Predicting the emergence of sexual violence in adolescence Short title: Sexual violence in adolescence

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Abstract

This study aims to report the epidemiology of sexual violence (SV) perpetration for both female and male youth across a broad age spectrum. Additionally, the etiology of SV perpetration is examined by identifying prior exposures that predict a first SV perpetration. Six waves of data were collected nationally online, between 2006 and 2012, from 1586 youth between 10 and 21 years of age. Five types of SV were assessed: sexual harassment, sexual assault, coercive sex, attempted rape, and rape. To identify how prior exposures may predict the emergence of SV in adolescence, parsimonious lagged multivariable logistic regression models estimated the odds of first perpetrating each of the five types of SV within the context of other variables (e.g., rape attitudes). Average age at first perpetration was between 15 and 16 years of age, depending on SV type. Several characteristics were more commonly reported by perpetrators than non-perpetrators (e.g., alcohol use, other types of SV perpetration and victimization). After adjusting for potentially influential characteristics, prior exposure to parental spousal abuse and current exposure to violent pornography were each strongly associated with the emergence of SV perpetration—attempted rape being the exception for violent pornography. Current aggressive behavior was also significantly implicated in all types of first SV perpetration except rape. Previous victimization of sexual harassment and current victimization of psychological abuse in relationships were additionally predictive of one's first SV perpetration, albeit in various patterns. In this national longitudinal study of different types of SV perpetration among adolescent men and women, findings suggest several malleable factors that need to be targeted, especially scripts of inter-personal violence that are being modeled by abusive parents in youths' homes and also reinforced by violent pornography. The predictive value of victimization for a subsequent first SV perpetration highlights the interrelatedness of different types of violence involvement. Universal and holistic prevention programming that targets aggressive behaviors and violent scripts in inter-personal relationships is needed well before the age of 15 years.

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Keywords

sexual violence; sexual harassment; rape; youth violence; longitudinal study

Introduction

Sexual violence (SV) is one of the most costly crimes, second only to homicides (McCollister, French, & Fang, 2010). Outcomes of SV victimization include posttraumatic stress disorder (Cortina & Kubiak, 2006), physical health problems (Conoscenti & McNally, 2006), and suicidal threats and attempts (McFarlane et al., 2005). With an estimated 1.6% of women and <1% of men reporting rape victimization; and 5.1% of men and 5.5% of women, reporting non-rape SV victimization every year (Breiding et al., 2014), understanding when and why people start perpetrating various forms of SV is of critical importance to prevention science.

Research Suggests that SV is Attributable to a Confluence of Factors

Risk factors for SV may be best understood within the perspective of the socio-ecological model (Centers for Disease Control and Prevention, 2004; Dahlberg & Krug, 2002). At the individual level, aggressive attitudes, including hostility against women (Carr & VanDeusen, 2004; Tharp et al., 2013), have been noted as risk factors (Tharp et al., 2013). Additionally, rape-supportive attitudes (Maxwell, Robinson, & Post, 2003; Tharp et al., 2013; Zinzow & Thompson, 2015) have been posited to be influential. Alcohol use (Carr & VanDeusen, 2004; Fineran & Bolen, 2006; Zinzow & Thompson, 2015) and nonsexual delinquency (Abbey & McAuslan, 2004; Tharp et al., 2013) are also more common among sexual offending adolescents. On the other hand, empathy is noted as a protective factor for SV (Broidy, Cauffman, Espelage, Mazerolle, & Piquero, 2003; Wheeler, George, & Dahl, 2002).

At the family level, a lack of parental monitoring is implicated, at least in terms of dating aggression among females living in high-crime communities (East, Chien, Adams, Hokoda, & Maier, 2010), as is exposure to conflict between parents (Vagi et al., 2013; Ybarra, Mitchell, Hamburger, Diener-West, & Leaf, 2011). A poor emotional bond between caregiver and child is also associated with sexually aggressive behavior (Ybarra et al., 2011). Studies of associations between parental income and adolescent SV perpetration are equivocal (Tharp et al., 2013) but suggest it should also be included as a potential contextualizer of SV.

At the peer level, peer pressure to engage in sexual activity is associated with SV among young men (Abbey, Wegner, Pierce, & Jacques-Tiura, 2012). Similarly, sexual harassment is a form of SV that is reinforced and maintained by peer group norms (Robinson, 2005). Yet, for male adolescents, social support and connection with friends appears to be protective against SV perpetration (Linder & Collins, 2005).

Media, which can be considered a community-level influence, may also affect SV perpetration. A review by Malamuth, Addison, and Koss (2000) suggests that frequent pornography use is consistently associated with sexually aggressive behaviors among adults,

and that these associations are pronounced for men who consume violent pornography, as well as men who are more likely to perpetrate sexual aggression in general. Findings from the Growing up with Media study, from which the current data originate, suggest that *violent* pornography particularly may be an important influencer for adolescent perpetrators (Ybarra & Mitchell, 2013; Ybarra et al., 2011). Similar, although non-significant, patterns are also noted for violent nonsexual media (Ybarra & Mitchell, 2013).

Taken together, SV appears to be the result of a confluence of factors that need to be considered if we are to understand those most important for prevention and intervention efforts.

Adolescence appears to be a Pivotal Period in the Etiology of SV

Nearly nine in ten male SV perpetrators report their first assault by age 20 (Grotpeter, Menard, Gianola, & O'Neal, 2008). Moreover, half of adult sexual offenders report first engaging in SV behavior during adolescence (Righthand & Welch, 2001). Accordingly, in national samples of non-adjudicated youth, including the current data set, the most common age of first SV perpetration is 16 years of age (Grotpeter et al., 2008; Ybarra & Mitchell, 2013). Although adolescence is implicated as the time when SV likely emerges, many studies involve college-aged or older adult men (Abbey & McAuslan, 2004; Maxwell et al., 2003), and these data are based upon retrospections after they have aged out of the time at greatest risk for starting perpetration.

