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Does Maltreatment in Childhood Affect Sexual Orientation in Adulthood?

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Abstract

Epidemiological studies find a positive association between physical and sexual abuse, neglect, and witnessing violence in childhood and same-sex sexuality in adulthood, but studies directly assessing the association between these diverse types of maltreatment and sexuality cannot disentangle the causal direction because the sequencing of maltreatment and emerging sexuality is difficult to ascertain. Nascent same-sex orientation may increase risk of maltreatment; alternatively, maltreatment may shape sexual orientation. Our study used instrumental variable models based on family characteristics that predict maltreatment but are not plausibly influenced by sexual orientation (e.g., having a stepparent) as natural experiments to investigate whether maltreatment might increase the likelihood of same-sex sexuality in a nationally representative sample (n = 34,653). In instrumental variable models, history of sexual abuse predicted increased prevalence of same-sex attraction by 2.0 percentage points (95% confidence interval [CI] = 1.4, 2.5), any same-sex partners by 1.4 percentage points (95% CI = 1.0, 1.9), and same-sex identity by 0.7 percentage points (95% CI = 0.4, 0.9). Effects of sexual abuse on men's sexual orientation were substantially larger than on women's. Effects of non-sexual maltreatment were significant only for men and women's sexual identity and women's same-sex partners. While point estimates suggest much of the association between maltreatment and sexual orientation may be due to the effects of maltreatment on sexual orientation, confidence intervals were wide. Our results suggest that causal relationships driving the association between sexual orientation and childhood abuse may be bidirectional, may differ by type of abuse, and may differ by sex. Better understanding of this potentially complex causal structure is critical to developing targeted strategies to reduce sexual orientation disparities in exposure to abuse.

Keywords: Sexual Behavior, Child Abuse, Homosexuality, Instrumental Variable Models, Sexual Orientation

INTRODUCTION

Epidemiological studies find a positive association between childhood maltreatment and same-sex sexuality in adulthood, with lesbians and gay men reporting 1.6 to 4 times greater prevalence of sexual and physical abuse than heterosexuals (Corliss, Cochran, & Mays, 2002; Hughes, Haas, Razzano, Cassidy, & Matthews, 2000; Roberts, Austin, Corliss, Vandermorris, & Koenen, 2010; Saewyc et al., 2006). Four explanations have been proposed for this association. The first is that nascent same-sex sexuality causes childhood maltreatment, through two pathways: (1) adolescents who reveal their same-sex sexual orientation are targeted for maltreatment (D'Augelli & Grossman, 2001; Saewyc et al., 2006); and (2) adolescents exploring same-sex attractions may put themselves in risky situations, increasing likelihood of maltreatment (Corliss et al., 2002; Holmes & Slap, 1998). A second

explanation proposes that sexual orientation minorities disproportionately exhibit gender-nonconforming behaviors in childhood (Rieger, Linsenmeier, Gygax, & Bailey, 2008; Roberts, Rosario, Corliss, Koenen, & Austin, 2012) and are targeted for maltreatment (Alanko et al., 2010).

A third explanation is that reported differences are attributable to differential recall of maltreatment by sexual orientation, due either to self-reflection during the coming out process or to differential willingness to endorse stigmatizing experiences (Corliss et al., 2002). A fourth explanation is that maltreatment increases likelihood of same-sex sexuality. Four pathways have been hypothesized: (1) maltreatment may cause loss of self-worth and create a stigmatized identity in victims; therefore, maltreated persons with same-sex preferences may be more willing to adopt another stigmatized identity, namely minority sexual orientation (Saewyc et al., 2006);(2) sexual abuse, perpetrated primarily by men, causes boys to believe they are homosexual (Gartner, 1999); (3) sexual abuse of girls by male perpetrators causes victims to be aversive to sexual relationships with men (Marvasti & Dripchak, 2004); and (4) sexual abuse of boys by men "teaches" homosexuality (Cameron & Cameron, 1995, 1996) (see also LeVay, 1996).

