.498)	(1.421)	(0.450)
	Panel B: Men		
	(1) Hookup partner's respect	(2) Willingness to end the last relationship	(3) Using condom at the first time of intercourse
Men per woman	-0.085*	-1.211***	0.147**
	(0.042)	(0.374)	(0.066)
Counts	3,822	845	2,461
Adjusted R^2	0.012	0.089	-0.013
Dependent mean	0.776	3.146	0.692
	(0.417)	(1.454)	(0.462)
Year-fixed effect	✓	✓	✓
Region-fixed effect	✓	✓	✓
College and individual characteristics	✓	✓	✓

Note: This table presents the estimated results of college sex ratios on emotional experiences and protective behavior in dating-related activities separately for women and men, following the identification model specified in Equation (2). Panel A reports the estimated results for women, while Panel B reports the estimated results for men. Men per woman is the primary measure of sex ratios. Each column represents a separate regression. In Column (1), hookup partner's respect indicates whether respondents ever suspected that their hookup partner respected them less after hookup (1-did not have the feeling, 0-otherwise). In Column (2), willingness to end the last relationship measures whether respondents are more likely to end the last relationship. In Column (3), using condom at the first time of intercourse measures whether respondents use condom at the first time of intercourse in the last relationship. Other control variables are consistent with those in Table 4. The dependent mean with standard deviation in parentheses is reported. Robust standard errors are clustered at the college level. Significance levels: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table 6: The impact of college sex ratios on dating-related opportunities and casual sexuality

	Panel A: Women				
	(1)	(2)	(3)	(4)	(5)
	Dating-related opportunity index				
Men per woman	1.789**	1.916***	1.466***	1.718***	1.698***
	(0.770)	(0.624)	(0.482)	(0.494)	(0.468)
Counts	13,267	13,267	13,267	13,267	13,267
Adjusted R^2	0.021	0.146	0.180	0.216	0.220
	Casual sexuality index				
Men per woman	0.042	-0.908*	-0.922**	-0.773*	-0.801**
	(0.347)	(0.387)	(0.395)	(0.374)	(0.371)
Counts	13,267	13,267	13,267	13,267	13,267
Adjusted R^2	0.004	0.032	0.035	0.068	0.074
	Panel B: Men				
	(1)	(2)	(3)	(4)	(5)
	Dating-related opportunity index				
Men per woman	-0.080	0.016	-0.450	-0.145	-0.085
	(0.792)	(0.593)	(0.758)	(0.634)	(0.630)
Counts	5,942	5,942	5,942	5,942	5,942
Adjusted R^2	0.020	0.147	0.206	0.272	0.273
	Casual sexuality index				
Men per woman	-0.006	-1.114**	-1.122*	-0.970*	-0.968*
	(0.487)	(0.505)	(0.604)	(0.539)	(0.556)
Counts	5,942	5,942	5,942	5,942	5,942
Adjusted R^2	0.017	0.049	0.072	0.158	0.159
Year and region fixed effects	✓	✓	✓	✓	✓
College type & demographics		✓	✓	✓	✓
Campus life			✓	✓	✓
Sexual history				✓	✓
Liberal attitudes					✓

Note: This table presents the estimated effects of college sex ratios on two indices: the dating-related opportunity index and the casual sexuality index, separately for women and men. Panel A reports the estimated results for women, while Panel B reports the estimated results for men. Each column represents a separate regression. The summary index in each panel is constructed via the unweighted sum of z-scores for each outcome within the index. Men per woman is the primary measure of sex ratios. The year fixed effect is included for all regressions. College type includes size and college tier. The total fall enrollment controls for the size of the dating market. The indicators of college tiers control for academic qualities. Demographics include age and a series of indicators for the US-born, races, religion, the urbanicity of high school location, mother's education level, and parent's marital status. Campus life includes three indicators for living on campus, being a Greek member, and being an Athletics team member as well as indicators for 36 detailed majors. Sexual history includes the indicator of being a virgin before entering colleges and the age of the first vaginal intercourse. Liberal attitudes include four variables measuring the liberal level on homosexual relations, abortion, child care, and political views. Robust standard errors are clustered at the college level. Significance levels: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table 7: Robustness checks with alternative sex ratio measures and inverse propensity weighting method