Cultural expectations of SV

Most longitudinal studies of SV focus on men as perpetrators and women as victims (Abbey & McAuslan, 2004; Maxwell et al., 2003; Swartout et al., 2015; White & Smith, 2009). As a result, much of what is known about SV perpetration is based upon men's reports. Due to the cultural narrative, very little is known about female perpetrators of SV.

Gaps in the Literature

Previous research has shaped our understanding of SV perpetration behavior, but gaps remain. In response, this study will examine the following research questions: First, what is the epidemiology of SV perpetration, including prevalence rates of different SV types for both female and male youth across a broad age spectrum? Second, how do prior exposures predict the emergence of a first SV perpetration in adolescence? Third, what is a comprehensive, prospective understanding of factors that contribute to perpetration for all youth, not just males? Based upon the literature and the guiding socio-ecological model, we hypothesize that factors at each level of the ecology will be influential, and that more proximal factors (i.e, at the individual level) will be most strongly related to the emergence of SV perpetration in multivariate models.

To address these gaps, we will use data from the Growing up with Media study, a longitudinal online study, which includes a large, diverse sample of male and female youth who were aged 10-15 at the study start and have since aged through 21 years of age. The methodology strongly positions this study to well contribute to the literature on SV perpetration: Initial reports were retrospective (i.e., "ever in your life"); subsequent measures

were prospective. Moreover, online collection increased youth's safety and privacy, thereby increasing the likelihood of self-disclosure (Hanna, Weinberg, Dant, & Berger, 2005). Because youth chose when and where to complete the survey, the survey experience was less vulnerable to peer or teacher influences that might impact school-based data collection. The sample size, with over 1,500 youth, was large enough to support the examination of rates by key demographic and psychosocial indicators across the levels of the socio-ecological model. Furthermore, sample weights were applied such that the resulting data can be considered nationally representative. Thus, a major contribution of the current paper is a prospective, longitudinal examination of the *emergence* of SV perpetration in both male and female adolescents as young as 10 years old.

Methods

The protocol was reviewed and approved by the Chesapeake Institutional Review Board. Caregivers provided informed consent and permission for their child's participation; youth provided informed assent or consent, depending on their age. Wave 1 data were collected between August and September 2006 with 1,586 youth-caregiver pairs. The cohort was surveyed again in 2007 (Wave 2) and 2008 (Wave 3). The study was re-funded, and the cohort was surveyed in 2010 (Wave 4), 2011 (Wave 5), and 2012 (Wave 6).

Caregiver respondents were recruited at baseline by emails sent to randomly-identified members of the Harris Poll Online[SM] (HPOL) opt-in panel who had reported having a child within the target age range (Center for Innovative Public Health Research, 2016). HPOL was the largest available database of individual double opt-in participants when the cohort was recruited in 2006. Caregivers first completed a mini-survey to confirm eligibility, and if eligible, were invited to take part in the longitudinal study. Caregivers were unaware that their initial answers determined eligibility for the longer, more sensitive survey. As such, self-selection into the study would be greatest at the permission rather than recruitment stage: Caregivers who deemed the survey topic too sensitive for their child would be unlikely to take part. This bias is introduced in all sensitive youth surveys that require parental permission, irrespective of recruitment mode.

Eligible caregivers were equally or more knowledgeable than other household members about the youth's home media use. After caregivers completed their portion of the online survey, they sent the survey link to their child. Youth participants were 10-15 years old (M: 12.7 years, SD: 1.8 years), read English, lived in the household at least 50% of the time, and had used the Internet in the past six months. Recruitment was balanced on youths' sex and age.

The Wave 1 response rate, 31%, is similar to other well conducted online surveys at the time (Kaplowitz, Hadlock, & Levine, 2004). As previously reported (Ybarra & Mitchell, 2008), caregiver participants, who were the recruitment target, were demographically similar to the national caregiver population (Bureau of Labor Statistics & Bureau of the Census, 2006). Also previously reported (Ybarra, Espelage, Langhinrichsen-Rohling, Korchmaros, & boyd, 2016), caregivers who were eligible but declined to participate were older, 47.7 vs. 44.1 years, $p < .001$; more likely to be employed, 56% vs. 50%, $p = .02$; and less likely to be

Hispanic, 7% vs. 13%, $p = .001$, or of a low-income (<$35,000 per year) household, 19% vs. 25%, $p = .008$ than caregivers who were eligible and agreed to take part. The two groups were equally likely to be White race, 62% vs. 53%, $p = .60$, and married, 73% vs. 72%, $p = .65$.

Response rates for Waves 2-6 ranged from 56-76% (Supplemental Table 1). Those who responded to at least one of Waves 4-6, when comprehensive SV items were added to the survey, were similar to non-responders in terms of sex and race; and baseline indicators of parental education, self-rated honesty, completing the survey alone, aggressive behavior, and sexual assault perpetration (3.2% v. 2.0%, $p = 0.192$). Non-responders were older (12.7 v. 12.4 years, $p = 0.002$) and more likely to have caregivers with higher employment status ($p < 0.001$) and parental income ($p = 0.034$). Internal validity therefore appears to be maintained over time.

On average, youth completed surveys in 21-39 minutes, depending on wave. Youth received a $20 incentive in Waves 1 and 2, $25 in Waves 3-5, and $35 in Wave 6. To invigorate response in Waves 4-6, an additional $5 was offered to youth 18 years and older who completed the survey within 48 hours, and another $10 was offered to non-respondents near the end of field.

Measures

Survey development followed standard practices, including the conduct of focus groups to inform question wording; a 'friends and family' test, which was an informal cognitive test of the survey; and a pilot of the survey.

SV perpetration.—SV broadly refers to behaviors ranging from sexual harassment to rape (Basile, Smith, Breiding, Black, & Mahendra, 2014) and can be perpetrated by a romantic partner or someone else, known or unknown, to the victim (Basile et al., 2014). Starting in Wave 1, youth were asked about sexual assault perpetration, defined as "unwanted sexual contact between victim and offender…[which] may or may not involve force and include... grabbing or fondling…[or] verbal threats" (Bureau of Justice Statistics, 2012). A literature review failed to yield a developmentally appropriate measure for youth in the targeted age range (i.e., 10-15 years old). We especially felt the phrase "sexual intercourse" was vague for youth. As such, an item was created specifically for this study: "…have you kissed, touched, or done anything sexual with another person when that person did not want you to?"