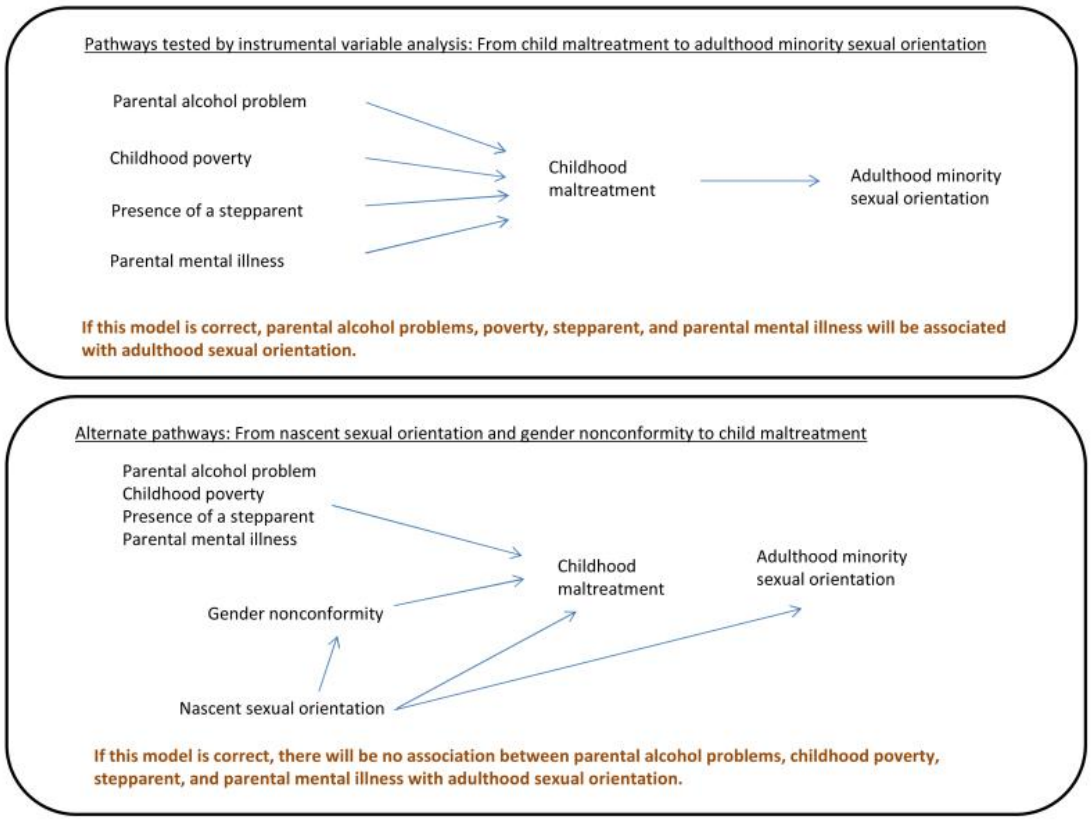
Interpretation of the association between exposure to maltreatment and sexual orientation is politically sensitive. Maltreatment is associated with many adverse health outcomes (Chermack, Stoltenberg, Fuller, & Blow, 2000; Riley, Wright, Jun, Hibert, & Rich-Edwards, 2010; Wegman & Stetler, 2009); thus, if maltreatment increases likelihood of same-sex sexual orientation, this finding may stigmatize same-sex sexual orientation by association. Furthermore, belief that sexual orientation is mutable rather than fixed has led to potentially traumatizing attempts to "cure" homosexuality, although belief that sexual orientation is biologically determined before birth has also led to attempts to "cure" homosexuality (LeVay, 1996). Despite possible political uses or misuses of scientific results, understanding the causal structure behind higher prevalence of maltreatment in sexual orientation minorities is important so that effective interventions can be designed to prevent maltreatment and to ameliorate possible sexual orientation disparities in maltreatment-related health outcomes (Institute of Medicine, 2011).

The causal structure driving the association between maltreatment and same-sex sexuality could be studied prospectively through repeated measures of maltreatment, gender nonconformity, and emerging sexual orientation during childhood. However, for ethical reasons, when childhood maltreatment is assessed in participants under age 18, mandated reporting requirements apply. Thus, in most prospective studies of children, maltreatment is assessed retrospectively in adulthood (Fergusson, Horwood, Ridder, & Beautrais, 2005). In cross-sectional studies of adults, age at which gender nonconforming behaviors appeared may be hard to recollect, and current sexual orientation may bias recollections of nonconformity. Thus, ascertaining the chronology of nonconformity, maltreatment, and emerging sexual orientation is challenging. Conventional statistical techniques directly assessing the association between maltreatment and same-sex sexual orientation cannot distinguish whether emergent same-sex sexual orientation leads to maltreatment or whether maltreatment leads to same-sex sexual orientation, or whether a third unmeasured variable is a common cause of both maltreatment and same-sex sexual orientation. However, instrumental variable analysis can provide statistically consistent estimates of the effect of an exposure on an outcome even when bidirectional causation or unmeasured common causes of the exposure and outcome may exist (Angrist & Krueger, 2001; Greenland, 2000).