	Women		Men	
	(1) Dating opportunity index	(2) Casual sexuality index	(3) Dating opportunity index	(4) Casual sexuality index
	Panel A: Full-time students enrollment			
Men per Women	1.706***	-0.787**	0.010	-0.965*
	(0.439)	(0.357)	(0.624)	(0.527)
Counts	13,267	13,267	5,942	5,942
Adjusted R^2	0.220	0.074	0.273	0.159
	Panel B: Part-time students enrollment			
Men per Women	-0.096	0.442**	0.298	0.232
	(0.286)	(0.208)	(0.206)	(0.221)
Counts	13,267	13,267	5,942	5,942
Adjusted R^2	0.219	0.074	0.273	0.158
	Panel C: Averaged over four years: two-year lag, the survey year, and one-year lead			
Men per Women	1.622***	-0.940**	-0.149	-1.056*
	(0.446)	(0.381)	(0.624)	(0.543)
Counts	13,267	13,267	5,942	5,942
Adjusted R^2	0.220	0.074	0.273	0.159
	Panel D: Averaged over four years: one-year lag, the survey year, and two-year lead			
Men per Women	1.780***	-0.921**	-0.118	-1.041*
	(0.477)	(0.405)	(0.644)	(0.580)
Counts	13,267	13,267	5,942	5,942
Adjusted R^2	0.220	0.074	0.273	0.159
	Panel E: Averaged over four years: the survey year and three-year lead			
Men per Women	1.945***	-0.971**	-0.026	-1.080*
	(0.544)	(0.439)	(0.674)	(0.615)
Counts	13,267	13,267	5,942	5,942
Adjusted R^2	0.220	0.074	0.273	0.159

Continued on next page

	Women		Men	
	(1) Dating opportunity index	(2) Casual sexuality index	(3) Dating opportunity index	(4) Casual sexuality index
	Panel F: Inverse propensity weighting			
Men per women	1.692***	0.054	-0.153	-0.844
	(0.369)	(0.330)	(0.629)	(0.550)
Counts	13,267	13,267	5,942	5,942
Adjusted R^2	0.221	0.069	0.271	0.159
Year-fixed effect	✓	✓	✓	✓
Region-fixed effect	✓	✓	✓	✓
College and individual characteristics	✓	✓	✓	✓

Note: This table presents robustness checks for the estimated effects of college sex ratios on two outcome indices, using alternative measures of sex ratios and a different regression method, following the identification model specified in Equation (2). Panel A reports estimates using the male-to-female ratio of full-time student enrollment as an alternative measure of sex ratios. Panel B reports estimates using the male-to-female ratio of part-time student enrollment as an alternative measure. Panels C to E report estimates using male-to-female ratios averaged over four years around the survey year. Panel C uses ratios from two years before, the survey year, and one year after. Panel D uses ratios from one year before, the survey year, and two years after. Panel E uses ratios from the survey year and three years after. Panel F reports estimates obtained by applying the inverse propensity score weighting method. Each column represents a separate regression. Other control variables are consistent with those in Table 6, Column (5). Robust standard errors are clustered at the college level. Significance levels: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table 8: The impact of college sex ratios on dating-related opportunities and casual sexuality by sexual history

	Women		Men	
	No sex before 18	Have sex before 18	No sex before 18	Have sex before 18
	Panel A. Dating-related opportunity index			
Men per woman	1.541***	1.924***	1.165	-1.038
	(0.519)	(0.496)	(0.739)	(0.735)
Counts	5,291	7,976	2,296	3,646
Adjusted R^2	0.262	0.190	0.298	0.213
	Panel B. Casual sexuality index			
Men per woman	-0.803*	-0.769**	-0.797	-1.226*
	(0.434)	(0.312)	(0.591)	(0.599)
Counts	5,291	7,976	2,296	3,646
Adjusted R^2	0.059	0.038	0.079	0.090
Year-fixed effect	✓	✓	✓	✓
Region-fixed effect	✓	✓	✓	✓
College and individual characteristics	✓	✓	✓	✓

Note: This table presents the estimated effects of college sex ratios on two indices: the dating-related opportunity index and the casual sexuality index, separately for women and men, following the identification model specified in Equation (2). Each column represents a separate regression with the sample restricted by the sexual history of whether the student keeps virginity before entering college. All other variables are consistent with those in Table 3 and Table 4. Robust standard errors are clustered at the college level. Significance levels: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table 9: The impact of college sex ratios on dating-related opportunities and casual sexuality by parental marriage status

	Women		Men	
	Married or cohabiting	Not married or cohabiting	Married or cohabiting	Not married or cohabiting
	Panel A. Dating-related opportunity index			
Men per woman	2.038***	0.797	-0.167	0.606
	(0.550)	(0.477)	(0.679)	(0.964)
Counts	9,171	4,096	4,365	1,577
Adjusted R^2	0.231	0.201	0.289	0.235
	Panel B. Casual sexuality index			
Men per woman	-0.851**	-0.704	-1.244**	-0.249
	(0.333)	(0.515)	(0.558)	(0.642)
Counts	9,171	4,096	4,365	1,577
Adjusted R^2	0.080	0.068	0.162	0.146
Year-fixed effect	✓	✓	✓	✓
Region-fixed effect	✓	✓	✓	✓
College and individual characteristics	✓	✓	✓	✓