The survey focus shifted from violent media and violent behavior in Waves 1-3 to the etiology of SV behavior in Waves 4-6 when the project was re-funded. As such, measures of sexual harassment, coercive sex, attempted rape, and rape were added at Wave 4. Sexual harassment, which is commonly included under the rubric of SV (Basile et al., 2014), was measured with 14 items $\alpha=0.94$. Nine in-person items (e.g., spreading sexual rumors) were modified from the American Association of University of Women survey (American Association of University Women Educational Foundation, 2001) and from the Adolescent Sexual Experiences Survey (Young, Grey, & Boyd, 2009). Five technology-based questions, some adapted from the Youth Internet Safety Survey, were also queried, such as "tried to get

someone else to talk about sex online <u>when they did not want to</u>." Because most of the sample endorsed at least one of these items one or more times across waves, a dichotomous measure was created to reflect youth who engaged in these behaviors to a non-normative degree (i.e., one standard deviation above the sample mean or more) versus all other.

As the Bureau of Justice Statistics (2012) definition of rape includes "psychological coercion as well as physical force," youth were asked how often they *ever*: (a) tried, but was not able, to make someone have sex with me when I knew they <u>did not want to</u> (*attempted rape*); (b) made someone have sex with me when I knew they <u>did not want to</u> (*rape*); or (c) gotten someone to give in to sex with me when I knew they <u>did not want to</u>? (*coercive sex*).

Past 12-month perpetration of sexual assault was asked in each wave. Both lifetime and past-12-month perpetration were queried for sexual coercion, attempted rape, and rape starting at Wave 4, to allow for the identification of new versus existing perpetration behavior. Those who reported perpetrating SV were asked age at first perpetration. Due to time constraints in Waves 4 and 5, a hierarchy was implemented: If rape was reported, then age at first perpetration for rape was asked. If rape was not reported, then age at first attempted rape was asked. If attempted rape was not reported, then age at first sexual assault was asked. In Wave 6, the survey was modified to query the age at first perpetration for each type of SV that was reported.

Potentially influential factors helping to contextualize SV perpetration.—
Individual level factors that were assessed for inclusion in the multivariate models included the following: youth age, sex, race, ethnicity, SV victimization questions that mirrored the perpetration questions described above, seriously violent behavior, 5 items, α=0.884 (Bachman, Johnston, & O'Malley, 2001; Federal Bureau of Investigation, 2012; Udry, 1996), aggressive behavior, 4 items, α=0.745 (Bachman et al., 2001; Dahlberg, Toal, Swahn, & Behrens, 2005), delinquent behavior, 9 items, α=0.905 (American Psychiatric Association, 2000; Finkelhor, Mitchell, & Wolak, 2000), teen dating violence (TDV) perpetration, 11 items, α=0.813, and victimization, 11 items, α= 0.768 (Foshee, 1996), alcohol use (Eaton et al., 2006), acceptance of couple's violence, 8 items, α=0.869 (Foshee, et al 1996), rape attitudes, 6 items, α=0.946 (Maxwell et al., 2003), empathy, 7 items, α=0.767 (Davis, 1980), and propensity to respond to stimuli with anger, 10 items, α=0.847 (Spielberger & Reheiser, 2004). *Family level* was measured by exposure to spousal abuse (Hamby, Finkelhor, Ormrod, & Turner, 2004); parental monitoring, 2 items, and caregiver-child emotional bond, 2 items, (Finkelhor et al., 2000); and household income. *Peer level* was measured by social support (Zimet, Dahlem, Zimet, & Farley, 1988), 8 items, α=.96 and perceived peer pressure for men and women to have sex, 6 items, α=0.852 (Krahe, 1998). *Community level* factors included exposure to violent (non-sexual) media (e.g., physical fighting, hurting, shooting, killing) (Windle et al., 2004), sexualized media (e.g., kissing, fondling, having sex) (Ybarra & Mitchell, 2013), and pornography (Ybarra & Mitchell, 2013). All variables are dichotomous except for age, propensity to anger, social support from friends, and social support from 'special person'.

Survey process indicators included self-reported honesty in answering survey questions and being alone or not when taking the survey. The full survey instrument, available online, contains further detail (Center for Innovative Public Health Research, 2016).

Statistical Analyses

The most common source of data missingness was non-response at a particular wave. Data for non-responders were coded as missing; their data were not imputed because too many assumptions would need to be made (Verbeke & Molenberghs, 2000). Among responders at each wave, rates of missing data (i.e., "do not want to answer") were low. In most cases, 7% or fewer responses were missing for any one variable.

Current statistical standards indicate that listwise deletion introduces unacceptable bias into model estimates (Olinsky, Chen, & Harlow, 2003). As such, missing data for respondents within each wave were imputed using Stata 13 software's multiple imputation command (Rubin, 1987). Data were assumed to be missing at random (Little & Rubin, 2002) based on the observation that missing data for a given question was correlated to responses to other questions in that same wave . For example, parental income produced fairly large refusal to respond rate (~25% in each of the six waves) due to the personal nature of this question. However, refusal to report income was highly correlated with other demographic variables including parental education and parental employment. The five SV perpetration outcome variables were not imputed, however, in alignment with current statistical standards (Sterne et al., 2009). Rates of missing outcome data were low however, suggesting that this had little effect on the estimated models. For sexual assault, rates of missingness ranged from 0.32% (n = 3) in Wave 5 to 1.13 % (n = 10) in Wave 4. Missing sexual harassment data ranged from 0.96% (n = 9) in Wave 5 to 2.03% (n = 18) in Wave 4. Likewise, missing coercive sex data ranged from 0.64% (n = 6) in Wave 5 to 1.35% (n =12) in Wave 4. Similar results were seen for attempted rape and completed rape (0.64% in wave 5 to 1.03% in wave 6 for both SV outcomes).

