

Original Investigation

Trajectory Analysis of the Campus Serial Rapist Assumption

Kevin M. Swartout, PhD; Mary P. Koss, PhD; Jacquelyn W. White, PhD; Martie P. Thompson, PhD; Antonia Abbey, PhD; Alexandra L. Bellis, BS

IMPORTANCE Rape on college campuses has been addressed recently by a presidential proclamation, federal legislation, advocacy groups, and popular media. Many initiatives assume that most college men who perpetrate rape are serial rapists. The scientific foundation for this perspective is surprisingly limited.

OBJECTIVE To determine whether a group of serial rapists exists by identifying cohesive groups of young men, indicated by their trajectories of rape likelihood across high school and college.

DESIGN, SETTING, AND PARTICIPANTS Latent class growth analysis of the 2 largest longitudinal data sets of adolescent sexual violence on college campuses using 2 distinct groups of male college students. The first group was used for derivation modeling (n = 847; data collected from August 1990 through April 1995) and the second for validation modeling (n = 795; data collected from March 2008 through May 2011). Final data analyses were conducted from February 16, 2015, through February 20, 2015.

MAIN OUTCOMES AND MEASURES Rape perpetration assessed using the Sexual Experiences Survey.

RESULTS Across samples, 178 of 1642 participants (10.8%) reported having perpetrated at least 1 rape from 14 years of age through the end of college. A 3-trajectory model best fit both the derivation and validation data sets. Trajectories reflected low or time-limited (92.6% of participants), decreasing (5.3%), and increasing (2.1%) rape patterns. No consistently high trajectory was found. Most men who perpetrated a rape before college were classified in the decreasing trajectory. During college, the increasing trajectory included 14 men (15.2%) who reported having perpetrated a rape, the decreasing trajectory included 30 men (32.6%), and the low or time-limited included 48 men (52.2%). No participant in the low or time-limited trajectory reported perpetrating a rape during more than 1 period. Most men (67 [72.8%]) who committed college rape only perpetrated rape during 1 academic year.

CONCLUSIONS AND RELEVANCE Although a small group of men perpetrated rape across multiple college years, they constituted a significant minority of those who committed college rape and did not compose the group at highest risk of perpetrating rape when entering college. Exclusive emphasis on serial predation to guide risk identification, judicial response, and rape-prevention programs is misguided. To deter college rape, prevention should be initiated before, and continue during, college. Child and adolescent health care professionals are well positioned to intervene during the early teenage years by informing parents about the early onset of nonconsensual sexual behavior.

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Author Affiliations: Department of Psychology, Georgia State University, Atlanta (Swartout, Bellis); Department of Health Promotion Sciences, Mel and Enid Zuckerman College of Public Health, University of Arizona, Tucson (Koss); Department of Psychology, University of North Carolina at Greensboro, Greensboro (White); Institute on Family and Neighborhood Life, Clemson University, Clemson, South Carolina (Thompson); Department of Psychology, Wayne State University, Detroit, Michigan (Abbey).

Corresponding Author: Kevin M. Swartout, PhD, Department of Psychology, Georgia State University, 140 Decatur St, Ste 1108, Atlanta, GA 30303 (kswartout@gsu.edu).

Sexual violence on college campuses has been the focus of federal legislation and intense public discourse, including new provisions to the Violence Against Women Act, a Presidential Executive Order for a White House Task Force to Protect Students from Sexual Assault,¹ a scientific review² issued by the Office of the Vice President, and widespread popular media coverage.³⁻⁵ An assumption runs throughout this discussion that a small distinct group of young men—often labeled *serial rapists*—commit most rapes on college campuses. For example, the White House Council on Women and Girls stated, “campus assailants are often serial offenders.”^{2(p6)} The National Judicial Education Program concludes, “Like stranger rapists, most nonstranger rapists are serial offenders.”^{6(p2)} A major Internet resource for persons who have been raped advised the White House Task Force that “three percent of college men are responsible for more than 90% of rapes.”^{7(p2)} One publication for practitioners in law, health, and prevention warned, “the vast majority of sexual assaults are in fact serial rapes.”^{8(p1359)} Yet another article written for health and prevention practitioners stated, “the findings from recent studies indicate that these men [sexual predators on campus] are as likely to be serial and multi-faceted offenders as are incarcerated rapists.”^{9(p55)} These statements characterize what we label as the *campus serial rapist assumption*, which has become the dominant model of campus sexual assault but has not been rigorously tested.