Note: This table presents the estimated effects of college sex ratios on two indices: the dating-related opportunity index and the casual sexuality index, separately for women and men, following the identification model specified in Equation (2). Each column represents a separate regression with the sample restricted by parental marriage status indicating whether students' parents are currently married or cohabiting. All other variables are consistent with those in Table 3 and Table 4. Robust standard errors are clustered at the college level. Significance levels: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Appendix

Notes on Data Sources and Measurement Construction

Data for all outcomes of dating-related behaviors and attitudes are obtained from the Online College Social Life Survey (OCSLS) designed by Paula England and collected between 2005 and 2011, covering more than 23,940 students at 21 four-year colleges and universities in the U.S. Data available at https://pages.nyu.edu/ocsls/2010/. This survey provides detailed information on students' sexual behaviors and attitudes in the college hookup context. The following discussion introduces my selection rules for each outcome included for the construction of indices. The details on survey questions and coding methods for variables are presented in Appendix Table A2.

In general, the behavioral measures outweigh the attitudinal measures when I was searching relevant survey questions for each index. Because of the existing sexual double standard on the college campus that women are judged more harshly than men with regard to sex (England et al., 2012), the reporting bias might be more prevalent in attitudinal measures than in behavioral measures of what students have done in their college life. In addition, the measures for activities after entering colleges outweigh the measures for activities that ever happened because those activities that occurred before college may bring measurement errors for the performances in the dating market on a college campus. Finally, when the attitudinal measures have to be included, the hypothetical questions on students' attitudes are not considered.

To construct the dating-related opportunity index, I searched every question about dating opportunities and picked those following the selection rules. The numbers of hookups/dates/relationships since the student started college are included. These variables measure students' dating opportunities since they began to colleges at the intensive and extensive margins. However, those dating opportunities are not restricted to students at the same college. To rule out the substitution of partners from other neighborhood colleges and reflect the dating opportunities at the same campus, the indicators of whether a student has the most recent hookup/date/relationship with someone at the same college are also included. Other candidates for the dating opportunity index in the survey have some drawbacks and are finally excluded. For example, there are attitudinal questions asking students' expectations on dating-related opportunities at their schools. The attitudinal questions in the survey are: 1) I wish there were more opportunities for going on dates before a relationship is established at my school; 2) I wish there were more opportunities for hooking up at my school; 3) I wish there were more opportunities for finding someone to have a relationship with at my school. [Options: Strongly agree, Agree, Disagree, Strongly disagree]. Compared with the objective questions on students' actual performances, these subjective questions on students' attitudes may easily suffer from reporting bias and measurement errors. Students who strongly wish for more hookup opportunities are not necessarily in schools with fewer hookup opportunities.

To construct the casual sexuality index, I searched every question about casual sex and picked those following the selection rules. The sexual activities in the last date/hookup measure the intensity of sexual activities in a nonexclusive relationship. The sexual activities occurred in relationships are not counted as casual sex and so are excluded. Besides, the indicator of no contact after the last hookup and the number of hookups with strangers since started colleges are also included. These two variables are trying to measure the casualness of hookups that occurred after entering colleges. Other candidates for the casual sexuality index include the number of sexual partners and the indicator of whether the student ever had two ongoing sexual partnerships at the same time. I exclude them because the two measures cover all activities ever happened before. Some activities might happen before students entering colleges.

The measurement errors cannot be addressed based on the current information in the survey.

Four variables are constructed to measure students' liberal attitudes, with higher values indicating more liberal views. 1) The survey question about homosexual relations is: "what is your opinion about sexual relations between two adults of the same sex?" The variable is coded as 1 "Always wrong"; 2 "Almost always wrong"; 3 "Wrong only sometimes"; 4 "Not wrong at all." 2) The survey question about abortion is: "please tell whether or not you think it should be possible for a pregnant woman to obtain a legal abortion." The variable is coded as 1 "if the woman's health is at risk", 2 "if the woman became pregnant as a result of rape", 4 "if the woman wants it for any reason", 7 "if all three options are checked", 0 "if no one is checked." 3) The survey question about child care is: "how do you envision that your children will be cared for?" The variable is coded as 1 "Women will stop working and stay at home when they're young", 2 "my partner and I will share the responsibility", 3 "men will stop working and stay at home when they're young." 4) The survey question about political view is "how would you characterize your political view?" The variable is coded as 1 "Very conservative", 2 "Somewhat conservative", 3 "Middle of the road", 4 "Somewhat liberal", 5 "Very liberal."