To examine the epidemiology of SV perpetration, prevalence rates were estimated using data weighted to reflect the caregiver population with children aged 10-15 years old in the USA in 2006. HPOL data are comparable to data obtained from random telephone samples once appropriate sample weights are applied (Schonlau et al., 2004; Terhanian, Bremer, Smith, & Thomas, 2000). As the initial recruitment target, caregivers were the weighting target. Variables included caregiver age, sex, race/ethnicity, region, education, household income, and child age and sex (Bureau of Labor Statistics & Bureau of the Census, 2006). Weights also adjusted for caregivers' self-selection into the online panel by weighting on attitudinal and behavioral differences compared to random digit dial (RDD) samples that were fielded during the same time period (Schonlau et al., 2004; Terhanian et al., 2000). Indicators associated with differential participation over time were also included in the weight.

To identify factors associated with the emergence of SV, descriptive analyses were first performed and univariate statistics estimated (e.g., average age at first perpetration). These analyses were followed by bivariate analyses between SV perpetration and exposure variables. To identify characteristics to include in the parsimonious models, we used generalized estimating equation regression models, which control for within-person

correlations of response. The covariates used in the generalized estimating equation models were chosen based on scientific considerations (i.e., the magnitude of association and statistical significance) as well as the existing literature. Survey process indicators, youth age, and youth sex were forced into the parsimonious model irrespective of significance. These models were based upon unweighted data as the aim was to estimate relative associations; this also served to increase power.

Finally, transition multivariable logistic regression models were created that regressed the presence or absence of SV at a "current wave" (e.g. SV outcome at time t) conditioned on SV outcomes in all prior surveys administered at times $t-1$ and the covariate values recorded in the current wave and previous wave (e.g. "lag" predictors at time $t-1$). In these models, we only considered participants at time t who had no prior report of SV in waves with times $t-1$. Therefore, t represents the time of first perpetration for participants who transitioned to SV during the survey wave administered at time t. The longitudinal design of the survey allowed us to use information at both the time of and just prior to the wave of potential first SV perpetration to predict the probability of transition to SV among those with no prior history of SV. As an example, Wave 4 and 5 covariates were considered as the lag and current-wave predictors, respectively, when modeling the conditional presence/absence of SV perpetration at Wave 5. Lag and current indicators of the same exposure or behavior were considered simultaneously to identify which sequence had a stronger influence on behavior. Conditional models were chosen over other time-trend or growth models because our focus is on how previous exposures predict first SV perpetration rather than trajectories over time (Diggle, Liang, & Zeger, 1994). If sample sizes allowed (i.e., at least 10 perpetrators), the cohort was then stratified by sex and the multivariate model was predicted for male and female youth separately. Given the small sample sizes, magnitude and trends were perferenced over statistical significance (Selvin, 1996).

Five separate transition multivariable logistic regression models were specified to estimate the odds of SV perpetration at time t for each SV type considered: sexual harassment, sexual assault, coercive sex, attempted rape, and rape. Because of the different survey designs at each cohort, Waves 1 through 4 were used to determine prior history of SV for sexual assault, while Wave 4 responses for questions about lifetime perpetration were used for this purpose when considering sexual harassment, coercive sex, attempted rape, and rape. Because of the lack of SV data prior to Wave 4 in four of the five SV types considered, the presence or absence of SV perpetration at time t was only modeled using the SV outcomes data for Waves 5 and 6.

Sample sizes vary for each model because outcome data were not imputed, as described above. Also, participants who responded with "ever" to a given SV perpetration question in Wave 5 and were also non-responders at Wave 4 were excluded from that particular SV transition model, as this response pattern suggests a possible history of SV prior to Wave 4.

Results

The Epidemiology of SV.

Sexual harassment perpetration, either in-person or via technology (i.e., online, via text messaging), was the most common of the SV types assessed, reported by 23% ($n = 122$) of male youth and 17% ($n = 84$) of female youth (Table 1). Sexual assault was the second most commonly reported SV perpetrated by youth, with 10% ($n = 29$) of males and 12% ($n = 22$) of females. On the other hand, rape was least commonly reported, with 4% ($n = 28$) of males and 2% ($n = 12$) of females.

As shown in Supplemental Tables S2a and S2b, male youth reported significantly higher rates of all types of SV perpetration assessed except for sexual assault, which was reported at a similar rate by female youth. That said, 42% of sexual harassment, 48% of sexual assault, 31% of coercive sex, 23% of attempted rape, and 30% of rape perpetrators were female.

Although patterns of differences in SV perpetration rates by race and ethnicity were not observed (Tables S2a and S2b), many other *individual*-level characteristics were associated with SV perpetration. Older age was associated with attempted rape, coercive sex, and sexual assault perpetration. Externalizing behaviors were more commonly reported by perpetrators of all types of SV assessed. Indeed, compared to 37% of non-perpetrators of attempted rape, 82% of perpetrators reported aggressive behavior, $p < .001$. Higher rates of SV victimization, TDV victimization, TDV perpetration, and other types of SV perpetration were also consistently noted among youth who reported each type of SV perpetration. For example, 5% of non-perpetrators of rape reported being a victim of rape compared to 37% of perpetrators of rape who also reported being victims of rape, $p < .001$. Ten percent of youth who reported sexual harassment perpetration also reported rape perpetration, compared to 0.8% of youth who reported not perpetrating sexual harassment, $p < .001$. Attitudes were also important: Particularly strong rape attitudes and acceptance of couple's violence were more common among perpetrators versus non-perpetrators. Low levels of empathy were noted for perpetrators of sexual harassment and attempted rape, with similar but non-significant trends noted for other SV perpetration. At the *family* level, exposure to spousal abuse predicted all types of SV perpetration. At the *peer* level, particularly strong peer pressure for both men and women to have sex were both associated with increased rates of SV perpetration. Finally, at the *community* level, exposure to violent but not non-violent pornography, predicted each type of SV. Sexualized and violent media were each associated with sexual harassment, sexual assault, coercive sex; and in the case of sexualized media, also rape.

The Emergence of SV Perpetration in Adolescence: How prior exposures predict first SV.