Although the serial rapist assumption is widely taken as fact by politicians and the popular press, it appears to be premised on a single source.¹⁰ In this study, male students responded yes or no to 4 questions about attempted or completed sexual intercourse by threats of bodily harm or actual force, oral sex by threats or bodily harm or actual force, and sexual intercourse with someone too intoxicated to resist. Combining responses to these items, 120 of the 1882 participants (6.4%) were identified as rapists. More than one-third (36.6%) of the identified rapists reported a single nonconsensual act. Men who disclosed more than 1 act were labeled *repeat rapists* (76 [63.3%]). The authors divided the total number of attempted and completed rape acts disclosed by repeat rapists (n = 439) by the total number of acts reported by all respondents (n = 483), concluding that “a majority of the undetected rapists...were repeat offenders”^{10(p80)} who perpetrated 90.8% of the rape acts disclosed. These findings have since been interpreted with an important semantic difference: “Of the 120 rapists...76 (63% of them) were serial rapists...”^{9(p56)} This statement implies that at least 2 separate offenses were committed by the same perpetrator against multiple victims^{11,12} under similar circumstances (eg, tactics, location, or victim characteristics).^{12,13} Every empirical study has strengths and limitations and must be scrutinized before it is used to inform policy. The aforementioned study¹⁰ had a large sample size; however, it was a cross-sectional design at a single institution and aggregated rapes that occurred before and during college.

The goal of this study was to more definitively investigate the extent to which most campus rapists consistently perpetrated rape during their high school and college years, using trajectory analyses of data from 2 large longitudinal studies of

At a Glance

- This study tested the assumption that most college men who commit rape do so consistently across time.
- 10.8% (178 of 1642) of the college men reported perpetrating at least 1 rape from 14 years of age through the end of college.
- Analyses revealed 3 cohesive groups of men in terms of their likelihood to commit rape across time: men with low or time-limited (92.6%), decreasing (5.3%), and increasing (2.1%) patterns.
- Most men (72.8%) who committed college rape only did so during 1 academic year.
- Exclusive emphasis on serial predation to guide risk identification, judicial response, and rape-prevention programs is misguided.

male college students’ sexual violence. To limit ambiguity, the Federal Bureau of Investigation (FBI) definition of *rape* was adopted for this study, which is “penetration, no matter how slight, of the vagina or anus with any body part or object, or oral penetration by a sex organ of another person, without the consent of the victim.”¹⁴ In addition, only completed acts were counted as rape; attempts that failed to result in penetration were excluded. Guided by the prevailing serial rapist assumption, one would expect 2 discrete patterns: a small group of men (4%-5%) who are likely to rape consistently and a larger group who are not likely to rape at all. A third trajectory was also expected: a group with a high likelihood of offending in high school that decreases during emerging adulthood, based on extensively replicated longitudinal studies of adolescent delinquency patterns.¹⁵⁻¹⁷

Methods

Analyses were conducted using the 2 largest existing longitudinal samples of college men’s sexual violence. The first was used to derive the best-fitting trajectory model¹⁸ and the second was used to verify that model.¹⁹ The 2 data sets were collected approximately 15 years apart (study dates are included in subsequent sections), with the more recent data collected in the past 3 years. Surveys and methods were similar across the 2 studies. Each was large enough to analyze this relatively low base-rate behavior (the most recent national study of male college students estimated the prevalence of completed rape perpetration since 14 years of age at 4.4%).²⁰ In both studies, local institutional review boards approved all protocols and Certificates of Confidentiality from the National Institutes of Health were obtained before data collection, as was written informed consent. At study intake, both samples were representative of the populations of first-year male students at the respective universities in terms of age and race based on data provided by their Offices of Institutional Research.

Participants and Procedure

Derivation Data set

The derivation data set was collected from 3 incoming classes of male students at a large southeastern university,

with each cohort completing 5 assessments across 4 years (August 1990 through April 1995). The first assessment, conducted during college orientation, measured precollege behaviors. The remaining 4 surveys, administered during the subsequent 4 spring semesters, limited recall to the time since the previous survey. A total of 851 men were surveyed at baseline, although 4 participants did not respond to any questions assessing rape; therefore, a sample size of 847 was used in the current analyses. Participants had a mean (SD) age of 18.5 (0.97) years when they began college; 559 (68.3%) self-reported as white, 211 (25.8%) as black, 48 (5.9%) as other, and 29 (3.4%) did not respond to the item. The yearly average retention rate was 77% and missing data were not related to reports of sexual violence across the study ($\chi^2_{103} = 65.6$; $P > .99$). Data from the fifth wave were not analyzed owing to a low response rate.