There are three key advantages to using standardized indices as the primary outcomes in this study. First, this approach offers a more comprehensive assessment of sex ratio effects by capturing a broader range of relevant outcomes rather than relying on narrowly defined measures in existing literature. Second, indices enhance statistical power, as all included measures are expected to have consistent signs (Kling et al., 2007; Law and Marks, 2020). For example, if each variable within the dating opportunities index for women increases by one standard deviation with a one-unit rise in college sex ratios, the index itself will increase by three standard deviations. Even if some individual measures are statistically insignificant, the overall index is more likely to retain significance. However, if the effects of included measures offset each other, the estimated index effect will be close to zero. Third, given that the two theoretical channels can yield inconclusive predictions for specific dating behaviors, using an index helps mitigate noise from contradictory effects, providing a clearer and more robust interpretation of how sex ratios shape dating behaviors. For example, as the number of available men increases, both channels predict that women will have a higher probability of entering long-term relationships, as supported by prior research (Angrist, 2002; Brainerd, 2017; Abramitzky et al., 2011; Pestel, 2021). Theoretically, the effect on men is ambiguous: the availability of partners channel suggests men may be less likely to form relationships due to a shortage of female mates, whereas the bargaining power channel suggests they may be more inclined to commit. Panel B in Figure A2 supports the availability of partners channel, showing that as male-to-female ratios rise, women are more likely to have a recent long-term relationship with someone from the same school. However, Panel A in Figure A2 shows no significant association between sex ratios and the number of relationships for women. Similarly, sex ratios negatively correlate with men's likelihood of long-term relationships, supporting the availability of partners channel. For women, the theoretical predictions are also mixed: while the availability of mates channel suggests they will engage in more hookups when men are more available, the bargaining power channel suggests the opposite, as increased bargaining power may lead women to participate in fewer casual sexual encounters.