In this study, we present instrumental variable analyses that use natural experiments involving factors that increase risk of childhood maltreatment but are not known to be influenced by or to directly influence nascent sexual orientation (Angrist, Imbens, & Rubin, 1996). Several family characteristics, namely, presence of a stepparent, poverty, parental alcohol abuse, and parental mental illness, are established risk factors for maltreatment (Administration on Children Youth and Families, 2007; Bays, 1990; Ronan, Canoy, & Burke, 2009) but are not plausibly affected by a child's nascent sexual orientation. We therefore used these family characteristics as instrumental variables to estimate the effect of maltreatment on sexual orientation. Because instrumental variables analyses, to our knowledge, have not been used in sexuality research, we describe the approach here and contrast the assumptions under which our analysis or a conventional analysis could identify the effect of maltreatment on sexual orientation.

The Instrumental Variable Approach

Under a set of assumptions detailed below, the instrumental variable models assess whether maltreatment resulting from family characteristics (childhood presence of a stepparent, poverty, parental alcohol abuse, and parental mental illness) influences same-sex sexual orientation. Specifically, the models assess whether theses family characteristics, which are known to be associated with maltreatment, are also associated with increased prevalence of same-sex sexual orientation. If, for example, participants who lived with stepparents in early childhood are both more likely to be maltreated and more likely to have same-sex sexual orientation, this suggests a causal pathway from stepparent through maltreatment to same-sex sexual orientation. If, alternatively, participants who lived with a stepparent were more likely to be maltreated but do not have higher prevalence of same-sex sexual orientation in adulthood, this suggests maltreatment does not influence sexual orientation (Fig. 1).



Figure

Hypothesized directed acyclic graphs of two hypotheses explaining the association between childhood maltreatment and adulthood minority sexual orientation.

Instrumental models use a two-stage estimation process. In the first stage, the instruments (e.g., presence of a stepparent) are used as independent variables to model risk of maltreatment. Presence of a stepparent, childhood poverty, parental alcohol abuse, and parental mental illness are assumed to exogenously "assign" a likelihood of maltreatment to each child, independently of future sexual orientation (Angrist, Imbens, & Rubin, 1996). The key feature of instrumental variables analysis is estimation of the effect of maltreatment by comparing sexual orientation outcomes across levels of predicted likelihood of maltreatment rather than across levels of the actual maltreatment encountered by participants. If the assumptions of the instrumental model are met, the predicted maltreatment, unlike the actual maltreatment, will be independent of possible effects of nascent sexual orientation on maltreatment. Thus, in the second stage, the predicted risk of maltreatment from this model, rather than

the actual maltreatment status, is used as the independent variable in models with adulthood sexual orientation as the dependent variable (Angrist & Krueger, 2001). The coefficients from this second model are the instrumental variable estimates.

Instrumental approaches are especially appropriate when randomization to exposure is unethical or unfeasible and conventional observational studies appear hopelessly confounded. Because estimation of coefficients is different in instrumental versus conventional models, assumptions and possible threats to validity of instrumental variable estimates also differ.

Threats to Validity: Conventional versus Instrumental Models

In a conventional model with sexual orientation as the dependent variable and maltreatment as the independent variable, interpreting the coefficient to represent the effect of childhood maltreatment on sexual orientation faces several threats to validity which are not threats to validity for instrumental models. First, if minority sexual orientation results in maltreatment whether due to gender nonconformity or sexual orientation, conventional estimates of the effect of abuse on sexual orientation are inflated. In contrast, because instrumental variable models use the instruments rather than actual maltreatment status to estimate effects of maltreatment, instrumental variable estimates can remain valid under these circumstances. This is because sexual orientation would not plausibly influence the instrument (e.g., having a stepparent).

Second, differential recall of maltreatment by sexual orientation would bias estimates from conventional models. However, because instrumental models do not use individuals' actual maltreatment status to estimate effects, even if recall of maltreatment is differential by sexual orientation, this would not necessarily bias instrumental estimates. The instrumental variable analysis can thus provide a valid test of the null hypothesis that maltreatment has no effect on sexual orientation even if there are unmeasured confounders of maltreatment and sexual orientation, and even if recall of maltreatment is unreliable or partially influenced by sexual orientation.