Validation Data Set

The more recent validation data set was collected from a single class of first-year men at a different large southeastern university, with yearly assessments from March 2008 through May 2011. Men completed the initial survey during the spring semester of their first year and subsequent surveys during the next 3 spring semesters. The first assessment measured behaviors respectively that occurred before college and during the first year of college. After the first assessment, recall was limited to the previous year. A total of 800 men were surveyed at baseline, although 5 participants were either not yet 18 or over 35 years of age; therefore, a sample of 795 was used in the current analyses. Participants had a mean (SD) age of 18.6 (0.51) years at the first assessment; 712 (89.7%) self-reported as white, 56 (7.1%) as black, 26 (3.3%) as other, and 1 did not respond to the item. The yearly average retention rate was 82% and missing data were not related to sexual violence across the study ($\chi^2_{91} = 51.2$; $P > .99$).

Measures

Each study used the Sexual Experiences Survey (SES) to measure rape perpetration (derivation²⁰ and validation [revised version]²¹). The SES is the most widely used measure of sexual assault perpetration among college students. It has strong internal consistency ($\alpha = .93$) and correspondence with face-to-face interview questions.²¹⁻²³ The SES contains behaviorally based items and has been recognized in federal and scientific reviews as an effective strategy for obtaining accurate reports of sexual violence.²³ Although the SES measures a range of sexually aggressive acts, only the items assessing completed behaviors that were consistent with the FBI definition of rape were used for our analyses.¹⁴ For example, vaginal rape disclosure was elicited as follows: "I put my penis or I put my fingers or objects into a woman's vagina without her consent by: taking advantage when she was too drunk or out of it to stop what was happening, threatening to physically harm her or someone close to her, and/or using force, for example holding her down with my body weight, pinning her arms, or having a weapon." Each of the 3 tactics was assessed using a separate item.

Statistical Analysis

The derivation data set was used to build and the validation data set to replicate a trajectory model using latent class growth analysis.^{24,25} Latent class growth analysis is a specific and more simplified case of growth mixture modeling²⁶⁻²⁹ that allows statistically heterogeneous latent groups to be discovered within observed longitudinal data. In growth mixture modeling, each latent group has an estimated intercept and linear slope and can model nonlinear change over time (eg, quadratic). Latent class growth analysis is a more statistically grounded alternative to manual classification and provides indices to assess model classification quality.²⁹ The analyses presented here were conducted from February 16, 2015, through February 20, 2015, using Mplus, version 7.11 (Muthén & Muthén),³⁰ with maximum likelihood estimation and the expectation maximization algorithm; ie, model parameters were estimated by maximizing likelihood functions across observations with and without missing values, assuming they were missing at random.³¹ Dichotomous variables representing whether a man committed rape at each time point were used to indicate trajectory membership in the derivation and validation models. The latent trajectory structures, therefore, are based on men's likelihoods of committing rape across time. Standard errors and CIs associated with model coefficients were computed using a bias-corrected bootstrapping procedure with 15 000 draws.^{32,33}

The derivation data set was fit to models ranging from 2 to 4 trajectories, with linear change over time specified for each latent group. Multiple model-fit indicators augmented by theoretical considerations informed the determination of the appropriate number of trajectories.^{34,35} First, the sample size-adjusted bayesian information criterion and bootstrap Lo-Mendell-Rubin likelihood ratio test were considered because they have been found to be the most accurate and consistent tests in determining trajectory number.^{36,37} In addition, entropy and posterior probabilities were examined to indicate how cleanly each model classified individuals into specific latent trajectories,²⁷ with higher values indicating better classification quality. In addition, each trajectory was stipulated to account for greater than 1% of the sample to be deemed meaningful. The latent class growth analysis findings must be replicated to guard against biased sampling and alternative interpretations.³⁸ Therefore, after identifying the model that best fit the derivation data, the trajectory structure was replicated in the validation data with the addition of quadratic change over time (ie, time²). Once an accurate trajectory structure was found and confirmed, each trajectory was explored by tallying the number of men who perpetrated rape at each assessment and the total number of college assessments in which men perpetrated.