Appendix Figures and Tables

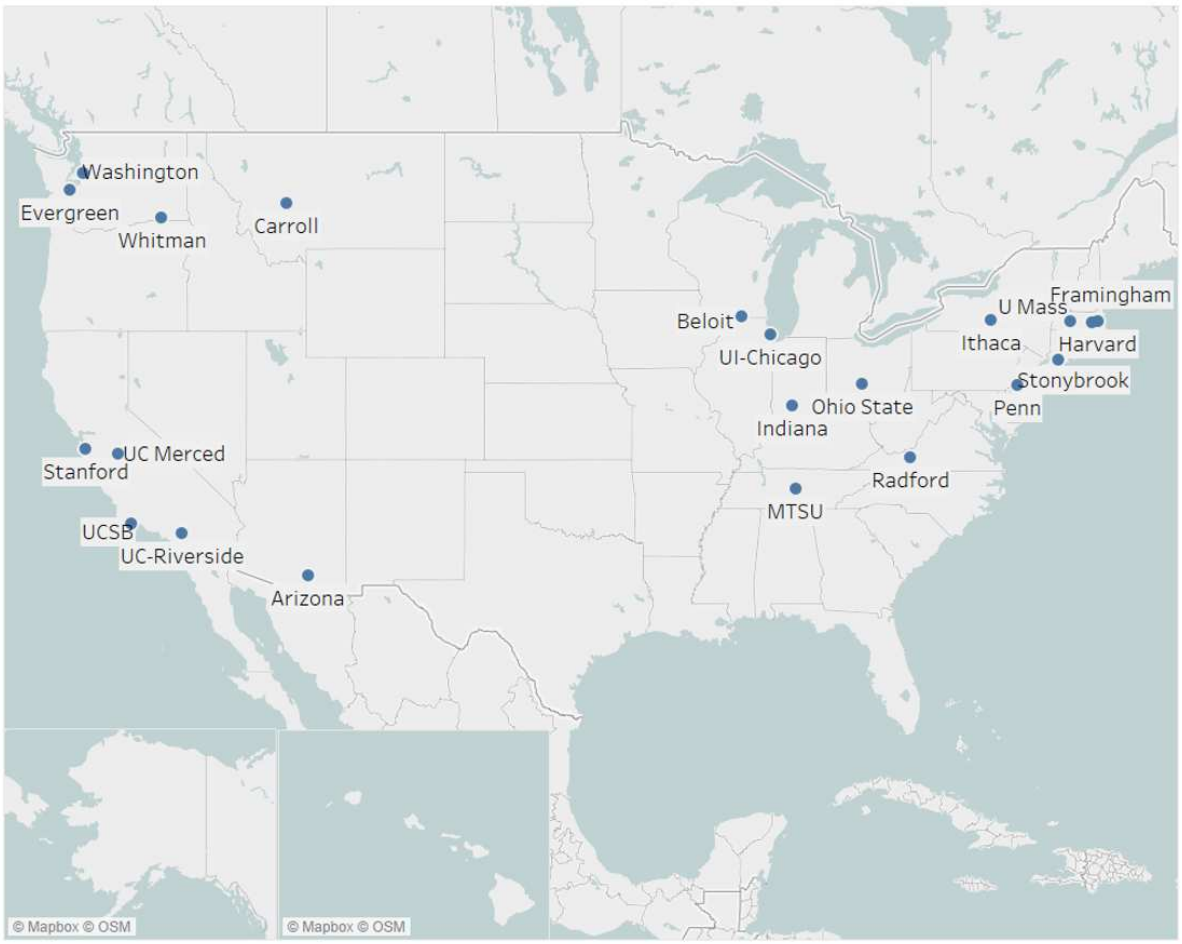
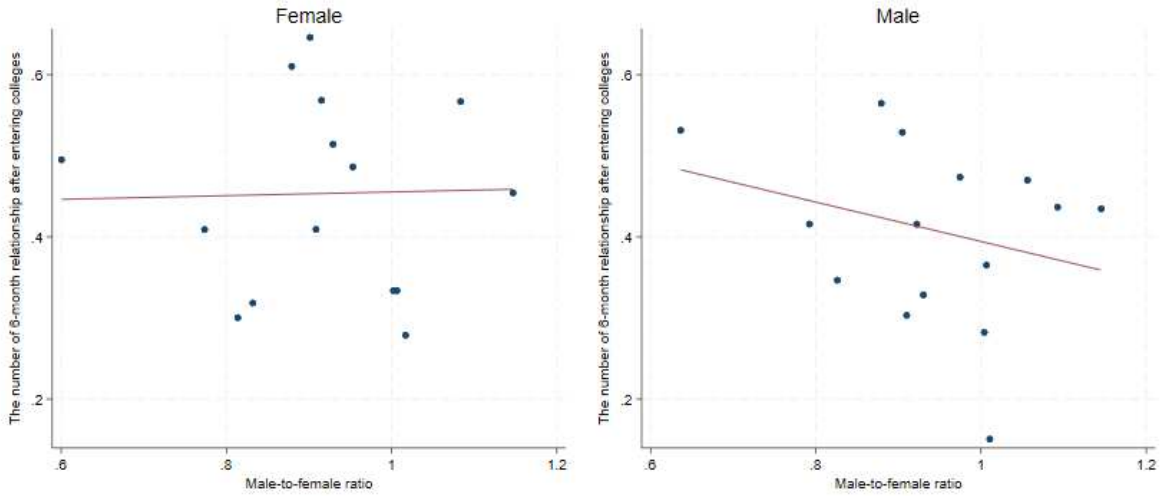


Figure A1: The map of colleges

Note: This figure presents a map of college locations, with data sourced from IPEDS and visualized using Tableau software.