Although the aforementioned issues are not threats to validity of instrumental estimates, instrumental variable analyses rest on strong assumptions that merit careful evaluation (Glymour, Tchetgen, & Robins, 2012). First, instrumental estimates will be biased if instruments are affected by sexual orientation. If, for example, presence of a pre-homosexual child increases risk of marital discord and divorce, presence of a stepparent could be influenced by a child's sexual orientation, and estimates using stepparent as an instrument will be biased. In our analyses, we used presence of a stepparent before age 5 years so that children's nascent sexual orientation could not influence the presence of a stepparent. It is extremely unlikely that early manifestation of sexual orientation could cause divorce and remarriage before age 5 years. However, age of occurrence of poverty, parental alcohol abuse, and mental illness during childhood were not available; therefore, this threat remains for these instruments.

Second, validity is threatened if sexual orientation influenced reporting of the instruments (e.g., if acknowledging a socially-stigmatized identity increased the likelihood of reporting parental mental illness, another stigmatized circumstance). However, this threat is implausible for the stepparent instrument because having a stepparent is not notably stigmatizing. Similarly, sexual orientation minority adults have higher prevalence of substance use disorders (Cochran, Ackerman, Mays, & Ross, 2004) and mental illness (Fergusson, Horwood, Ridder, & Beautrais, 2005). If having a substance use disorder or mental illness increased the likelihood of reporting such issues in parents, then estimates using these instruments would be biased.

Third, if there are unmeasured common causes of our instruments and minority sexual orientation, then instrumental analyses may be biased. For example, if shared genetic factors increase risk of mental illness and same-sex sexuality, this might create an association between our instruments and same-sex sexuality (Zietsch, Verweij, Bailey, Wright, & Martin, 2011). Finally, for instruments to produce consistent estimates, they must not affect sexual orientation other than through maltreatment.

METHOD

Participants

We used data from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). NESARC entailed a multi-stage sampling design that yielded a representative sample of the civilian, non-institutionalized population from age 18 years to over 90 years residing in the United States at Wave 1, conducted in 2001 (81% response rate) (Grant & Kaplan, 2005). The current study used data primarily from the Wave 2 follow-up interview (response rate, 86.7%; cumulative response, 70.2%) (Ruan et al., 2008), conducted in 2004-2005, which assessed child maltreatment, parental traits, and sexual orientation. For participants present in Wave 2, we also included data from Wave 1 regarding presence of a stepparent, which was not assessed at Wave 2.

Participants were from age 20 years to over 90 (M age = 49.1 years), were 58.0% female, 84% U.S. born, 59.2% White, 19.0% Black, 2.8% Asian/Hawaiian/Pacific Islander, 1.7% Native American, and 18.4% Hispanic. Nearly 6% of participants reported same-sex attraction (5.8%, n = 2269), 3.4% (n = 1266) reported any lifetime same-sex sexual partners, and 1.5% (n = 577) reported same-sex identity.

Measures

Three dimensions of sexual orientation were coded dichotomously: any versus no same-sex attraction; any versus no lifetime same-sex sexual partners; and bisexual, lesbian or gay versus heterosexual identity. We distinguished among these three dimensions because maltreatment could, in theory, influence each domain differently (Sell, 1997). Participants were asked if they were sexually attracted only to the opposite sex, mostly to the opposite sex, equally to both sexes, mostly to the same sex, or only to the same sex. Participants who reported anything other than “only attracted to the opposite sex” were considered to have same-sex attraction.

Childhood exposure to physical and psychological abuse (Straus, Hamby, Finkelhor, Moore, & Runyan, 1998), physical and emotional neglect (Bernstein et al., 1994), and witnessing male-to-female intimate partner violence (Straus, 1990) were measured with previously validated scales. Scales were converted to ordinal measures reflecting no maltreatment, medium, or high levels of maltreatment. Preliminary analyses indicated the different types of non-sexual maltreatment were highly correlated; therefore, we created a single measure of non-sexual maltreatment by adding one point for each scale at medium and two points for each scale at high. We divided the resulting scale into four levels to facilitate ordinal analysis.