The average age of first sexual harassment perpetration was more than one year younger for male youth (15.0 versus 16.2 years) and eight months younger for female youth (15.1 versus 15.8 years) than age at first perpetration of all other SV behaviors (Table 1). Skewed data were suggested for sexual assault for males (Mean: 16.2; Median: 17.0) and attempted rape for females (Mean: 16.6, Median: 18.0).

When all potentially influential youth characteristics included in the study were examined simultaneously (Tables 2 and 3), several of the *individual*-level characteristics examined were predictive of SV perpetration. Most notably, current aggressive behavior was associated with over a two-fold increase in relative odds of a first perpetration of all types of SV except for rape. Current delinquent behavior was also associated with increased odds of sexual harassment, with elevated but non-significant odds for other types of SV. Current psychological abuse victimization was associated with increased odds of a first sexual assault, coercive sex, and rape perpetration. Previous sexual harassment victimization predicted a subsequent first sexual harassment perpetration as well as a first attempted rape. Prior rape attitudes and acceptance of couple's violence were also implicated in the first perpetration of some types of SV. At the *family*-level, previous exposure to spousal abuse among one's caregivers was associated with a six-fold and higher odds, depending on the type of SV, for one's first perpetration of each of the five types of SV assessed. At the *community*-level, exposure to violent (but not non-violent) pornography was associated with a four-fold increased odds or higher, depending on the type of SV, of a first perpetration of all types of SV except for attempted rape, which had elevated but non-significant odds. *Peer* pressure for females to have sex was associated with one's first perpetration of sexual assault, with similar but non-significant findings for a first rape.

Both Male and Female Youth as Perpetrators.

When the cohort was stratified by sex, similar patterns were noted for male and female perpetrators, although some relations lost statistical significance due to reduced power (Table 2). For example, previous rape victimization was associated with a five-fold increase in relative odds of first sexual harassment for both boys and girls. Moreover, as age increased, the relative odds of first sexual harassment decreased for both sexes. There was some suggestion that current aggression may be particularly influential for girls and psychological dating abuse victimization for boys when understanding their odds of first sexual assault. Current exposure to violent pornography may be particularly influential for boys in understanding their odds of a first sexual harassment. Stratified models were not estimated for coercive sex, rape, and attempted rape because, of the youth with no prior history of the SV perpetration, only nine female perpetrators reported the former, and four female perpetrators were noted for each latter outcome.

Discussion

The epidemiology of SV perpetration in adolescence.

In this comprehensive, national study of youth as young as 10 years of age, more than one in five male youth and one in six female youth report some type of SV perpetration by the age of 21 years. As mentioned in another study of the same dataset (Ybarra & Mitchell, 2013), it bears noting that differences by race, ethnicity, and income are not apparent for SV perpetrators versus non-perpetrators within the context of other influential factors. This is in contrast to arrest and conviction rates, which can be affected by cultural influences (Fite, Wynn, & Pardini, 2009), and highlights the importance of community-based research to contextualize criminal behavior.

It is important to further note the exposures and behaviors across the ecology that were no longer significant within the context of other factors. For example, alcohol use (Carr & VanDeusen, 2004; Fineran & Bolen, 2006; Zinzow & Thompson, 2015) and empathy (Broidy et al., 2003; Wheeler et al., 2002) were both predictive of SV at the bi-variate level, and both noted associations were explained by other influential factors. Many of the SV perpetration and victimization experiences, while strongly inter-related, were also no longer significant when included in the multivariate models. The same was true for sexualized and violent media exposures. Thus, there are important factors across the social ecology that predict a first SV perpetration, not all of which are influential when examined simultaneously and longitudinally. Considering multiple factors across the social ecology is critically important if we are to identify those that are most predictive at each level in affecting sexually violent behavior in adolescence.

Males and females are both perpetrators.

Differences in perpetration rates are noted by sex: For all types of SV, except sexual assault, males are overrepresented as perpetrators. Nonetheless, a large minority of perpetrators are female. Furthermore, in multivariate models, sex does not significantly predict a first SV perpetration for all types of SV assessed except attempted rape. Although previous studies have noted gender norms that promote male dominance and control as key factors in predicting SV perpetration (Jewkes, Fulu, Roselli, & Garcia-Moreno, 2013), most studies only include males as potential perpetrators. Current findings provide further support that it is imperative to include females in studies of SV perpetration to better understand how they are different and similar to male perpetrators. The inclusion of measures of gender norms in future studies may help contextualize these differences.

That said, when examined separately, the models for first perpetrations of sexual harassment and assault looked relatively similar for males and females although small sample sizes and wide confidence intervals preclude any strong conclusions. Based upon the current findings, the imperative to include women in perpetration studies may not necessarily be to identify etiological differences with men, but rather to ensure that the conversation about perpetration includes women and acknowledges that it is not just men who are the aggressors.

Limitations.

Findings should be interpreted within the study's limitations. While measuring SV behaviorally (e.g., kissing, touching) and without labels (e.g., rape) is a strength, the questions may also have been vulnerable to misinterpretation. In addition, assault was measured in all waves, whereas the other SV types were added at Wave 4 due to funding shifts. Although internal validity of the sample over time is suggested, results might possibly have been different if all SV measures had been included since Wave 1. Moreover, given the sensitivity of the topic, observed rates may be underestimates of the true prevalence of SV perpetration. Nonetheless, the prevalence of SV reported here is much higher than the lifetime national rate of 0.15% among adults who were interviewed face-to-face (Hoertel, Le Strat, Schuster, & Limosin, 2012).

Additionally, wide confidence intervals, suggesting lack of precision in estimates due to the small sample size, were observed in some cases. The sample of perpetrators was too small to support separate models for male and female youth for the more serious types of SV. Also, sexual harassment was measured with a greater number of items than other types of SV, perhaps resulting in it being endorsed more frequently overall. Finally, due to the hierarchy implemented for SV follow-up questions at Waves 4 and 5, there are some missing age-at-first-perpetration data for individuals who perpetrated rape, attempted rape, and/or coercive sex. It is possible that first perpetration may be younger than detected if these SVs were perpetrated before rape, which was preferenced in the hierarchical follow-ups. Predictive multivariate models that identify prior exposures associated with first SV perpetration were unaffected by this hierarchy however, as these characteristics were asked independently of SV. Also, while this study has some of the most comprehensive measures included in studies of SV perpetration to date, some measures could not be included because of a change in focus in the study from Waves 1-3 and Waves 4-6.