Panel A. The number of 6-month relationships



Panel B. The most recent 6-month relationship on campus

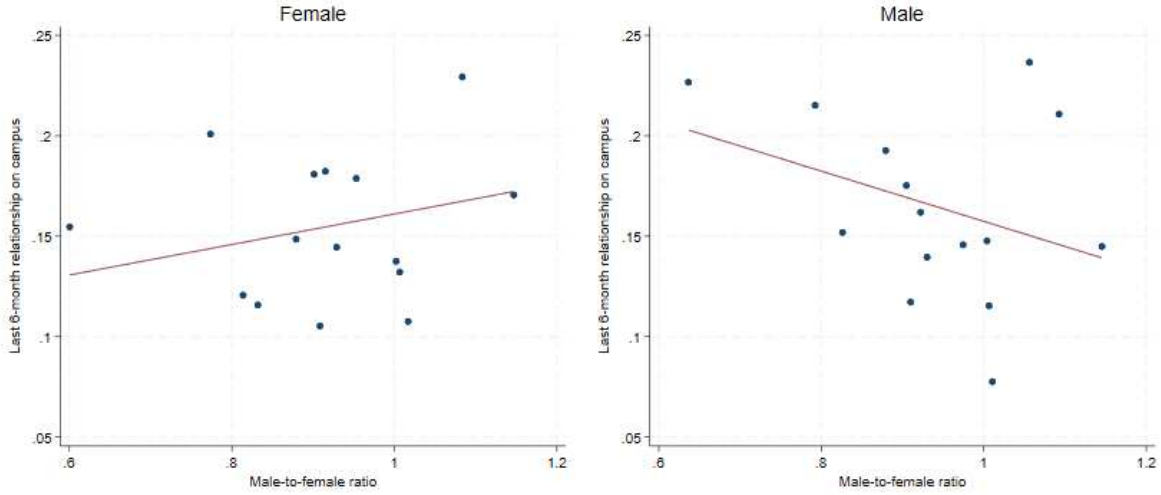


Figure A2: Dating opportunities versus college sex ratios by gender

Note: This figure presents the bin scatter plot of college sex ratios with respect to students' dating opportunities by gender. Panel A presents the dating opportunities measured by the total number of 6-month relationship on campus. Panel B presents the dating opportunities measured by whether students having the most recent romance with the one from the same campus. The male-to-female ratio is calculated by using male undergraduates divided by female undergraduates. The number of male and female undergraduates is extracted from the total fall enrollment by gender in each college and survey year in the Integrated Postsecondary Education Data System. The data on students' 6-month relationships and the last 6-month relationships are obtained from the Online College Social Life Survey. The sample includes 19,209 undergraduates in 21 four-year colleges, as shown in Table 1.

Table A1: The correlation coefficients of sex ratios in the selected year

	Sex ratio in 2005	Sex ratio in 2007	Sex ratio in 2009	Sex ratio in 2011
Sex ratio in 2005	1.00			
Sex ratio in 2007	0.99	1.00		
Sex ratio in 2009	0.99	0.99	1.00	
Sex ratio in 2011	0.94	0.91	0.95	1.00

Note: This table presents the correlation coefficients of sex ratios in selected years. The sex ratio is calculated by dividing the number of male undergraduates by the number of female undergraduates. The number of male and female undergraduates is extracted from the total fall enrollment by gender in each college and survey year in the Integrated Postsecondary Education Data System.

Table A2: Outcome variables, corresponding survey questions, and coding method for analysis

Variable Name	Survey Question	Coding Method
Hookup	1. Since you started college (counting during the summer or during the term abroad), how many people have you hooked up with whom you didn't know before that night? [Options: 0-15] 2. Since you started college (counting during the summer or during the term abroad), how many people have you hooked up with in the case where you were not already in a romantic relationship with the person but you did know him or her? [Options: 0-15]	This variable sums the options in the two questions.
Date	1. Since you started college, with how many people have you been on dates with whom you were not already in a relationship, where the date involved going to a fraternity, sorority, or dorm event? [Options: 0-15] 2. Since you started college, with how many people have you been on dates with whom you were not already in a relationship, where the date did not involve going to a fraternity, sorority, or dorm event? [Options: 0-15]	This variable sums the options in the two questions.
Relationship	1. Since you started college have you been in a romantic relationship that has lasted longer than six months? [Options: Yes or No] 2. If yes, how many? [Options: 1,2,3,4,5 or more]	"No" in Q1 is coded as 0. "1-4" in Q2 are coded as the option. "5 or more" in Q2 is coded as 5.
Last hookup on campus	Now some questions about the last time you hooked up (whether or not you knew the person beforehand): 1. Is the person you hooked up with a student at your college? [Options: Yes, No, Don't know]	If the variable "Hookup" is not 0 and the option is "Yes" in Q1, the variable is coded as 1. All others are coded as 0.
Last date on campus	Now some questions about the last date that you went on with someone you were not already in an exclusive relationship with: 1. Was your date a student at the same college as you? [Options: Yes, No, Don't know]	If the variable "Date" is not 0 and the option is "Yes" in Q1, the variable is coded as 1. All others are coded as 0.

Continued on next page

Variable Name	Survey Question	Coding Method
Last relationship on campus	If you have been in more than one relationship that lasted for longer than 6 months, the following questions pertain to the most recent 6-month relationship that you have had, and the person you romantically involved with as your significant other: 1. Were you romantically involved with this person before you started college, or did the relationship begin after you started college? [Options A. I was involved with the person before I started college; Option B. I became involved with the person after I started college.] 2. Was/is your significant other a student at your college? [Options: Yes, No]	If "Option B" in Q1 and "Yes" in Q2, the variable is coded as 1. All others are coded as 0.
Sexual activities in the last date	The following questions are about any sexual activity that occurred during your most recent date with someone you weren't already in an exclusive relationship with. 1. Which sexual behaviors did you engage in? (Check all that occurred) [Options: 1 Kissing or making out; 2 You touched your partner's breast or buttocks area; 3 Had your breast or buttocks area touched by your partner; 4 You stimulated your partner's genitals with your hand; 5 Had your genitals stimulated by your partner's hand; 6 You performed oral sex on your partner; 7 Your partner performed oral sex on you; 8 Had vaginal sexual intercourse; 9 Anal intercourse: you penetrated your partner; 10 Anal intercourse: your partner penetrated you; 11 You stimulated your own genitals; 12 Your partner stimulated her/his genitals; 13 You had an orgasm; 14 You think your partner had an orgasm]	The variable is indicating the most intensive sexual activities that occurred: 0 for nothing happened [no check on options 1-12]; 1 for kiss only [check on option 1]; 2 for touch [check on option 2 or 3 at most]; 3 for stimulating genitals [check on 4 or 5 or 11 or 12 at most]; 4 for oral sex [check on 6 or 7 at most]; 5 for vaginal sex [check on option 8 at most]; 6 for anal intercourse [check on option 9 or 10 at most].