Because sexual abuse affects other dimensions of sexual behavior (Browne & Finkelhor, 1986; Holmes & Slap, 1998) and sexual abuse in particular has been hypothesized to affect sexual orientation (Gartner, 1999; Wilson & Widom, 2010), we retained sexual abuse as a distinct variable. Participants were asked about unwanted sexual contact with an adult before age 18 or with someone when they were too young to know what was happening (Wyatt, 1985). In this context, they were asked about four types of contact: sexual fondling, being forced to touch someone in a sexual way, attempted intercourse, and completed intercourse (e.g., “Before you were 18 years old, how often did an adult or other person touch or fondle you in a sexual way when you didn’t want them to or when you were too young to know what was happening?”). Participants who said they had “almost never” or “sometimes” been fondled or been forced to touch someone in a sexual way were coded as having experienced a low level of sexual abuse. Participants were considered to have experienced a medium level of abuse if they were exposed to this type of abuse “fairly often” or “very often” or if someone “almost never” or “sometimes” attempted sexual intercourse. Participants who had experienced these events more frequently or had ever had someone complete sexual intercourse with them were considered to have experienced a high level of abuse.

Participants were asked about characteristics of parents or other adults in the home in their childhood, before age 18. Problem drinking and problem drug use, defined for participants to mean substance use that led to physical, emotional, interpersonal, legal or work problems, or involved a lot of time spent drunk, high or hung over, were each assessed with one question. A parent was considered mentally ill if s/he had been treated or hospitalized for mental illness, had attempted suicide, or had committed suicide. Childhood poverty was measured by receipt of government aid. Participants were asked if they had ever lived with a stepparent and, if so, at what age. So that possible parental conflict resulting from participants’ gender nonconforming behavior or coming out as gay, lesbian or bisexual could not affect presence of a stepparent, only participants who had begun living with a stepparent before age 5 were

coded “1”; those who had never lived with a stepparent were coded “0.” Participants who had begun living with a stepparent between ages 5 and 18 (n = 3,352) were omitted in analyses including this variable.

Based on participants’ selections of their race and ethnic origin, and following the U.S. Census Bureau algorithm, NESARC classified race/ethnicity in the following preferential order: Hispanic or non-Hispanic Black, American Indian/Native Alaskan, Native Hawaiian/Pacific Islander, Asian or White. Age at interview was continuous. Immigrant status was U.S.-born or foreign-born. Income in the year of the interview, adjusted for family size, was grouped in three levels: below 150% of poverty; above 150% of poverty but below median income; or above median income. Educational attainment was: less than high school graduate, high school graduate, some college, or completed college.

The sample size was 33,771, after 882 (2.5%) people were excluded for missing data. For the three sexual orientation outcomes, less than 1.3% of participants were missing data; for the instruments, less than 1.0% were missing; for the exposures, less than 0.6% were missing; for the covariates, less than 1% were missing. In analyses including the stepparent variable the sample size was somewhat smaller (n = 30,438), because an additional 3,333 people who first lived with a stepparent between ages 5 and 18 years were excluded.

Procedure

We assessed the association between sexual abuse and non-sexual maltreatment and the three dimensions of sexual orientation using probit regression. To estimate the effect of sexual abuse and maltreatment on sexual orientation, we conducted instrumental variable probit regressions, using the Stata conditional mixed process estimator (Roodman, 2009; StataCorp LP, 2010). We next estimated population attributable fraction of same-sex sexual attraction, orientation, and partners due to childhood abuse using the SAS PAR macro (Spiegelman, Hertzmark, & Wand, 2007). We conducted all analyses with and without adjustment for race/ethnicity, immigrant status, and sex, and age, income, and education at the time of the interview. We further examined results stratified by sex.

To describe the strength of our proposed instruments, we regressed childhood maltreatment and sexual abuse on each instrument separately (Bound, Jaeger, & Baker, 1995). To assess possible pathways directly linking the instruments with the outcome, we regressed each of the three sexual orientation measures on each of the instruments in separate logistic regressions adjusted for child maltreatment and sexual abuse. We additionally conducted Sargan overidentification tests using both two-stage least square and maximum likelihood models (StataCorp LP, 2010). Sargan tests check for discrepancies among the four instruments in their estimates of the effect of abuse on sexuality (Baum, Schaffer, & Stillman, 2003). Finally, we conducted inequality constraints tests, which can detect extreme violations of the instrumental variables assumptions with binary endogenous variables and outcomes (Bonet, 2001; Pearl, 2000).