Results

A total of 72 men (8.5%) in the derivation sample and 106 (13.3%) in the validation sample reported behavior that meets the FBI definition of completed rape. With the data sets combined ($N = 1642$), 178 men (10.8%) committed rape either be-

Table 1. Estimated Fit Statistics for Alternative Trajectory Models

Variable	No. of Trajectories Estimated		
	2	3	4
Derivation Data Set			
Adjusted BIC ^a	705.1	705.4	714.3 ^b
BLRT	43.2	10.5	8.7
P value	<.001	<.001	.01
Entropy	0.94	0.94	0.95
LC probabilities ^c	0.92-0.99	0.72-0.99	0.71-0.99
Smallest class, %	2.4	1.7	0.8
Validation Data Set			
Adjusted BIC ^a	1202.2	1200.3	1205.0
BLRT	182.6	15.9	21.8
P value	<.001	<.001	<.001
Entropy	0.87	0.93	0.91
LC probabilities ^c	0.94-0.97	0.83-0.99	0.81-0.97
Smallest class, %	8.1	2.1	1.0

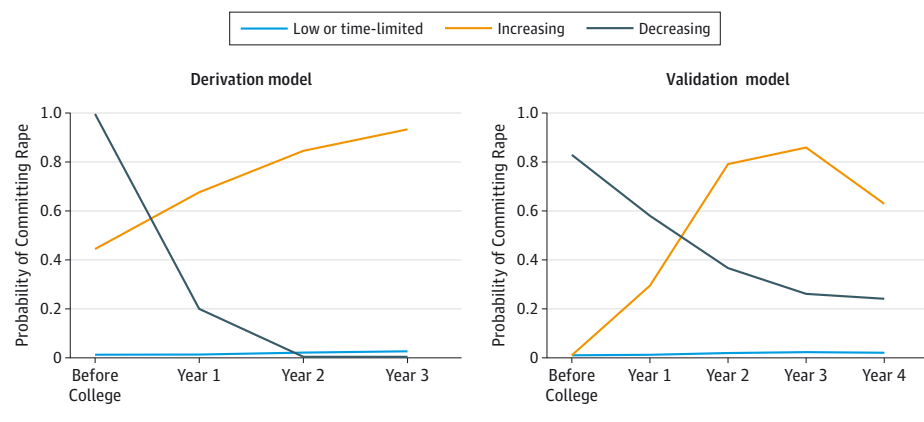
Abbreviations: BIC, Bayesian information criterion; BLRT, bootstrap Lo-Mendell-Rubin likelihood ratio test; LC, latent class.

^a Adjusted for sample size.

^b Model identification required 2 fixed parameters.

^c Average LC probabilities for most likely LC membership.

Figure. Estimated Probabilities of Committing Rape for Each Trajectory Group Across Time



The derivation (n = 847) and validation (n = 795) data supported similar trajectory structures. Both models yielded a low or time-limited, decreasing, and increasing trajectory. Neither model uncovered a trajectory with consistently high perpetration likelihood.

fore or during college. Before college, 84 of the 178 men (5.1%) committed rape. During college, 129 of the 178 men (7.9%) committed rape. Of the 84 men who reported committing rape before college, 49 (58.3%) did not perpetrate any rapes during college. Conversely, 94 of the 129 men (72.9%) who reported committing rape during college did not do so before college.

Model Fitting and Replication

A 3-trajectory model statistically fit the derivation data better than both the 2- and 4-trajectory models (Table 1). Thus, the 3-trajectory model was selected and subsequently fit to the validation data set. The strong fit of the 3-trajectory model was replicated in the validation data, with consistent trajectory patterns across the 2 data sets (Figure).

Trajectory Characteristics

Estimates were similar across the derivation and validation models; for clarity, only estimates from the validation model are presented in the results from this point forward. In the validation model, most men (92.6%), including 689 men in the sample who did not report rape at any time point, were classified in a trajectory with a low intercept and nonsignificant

change over time (Table 2). The Figure illustrates that men in this trajectory had a consistently low likelihood of committing rape across time. Although 56 men in this group reported committing rape, none did so at more than 1 assessment. This information leads us to consider these men as having a low or time-limited likelihood of committing rape.

Two dynamic trajectories were also identified: one with decreasing rape likelihood and another with increasing likelihood. The decreasing trajectory accounted for 5.3% of the validation sample and had a higher intercept than the other 2 trajectories, but significantly negative linear change over time. The Figure illustrates this group’s steady decline in rape likelihood across time. The increasing trajectory accounted for 2.1% of the sample, with an intercept that was not significantly different from the low or time-limited trajectory. This increasing trajectory is characterized by significantly positive linear change with a negative quadratic effect. The Figure illustrates that the increasing trajectory has a sharp increase in rape likelihood once men enter college and an attenuation of this increase beginning during the third year of college.