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Variable Name	Survey Question	Coding Method
Sexual activities in the last hookup	The following questions are about any sexual activity that occurred during the last time you hooked up (whether or not you knew the person beforehand). 1. Which sexual behaviors did you engage in? (Check all that occurred) [Options: 1 Kissing or making out; 2 You touched your partner's breast or buttocks area; 3 Had your breast or buttocks area touched by your partner; 4 You stimulated your partner's genitals with your hand; 5 Had your genitals stimulated by your partner's hand; 6 You performed oral sex on your partner; 7 Your partner performed oral sex on you; 8 Had vaginal sexual intercourse; 9 Anal intercourse: you penetrated your partner; 10 Anal intercourse: your partner penetrated you; 11 You stimulated your own genitals; 12 Your partner stimulated her/his genitals; 13 You had an orgasm; 14 You think your partner had an orgasm]	The variable is indicating the most intensive sexual activities that occurred: 0 for nothing happened [no check on options 1-12]; 1 for kiss only [check on option 1]; 2 for touch [check on option 2 or 3 at most]; 3 for stimulating genitals [check on 4 or 5 or 11 or 12 at most]; 4 for oral sex [check on 6 or 7 at most]; 5 for vaginal sex [check on option 8 at most]; 6 for anal intercourse [check on option 9 or 10 at most].
No contact after the last hookup	The following questions are about any sexual activity that occurred during the last time you hooked up (whether or not you knew the person beforehand). 1. Have you emailed or IM'd this person since you hooked up? [Options: Yes; No] 2. Have you talked (on the phone or in person) to this person since you hooked up? [Options: Yes, we have talked since then; No, we haven't talked since then]	The variable is coded as 1 if "No" are selected in both questions.
Numbers of hookups with strangers	1. Since you started college (counting during the summer or during the term abroad), how many people have you hooked up with whom you didn't know before that night? [Options: 0-15]	The variable is coded as what the option is.
Hookup partner's respect	Since you started college (counting during summers or during a term abroad): 1. Have you ever hooked up with someone and afterward had the feeling that the person respected you less because you hooked up with him/her? [Options: Yes; No]	The variable is coded as 1 if "No" is selected and as 0 if "Yes" is selected.

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Variable Name	Survey Question	Coding Method
Willingness to end the last relationship	In some breakups, one person wanted the relationship to end more than the other. How was it with this break up? [Options: I wanted to break up much more; I wanted to break up somewhat more; We wanted to break up about the same time; My partner wanted to break up somewhat more; My partner wanted to break up much more.]	The variable is coded as 5 if "I want to break up much more" is selected, as 4 if "I somewhat more" is selected, as 3 if the same, as 2 if "partner want somewhat more" is selected, and as 1 if "partner much more" is selected.
Using condom at the first time of intercourse	Did you use a condom the first time you had intercourse with this significant other? [Options: Yes; No]	The variable is coded as 1 if "Yes" is selected and as 0 if "No" is selected.

Note: This table presents variables, corresponding survey questions, and coding methods for constructing variables in this study. The survey can be accessed from the official website of the Online College Social Life Survey.