Recruiting truly nationally representative samples is increasingly difficult (Pew Research Center for the People & the Press, 2012). These difficulties are magnified when recruiting youth for studies that involve sensitive topics. To address this limitation and to minimize self-selection bias, participants were randomly recruited from the four million-member panel. Eligibility was determined before describing the study's purpose, so as not to attract participants with particular experiences. Moreover, these potential underlying differences were adjusted in the weighting scheme, which included attitudinal and behavioral attributes that were weighted to approximate those observed in national RDD samples (Schonlau et al., 2004; Terhanian et al., 2000).

Prevention implications.

A progression of SV perpetration is noted when looking at age of first perpetration. Those reporting their first sexual harassment are younger than all other types of SV, suggesting it may precede other types of SV. Furthermore, sexual harassment victimization predicts both a first sexual harassment perpetration and attempted rape perpetration in the models; and increased age is associated with a significant *reduction* in likelihood of one's first sexual harassment perpetration. Espelage, Basile, and Hamburger (2012) found that bullying perpetration precedes sexual harassment perpetration in early adolescence. Preventing violent behaviors in earlier adolescence then, including bullying and sexual harassment, may have a downstream impact on more serious forms of violence, including forms of SV perpetration.

Current findings add to the extant research suggesting that the etiology of SV is complex and multifactorial (Abbey et al., 2012; Cale, Lussier, & Proulx, 2009; Lussier & Davies, 2011; Swartout et al., 2015) and is explained by exposures at each level of the social ecology. Prior exposure youth have to violent romantic partnerships as modeled by their caregivers (*family*-level) predicts subsequent SV perpetration. These scripts are also reinforced by actors youth see in violent pornography they are currently watching (*community*-level). The co-occurrence of aggressive - and possibly also delinquent – behaviors (*individual*-level) further tips the scales towards SV aggression; as do prior attitudes accepting of violence in

relationships (*individual*-level) and the perception that youth, especially girls, are expected to have sex (*peer*-level) for some forms of SV. The predictive value of victimization experiences (*individual*-level), be they previous sexual harassment or current psychological TDV, also highlights the inter-relatedness of victimization and perpetration; and, when it is experienced, likely further reinforces for youth the inevitability of violence in relationships. Every part of this web of factors encircling and increasing youth's SV risk is malleable however, and can be targeted by prevention and intervention efforts. Universal intervention programs that target these attitudes and behaviors and further counter scripts that promote violence need to be broadly disseminated and implemented. For example, the Good Behavior Game targets aggressive behavior among elementary school youth and yet impacts suicidal ideation, substance use, and mental health, with effects noted well into adulthood (Poduska & Kurki, 2014). More recently, social emotional learning programs have been effective in reducing youth aggression (Espelage, Low, Polanin, & Brown, 2015). A wider implementation of universal interventions could potentially impact SV at the public health level.

A different, although not necessarily mutually exclusive approach could be intervention programs that are designed for and implemented at salient developmental periods. Indeed, consistent with the National Youth Survey, which found 16 as the modal age of onset for attempted rape and rape (Grotpeter et al., 2008), the current study finds first perpetration appears between 15 and 16 years of age on average, depending on SV type. Perhaps then, for women, sexual harassment perpetration could be highlighted at 13 and 14 years of age; sexual assault and coercive sex at 14 and 15 years of age; and rape and attempted rape at 15 and 16 years of age so that the content emphasis is tailored to when particular behaviors are likely to emerge. Similarly age-tailored messaging could be crafted for men based upon their potential SV trajectories.

Future research.

From an etiological perspective, the accumulation or interaction of risk factors, as well as how these risk factors may be different based upon the developmental stage of the perpetration, could move our understanding of the emergence of SV even further forward. Future research could also examine whether various trajectories of perpetrators emerge at different developmental periods in national, prospective studies of pre-college-aged youth. Finally, while including females is a major strength of the study, the small numbers of perpetrators of more serious types of SV precluded stratified analyses. Funding of larger community-based cohorts would allow for this important next step.

From a prevention perspective, more research is needed to understand the outliers noted in the age-at-first perpetration analyses, as these youth may reflect different types of perpetrators that would benefit from more targeted intervention. Cost-benefit analyses that compare universal aggression reduction programs with those that targeted specific behaviors would also be helpful in moving the field forward by informing the most efficient use of resources.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Abbreviations:

SV	sexual violence
HPOL	Harris Poll OnLine
TDV	teen dating violence
aOR	adjusted Odds Ratio
GEE	generalized estimating equation

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Individual
youth age, sex, race, ethnicity, seriously violent behavior, aggressive behavior, delinquent behavior, SV victimization, TDV perpetration and victimization, substance use, acceptance of couple violence, rape attitudes, and empathy, propensity to respond to stimuli with anger

Family
household income, exposure to spousal abuse, poor caregiver monitoring, poor caregiver-child relationship

Peer
perceived peer pressure to have sex, social support from friends, social support from a 'special person'