Table 3 includes the 106 men in the validation sample who reported perpetrating rape, organized by trajectory member-

Table 2. Characteristics of the 3-Trajectory Validation Model

Characteristic	Trajectory Group		
	Low or Time-Limited	Decreasing	Increasing
Size, % ^a	92.6	5.3	2.1
Estimates (95% CI) ^b			
Intercept ^c	0.0 ^d	6.35 (3.79 to 8.48)	-0.09 (-107.97 to 9.26)
Linear slope ^e	0.68 (-26.37 to 3.14)	-1.45 (-5.45 to -0.13)	4.86 (0.24 to 104.94)
Quadratic slope	-0.11 (-0.57 to 6.56)	0.19 (-0.12 to 1.04)	-0.88 (-20.28 to 0.04)
Rape acts per assessment, median (IQR)			
Before college	0 (0 to 0)	1 (1 to 3)	0 (0 to 0)
College year			
1	0 (0 to 0)	1 (0 to 2)	0 (0 to 1)
2	0 (0 to 0)	0 (0 to 1)	2 (2 to 3)
3	0 (0 to 0)	0 (0 to 0)	3 (1 to 4)
4	0 (0 to 0)	0 (0 to 1)	1 (0.5 to 2) ^f

Abbreviation: IQR, interquartile range.

^a Based on estimated posterior probabilities.

^b Bias-corrected bootstrapped CIs with 15 000 draws.

^c Expected log of the odds at baseline assessment.

^d Intercept of the low or time-limited trajectory was fixed at zero as the reference.

^e Expected linear change in the log of the odds for each assessment.

^f First quartile split between 0 and 1.

Table 3. Number of Men in the Validation Sample Who Perpetrated Rape at Each Assessment From Each Trajectory Group

Trajectory	No. (%) ^a	Participants ^b	Year				College Total	Total
			Before College	1	2	3		
Low or time-limited	745	8 (1.1)	9 (1.2)	17 (2.3)	11 (1.5)	11 (1.5)	48 (6.4)	56 (7.5)
Decreasing	36	33 (91.7)	22 (61.1)	13 (36.1)	5 (13.9)	7 (19.4)	30 (83.3)	36 (100)
Increasing	14	0	5 (35.7)	12 (85.7)	11 (78.6)	8 (57.1)	14 (100)	14 (100)
Total	795	41 (5.2)	36 (4.5)	42 (5.3)	27 (3.4)	26 (3.3)	92 (11.6)	106 (13.3)

^a First 3 rows, percentages based on total trajectory group number; last row, percentages based on total validation sample.

^b Based on most likely trajectory membership; will differ slightly from percentages based on posterior probabilities.

Table 4. Total Number of College Years Men in Each Trajectory Group Reported Perpetrating Rape

College Years	Trajectory Group		
	Low or Time-Limited	Decreasing ^a	Increasing
No.			
0	697 (93.6)	6 (16.7)	0
1	48 (6.4)	19 (52.8)	0
2	0	6 (16.7)	8 (57.1)
3	0	4 (11.1)	4 (28.6)
4	0	1 (2.8)	2 (14.3)
Total ^b	745	36	14

^a Percentages in this column do not add to 100 owing to rounding.

^b Based on most likely trajectory membership, will slightly differ from percentages based on posterior probabilities.

ship and assessment point. The decreasing trajectory included 33 men (91.7%) who committed rape before college; once in college, this group accounted for 28.3% of the men (n = 30) who committed rape. Although only 2 members of the increasing trajectory perpetrated rape before college, all did so during college. Owing to its large size, the low or time-limited group contained 48 men (52.2%) who committed rape during college; however, none reported having committed rape at multiple assessments. Furthermore, 25 men (69.4%) in the decreasing trajectory committed rape during 1 or fewer college years; all of the men in the increasing trajectory committed rape during 2 or more college years, although those men constituted only 14 (15.2%) of those who committed college rape (Table 3 and Table 4). Most men (67 [72.8%]) who com-

mitted college rape only did so during 1 academic year (Table 4). Taken together, these findings do not support the campus serial rapist assumption—most men who committed rape did not do so consistently across time.