Table A3: Descriptive statistics for outcomes by the mean of college sex ratios

	Women		Men	
	Low sex ratios	High sex ratios	Low sex ratios	High sex ratios
	Dating-related opportunities			
Hookup	3.81	3.63	5.09	4.95
	(5.53)	(5.23)	(7.05)	(6.74)
Last hookup on campus	0.33	0.38	0.42	0.42
	(0.47)	(0.49)	(0.49)	(0.49)
Date	3.04	2.99	4.19	4.35
	(4.48)	(4.46)	(5.76)	(6.19)
Last date on campus	0.31	0.35	0.42	0.41
	(0.46)	(0.48)	(0.49)	(0.49)
Relationship	0.47	0.44	0.48	0.36
	(1.00)	(0.95)	(0.98)	(0.88)
Last relationship on campus	0.15	0.16	0.19	0.15
	(0.36)	(0.37)	(0.39)	(0.36)
Dating-related opportunity index	-0.06	0.07	0.14	-0.11
	(3.64)	(3.58)	(3.78)	(3.65)
	Casual sexuality			
Sexual activities in the last date	1.79	1.69	2.25	2.27
	(1.95)	(1.90)	(2.09)	(2.12)
Sexual activities in the last hookup	3.37	3.30	3.57	3.57
	(1.58)	(1.59)	(1.56)	(1.55)
No contact after the last hookup	0.15	0.15	0.16	0.15
	(0.35)	(0.35)	(0.37)	(0.36)
Numbers of hookups with strangers	1.51	1.38	2.23	2.23
	(2.94)	(2.77)	(3.69)	(3.62)
Casual sexuality index	0.05	-0.05	0.002	-0.001
	(1.83)	(1.82)	(1.97)	(1.93)
Counts	6,898	6,369	2,542	3,400

Note: The table presents descriptive statistics for students' characteristics by the mean of college sex ratios. The mean of college sex ratios in the sample is 0.92. Colleges with sex ratios below the mean are classified as having low sex ratios, while those with ratios above the mean are classified as having high sex ratios. The mean values of outcome measures are reported in the main cells, with standard deviations provided in parentheses.

Table A4: Descriptive statistics for students' characteristics by the mean of college sex ratios

	Women		Men	
	Low sex ratios	High sex ratios	Low sex ratios	High sex ratios
	Dating market size			
Fall enrollment	16,650	24,074	16,390	22,654
	(9,668)	(10,966)	(10,159)	(10,477)
	College tier			
Tier	1.63	1.03	1.66	1.02
	(0.91)	(0.25)	(0.92)	(0.21)
	Demographics			
Age	19.86	19.65	20.23	19.93
	(1.61)	(1.50)	(1.79)	(1.62)
US born	0.90	0.90	0.87	0.89
	(0.30)	(0.30)	(0.34)	(0.31)
Nonwhite	0.34	0.34	0.33	0.34
	(0.47)	(0.48)	(0.47)	(0.47)
No religions	0.23	0.18	0.25	0.20
	(0.42)	(0.39)	(0.43)	(0.40)
High school location: urban	0.39	0.33	0.37	0.35
	(0.49)	(0.47)	(0.48)	(0.48)
Mother's education attainment:	0.48	0.51	0.53	0.54
Bachelor degree or above	(0.50)	(0.50)	(0.50)	(0.50)
Parents married & cohabitating	0.69	0.69	0.74	0.73
	(0.46)	(0.46)	(0.44)	(0.44)
	Majors & campus life			
Arts, humanities & social	0.36	0.34	0.37	0.39
sciences	(0.48)	(0.47)	(0.48)	(0.49)
Natural sciences and engineering	0.09	0.10	0.16	0.16
	(0.29)	(0.30)	(0.37)	(0.37)
Major undecided	0.28	0.28	0.29	0.29
	(0.45)	(0.45)	(0.46)	(0.45)
Live on campus	0.49	0.68	0.45	0.67
	(0.50)	(0.46)	(0.50)	(0.47)
Greek member	0.13	0.13	0.15	0.15
	(0.33)	(0.34)	(0.36)	(0.36)
Athletics team member	0.06	0.06	0.13	0.12
	(0.23)	(0.24)	(0.34)	(0.32)
	Sexual history			
Virgin before entry of college	0.41	0.39	0.41	0.37
	(0.49)	(0.49)	(0.49)	(0.48)
Age of the first vaginal	40.84	40.55	39.65	38.96
intercourse	(37.26)	(37.23)	(36.56)	(36.44)

Continued on next page

	Women		Men	
	Low sex ratios	High sex ratios	Low sex ratios	High sex ratios
	Liberal attitudes			
Homosexuality	3.43	3.26	3.16	2.88
	(0.92)	(0.94)	(1.03)	(1.00)
Abortion	5.43	4.64	5.39	4.34
	(2.31)	(2.81)	(2.34)	(2.90)
Political views	2.61	2.65	2.60	2.67
	(1.18)	(1.09)	(1.11)	(0.99)
Child care	1.77	1.79	1.84	1.84
	(0.43)	(0.42)	(0.39)	(0.39)
Counts	6,898	6,369	2,542	3,400

Note: The table presents descriptive statistics for students' characteristics by the mean of college sex ratios. The mean of college sex ratios in the sample is 0.92. Colleges with sex ratios below the mean are classified as having low sex ratios, while those with ratios above the mean are classified as having high sex ratios. The mean values of students' characteristics are reported in the main cells, with standard deviations provided in parentheses.