Community
non-violent and violent pornography, violent (non-sexual) media, and sexualized media
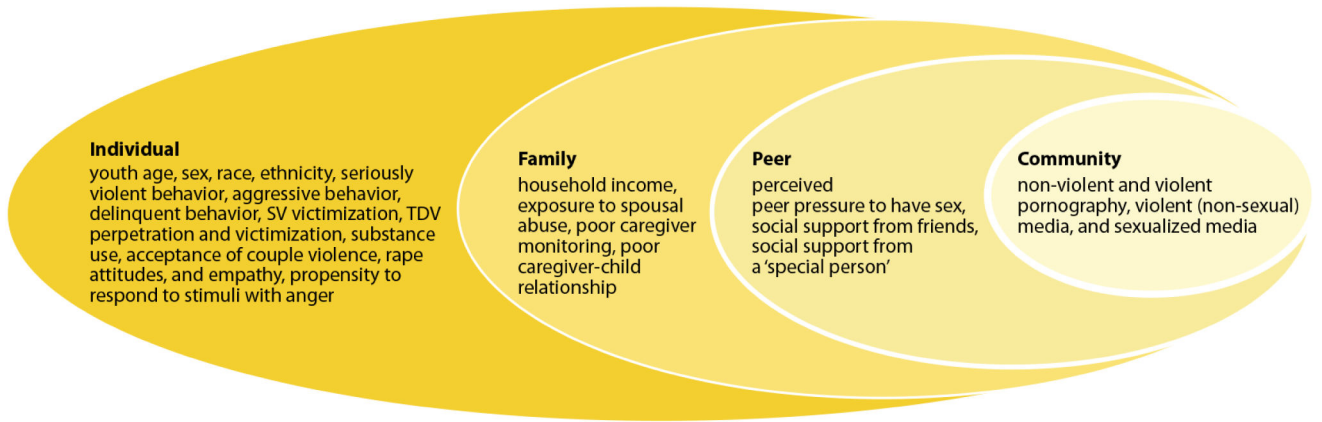
Figure 1:
Socio-ecological Model of Sexual Perpetration

Table 1:

Lifetime adolescent SV prevalence rates and age at first perpetration

Type of SV	Male youth				Female youth				Statistical comparison of male vs. female mean age of first perpetration
	All males	Among male perpetrators			All females	Among female perpetrators			
	Prevalence (lifetime)	Mean Age (SD)	Median Age	N	Prevalence (lifetime)	Mean Age(SD)	Median Age	N	p-value
Sexual harassment [a,e]	23.35%	15.0 (2.2)	15	122	17.24%	15.1 (2.5)	15	84	.836
Sexual assault [a,b]	9.73%	16.2 (2.3)	17	29	12.45%	15.9 (3.1)	16	22	.649
Coercive sex [a]	6.40%	16.8 (1.3)	16.5	8	4.23%	15.8 (4.4)	16	5	.568
Attempted rape [a,c]	7.97%	16.8 (1.6)	16	36	3.41%	16.6 (3.2)	18	13	.813
Rape [a,d]	3.59%	16.3 (2.1)	16	28	2.20%	16.5 (2.6)	16	12	.786

[a] Age of first perpetration asked of youth who reported perpetration at Wave 6

[b] Age of first perpetration asked of youth in Waves 4 and 5 if attempted rape or rape were not also reported

[c] Age of first perpetration asked of youth at Waves 4 and 5 if rape was not also reported

[d] Age of first perpetration asked of youth at Waves 4 and 5

[e] Includes perpetration face-to-face and via technology (online, text messaging)

Data are weighted as the aim is to report prevalence rates.

Table 2.

Predicting the emergence of sexual assault and sexual harassment among youth with no prior history of SV

Youth characteristics	Predicting… Sexual assault			Sexual harassment		
	All youth (n = 752) aOR [95% CI]	Males (n = 361) aOR [95% CI]	Females (n = 391) aOR [95% CI]	All youth (n = 693) aOR [95% CI]	Males (n = 327) aOR [95% CI]	Females (n = 366) aOR [95% CI]
Individual						
Demographic characteristics						
Age (years; range 14–21; previous)	0.90 (0.66, 1.24)	1.21 (0.67, 2.20)	1.01 (0.70, 1.45)	**0.77 (0.65, 0.91)** **	0.83 (0.65, 1.06)	**0.71 (0.56, 0.90)** **
Female sex	3.05 (0.98, 9.51)	NA		0.97 (0.52, 1.80)	NA	NA
Attitudes						
Rape attitudes (previous)	NI	NI	NI	1.87 (0.98, 3.55)	1.87 (0.78, 4.51)	2.58 (0.95, 6.98)
Acceptance of couple's violence[a] (previous)	**4.18 (1.16, 15.03)** *	4.47 (0.39, 51.31)	2.91 (0.66, 12.88)			
Externalizing behaviors						
Aggressive behavior (current)	**5.90 (1.86, 18.71)** **	1.60 (0.21, 12.04)	**10.79 (2.39, 48.66)** **	**2.30 (1.25, 4.22)** **	1.54 (0.64, 3.71)	**3.52 (1.49, 8.31)** **
Delinquent behavior (current)	NI	NI	NI	**2.52 (1.24, 5.12)** *	2.07 (0.74, 5.78)	**3.03 (1.11, 8.22)** *
Other SV perpetration						
Perpetration of sexual harassment (previous)	2.24 (0.67, 7.51)	5.13 (0.61, 43.47)	2.12 (0.45, 10.05)	NI	NI	NI
SV victimization						
Victim of sexual harassment (previous)	NI	NI	NI	**2.27 (1.23, 4.19)** **	**3.05 (1.33, 6.98)** **	1.79 (0.73, 4.37)
Victim of rape (previous)	NI	NI	NI	4.34 (0.96, 19.60)	5.76 (0.35, 95.74)	5.40 (0.94, 31.09)
Teen dating violence						
Victim of psychological abuse (current)	**4.54 (1.43, 14.47)** *	6.85 (0.97, 48.18)	1.93 (0.48, 7.69)	1.80 (0.99, 3.27)	1.85 (0.78, 4.39)	1.63 (0.70, 3.77)
Peers: peer pressure for females to have sex[b] (previous)	**3.75 (1.03, 13.62)** *	3.38 (0.31, 37.20)	3.14 (0.73, 13.56)	NI	NI	NI
Family: exposure to spousal abuse (previous)	**51.58 (7.18, 370.55)** ***	NI	NI	**6.17 (1.13, 33.77)** *	NI	NI
Media: pornography (current)						
No exposure	1.0 (RG)	1.0 (RG)	NI	1.0 (RG)	1.0 (RG)	1.0 (RG)
Exposure to non-violent pornography	0.78 (0.21, 2.92)	0.78 (0.06, 10.38)	NI	1.44 (0.74, 2.78)	2.25 (0.79, 6.40)	0.96 (0.38, 2.47)
Exposure to violent pornography	**6.58 (1.56, 27.77)** *	**46.10 (3.05, 697.84)** **	NI	**4.62 (1.90, 11.27)** **	**10.96 (2.78, 43.18)** **	2.99 (0.85, 10.54)
Survey process indicators						