Discussion

Many researchers, policymakers, journalists, and campus administrators have assumed that 1 small subgroup of men accounts for most rapes committed on college campuses. Our findings are inconsistent with that perspective. Analyses of the 2 largest existing longitudinal data sets on sexual violence from 14 years of age through college revealed 3 trajectories: (1) consistently low or time-

limited, (2) decreasing, and (3) increasing rape likelihood across the high school and college years. Neither data set supported a cohesive group of men who consistently committed rape across emerging adulthood. The men most likely to commit rape before college were not the men most likely to do so during college. Those who arrived on campus seemingly at greatest risk to commit rape decreased their perpetration likelihood across the early college years. A small group of men who were unlikely to perpetrate before college drastically increased their perpetration likelihood after matriculation.

The results lead to 3 additional observations: (1) 178 male college students (10.8%) surveyed across studies reported committing an act of completed rape since they were 14 years of age, indicating that there are approximately twice as many men on campuses who have committed rape than previously reported¹⁰; (2) most college men who perpetrate rape do so during relatively limited time frames; and (3) the term *serial rapist* should be used with more caution. Although a substantial number of men report committing more than 1 act of rape,^{39,40} more research is needed regarding assault timing, tactics, and location in addition to victim characteristics^{12,13} to establish whether it is appropriate to broadly apply this label to campus offenders.

This study is the first, to our knowledge, to specifically model trajectories of rape likelihood across time. These findings add to the growing number of publications regarding trajectories of sexual aggression in both collegiate and community populations.^{19,41-43} Much of the previous research in this area has considered a wider range of acts (eg, unwanted sexual contact, verbally coerced sex, and attempted rape), suggesting that more than 30% of male college students commit at least 1 sexually aggressive act during adolescence (since 14 years of age).^{39,40} In contrast with previous studies,^{19,43} these more specific analyses did not uncover a consistently elevated trajectory. Young men who commit rape but have a low or time-limited, decreasing, or increasing likelihood of perpetration across adolescence might have different risk and protective factors present in their lives. The patterns of rape likelihood observed in the decreasing and increasing trajectories, in particular, may be due to social learning⁴⁴ and social control⁴⁵ processes—especially given that the changes in rape likelihood coincide with men's transition to the college environment. These processes might be facilitated via childhood experiences,³⁸ peer network evolution,^{19,46} alcohol use,^{19,41} or hostile attitudes toward women.^{19,46} Future re-

search determining predictors across and within trajectories would further inform prevention programs tailored to men with differing patterns of rape likelihood across time, to bring prevention efforts closer in line with men's sexually violent behavioral patterns.⁴⁷

Standard self-report measures ask participants to respond affirmatively to each tactic used (eg, force or victim incapacitation) but do not ascertain whether these tactics were used in a single incident or different incidents. Thus, a limitation of this study and others is an inability to state whether multiple rape acts reported at a single assessment were perpetrated within 1 or more assaults. Both data sets analyzed were collected in the southeastern United States, which strengthens comparability but possibly limits generalizability. Different versions of the SES were used across the 2 studies; the updated version²¹ measures a wider range of behavior, which is likely why the rape incidence rates differed by approximately 5% across the 2 studies.

Conclusions

Sexual violence is detrimental to young women's well-being, reduces equal access to education, and creates an unwelcoming campus climate. These findings inform current policy discussions by cautioning against a uniform approach to high school and college rape response and prevention. Most men in college who commit rape do so during limited time frames. Although some men perpetrate rape across multiple college years, these men are not at high risk entering college and account for a small percentage of campus perpetrators—at least 4 of 5 men on campus who have committed rape will be missed by focusing solely on these men. The different eras represented by the data sets and use of a derivation-validation approach increase our confidence in and the generalizability of the findings. Outcomes of this study reinforce the need to (1) recognize the heterogeneity of rapists and avoid “one-size-fits-all” institutional responses to misconduct resolution or sexual violence prevention⁴⁸ and (2) promote sexual and relationship health before high school, when men in the decreasing group begin to commit rape, and throughout the college years, when men in the increasing group begin to perpetrate rape.

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Study concept and design: Swartout, Koss, White, Thompson, Abbey.

Acquisition, analysis, or interpretation of data: Swartout, White, Thompson, Abbey, Bellis.

Drafting of manuscript: Swartout, Koss, White, Abbey.

Critical revision of the manuscript for important intellectual content: All authors.

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Obtained funding: White, Thompson.

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Study supervision: White, Abbey.

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