Youth characteristics	Predicting… Sexual assault			Sexual harassment		
	All youth (n = 752) aOR [95% CI]	Males (n = 361) aOR [95% CI]	Females (n = 391) aOR [95% CI]	All youth (n = 693) aOR [95% CI]	Males (n = 327) aOR [95% CI]	Females (n = 366) aOR [95% CI]
Dishonesty of responses	**0.11 (0.02, 0.65)** *	0.08 (0.00, 3.33)	0.24 (0.02, 2.64)		NI	NI
Not alone when completing the survey	*3.61 (0.83, 15.75)*	4.56 (0.28, 74.69)	2.03 (0.37, 11.18)		2.75 (0.78, 9.77)	1.68 (0.64, 4.44)

Six separate multivariate logistic regression models shown. Odds ratios are adjusted for all other characteristics shown in the table and reflect the relative odds of reporting first perpetration (e.g., of sexual assault) given a particular experience (e.g., rape attitudes) among youth who report no prior history of that particular SV (e.g., sexual assault) perpetration. Bolded text indicates statistical significance, *p* < =0.05. Italicized text indicates *p* < =0.10

aOR adjusted odds ratio, *NI* not included in the model due to collinearity with other variables in the model, *NA* not applicable; *TDV* teen dating violence

*
  p < 0.05;

**
  p < 0.01;

***
  p < 0.001

[a]
Score > 10 versus   10

[b]
Score > 6 versus   6

Table 3.

Predicting the emergence of coercive sex, attempted rape, and rape among youth with no prior history of the SV in question

Youth characteristics	Predicting….					
	Coercive sex (n = 792)		Attempted rape (n = 786)		Rape (n = 799)	
	aOR [95%CI]	p-value	aOR [95%CI]	p-value	aOR [95%CI]	p-value
Individual						
Demographic characteristics						
Age (years; Range: 14-21; previous)	1.07 (0.83, 1.39)	0.584	1.03 (0.79, 1.35)	0.819	1.10 (0.78, 1.53)	0.588
Female sex	0.83 (0.28, 2.44)	0.732	**0.16 (0.04, 0.64)**	**0.010**	1.07 (0.24, 4.64)	0.933
Attitudes						
Rape attitudes (previous)	**3.01 (1.12, 8.05)**	**0.029**	1.08 (0.35, 3.38)	0.895	*3.37 (0.91, 12.49)*	*0.068*
Acceptance of couple's violence[a] (previous)	0.96 (0.34, 2.73)	0.939	1.26 (0.43, 3.72)	0.677	0.74 (0.18, 3.01)	0.675
Externalizing behavior						
Aggressive behavior (current)	**3.86 (1.43, 10.43)**	**0.008**	**3.64 (1.27, 10.44)**	**0.016**	2.43 (0.65, 9.04)	0.186
Delinquent behavior (current)	2.44 (0.61, 9.73)	0.205	2.76 (0.56, 13.71)	0.214	3.25 (0.36, 29.40)	0.294
Other SV perpetration						
Perpetration of sexual harassment (previous)	0.66 (0.17, 2.53)	0.549	*2.56 (0.84, 7.82)*	*0.100*	0.35 (0.06, 1.96)	0.233
SV victimization						
Victim of sexual harassment (previous)	1.12 (0.40, 3.13)	0.823	**4.07 (1.18, 14.02)**	**0.026**	0.57 (0.15, 2.15)	0.410
Victim of rape (previous)	1.15 (0.11, 11.75)	0.908	*4.41 (0.75, 25.85)*	*0.100*	1.40 (0.12, 16.36)	0.790
Teen dating violence						
Victim of psychological abuse (current)	**2.96 (1.13, 7.77)**	**0.027**	0.95 (0.32, 2.77)	0.920	**14.20 (2.71, 74.42)**	**0.002**
Peers						
Peer pressure for females to have sex[b] (previous)	0.95 (0.36, 2.52)	0.916	0.81 (0.27, 2.50)	0.721	*4.60 (0.94, 22.47)*	*0.059*
Family						
Exposure to spousal abuse (previous)	**6.85 (1.01, 46.64)**	**0.049**	**7.76 (1.04, 57.65)**	**0.045**	**15.35 (1.73, 136.48)**	**0.014**
Media						
Pornography (current)						
No exposure	1.0 (RG)		1.0 (RG)		1.0 (RG)	
Exposure to non-violent pornography	1.67 (0.50, 5.53)	0.403	1.14 (0.33, 3.87)	0.837	1.38 (0.28, 6.92)	0.694
Exposure to violent pornography	**10.77 (2.90, 40.01)**	**<0.001**	3.66 (0.76, 17.63)	0.106	**7.51 (1.24, 45.58)**	**0.028**
Survey process indicators						
Dishonesty of responses (current)	0.40 (0.06, 2.63)	0.337	0.38 (0.04, 3.24)	0.374	*0.16 (0.02, 1.20)*	*0.075*
Not alone when completing the survey (current)	2.76 (0.76, 10.00)	0.123	2.32 (0.58, 9.32)	0.237	2.05 (0.39, 10.70)	0.395

Three separate multivariate logistic regression models are shown, one for each type of SV perpetration examined. Odds ratios are adjusted for all other characteristics shown in the table and reflect the relative odds of reporting first perpetration (e.g., of rape) given a particular experience (e.g., victim of sexual harassment previously) among youth who report no prior history of that particular SV (e.g., rape perpetration). Data are

unweighted because the aim is to estimate magnitude of difference rather than prevalence rates. Bolded text indicates statistical significance, p < 0.05. Italicized text indicates p < =0.10

[a] score>10 versus 10;

[b] score>6 versus 6;

[c] Age is at the cohort prior to the first SV (i.e., refers to the age at Wave 4 if SV was reported in Wave 5, or the age at Wave 5 if SV was reported in Wave 6 or if SV was not reported across any wave). aOR = adjusted Odds Ratio; TDV = teen dating violenc; RG= Reference group