We tested parental problem drug use as an instrumental variable, but it was positively associated with same-sex sexuality after adjustment for childhood nonsexual maltreatment and sexual abuse. Because parental problem drug use was associated with the instruments and sexual orientation, we adjusted for it in instrumental variable analyses (Angrist, Imbens, & Rubin, 1996). We also adjusted for exposure to community violence in childhood, which was similarly associated with both the instruments and sexual orientation. All statistical tests conducted were two-sided.

RESULTS

Childhood sexual abuse and non-sexual maltreatment were approximately linearly predictive with report of same-sex attraction, partners, and identity (Tables 1 and 2). All of the family characteristics used as instruments strongly predicted experience of sexual abuse and maltreatment. The strongest association was between parental alcohol abuse and non-sexual maltreatment (Wald F-statistic = 812); the weakest association was between presence of a stepparent and non-sexual maltreatment (Wald F-statistic = 23). All values far exceeded the generally recommended threshold of $F > 10$ to avoid weak instrument bias (Staiger & Stock, 1997). None of the instruments were associated with sexual orientation after adjustment for maltreatment and sexual abuse (Table 3).

Table 1

Prevalence of child maltreatment and instruments by same-sex sexual attraction, partners, and identity, U.S. men 2004-2005 (n = 14,436)

	Same-sex attraction		Same-sex partners		Same-sex identity	
	No (n = 13,704)	**Yes (n = 732)**	**Never (n = 13,783)**	**Ever (n = 644)**	**No (n = 14,149)**	**Yes (n = 271)**
	% (SE)		**% (SE)**		**% (SE)**	
Total	95.0	5.1	95.5	4.5	98.1	1.9
Childhood maltreatment						
Sexual abuse						
None	94.7 (0.3)	86.4 (1.5)	95.0 (0.2)	79.5 (1.9)	94.6 (0.2)	80.8 (2.8)
Low	1.8 (0.1)	2.2 (0.7)	1.7 (0.1)	3.3 (0.8)	1.8 (0.1)	1.9 (0.7)
Medium	1.6 (0.1)	4.3 (0.8)	1.6 (0.1)	6.0 (1.0)	1.7 (0.1)	4.7 (1.4)
High	1.9 (0.2)	7.1*** (1.1)	1.8 (0.2)	11.3*** (1.5)	2.0 (0.2)	12.6*** (2.7)
Non-sexual maltreatment						
None	29.7 (0.6)	23.5 (1.9)	29.6 (0.6)	23.5 (2.0)	29.5 (0.6)	20.5 (3.0)
Low	38.5 (0.6)	37.8 (2.1)	38.6 (0.6)	34.8 (2.1)	38.5 (0.6)	35.1 (3.3)
Medium	27.8 (0.5)	31.9 (2.0)	27.8 (0.5)	33.0 (2.1)	27.9 (0.5)	34.5 (3.3)
High	4.0 (0.2)	6.7** (1.0)	4.0 (0.2)	8.7*** (1.3)	4.1 (0.2)	10.0** (2.1)
Instruments						
Poverty	12.8 (0.4)	12.3 (1.3)	12.7 (0.4)	14.9 (1.7)	12.7 (0.4)	14.3 (2.6)
Parent alcohol problem	20.5 (0.5)	21.4 (1.7)	20.3 (0.5)	26.1* (2.2)	20.5 (0.5)	25.0 (3.2)
Parent mental illness	6.2 (0.2)	7.6 (1.1)	6.2 (0.2)	9.2* (1.3)	6.3 (0.2)	8.5 (2.0)
Stepparent before age 5	2.6 (0.2)	3.0 (0.8)	2.6 (0.2)	3.8 (1.0)	2.6 (0.2)	4.5 (1.5)

Open in a separate window

χ^2 test for same-sex versus non-same-sex,

*$p < .05$
**$p < .01$
***$p < .001$

Table 2

Prevalence of child maltreatment and instruments by same-sex sexual attraction, partners, and identity, U.S. women 2004-2005 (n =19,860)

	Same-sex attraction		**Same-sex partners**		**Same-sex identity**	
	No (n = 18,358)	**Yes (n = 1,502)**	**Never (n = 19,238)**	**Ever (n = 622)**	**No (n =19,512)**	**Yes (n = 306)**
	% (SE)		**% (SE)**		**% (SE)**	
Total	92.4	7.6	96.9	3.1	98.5	1.5
Childhood maltreatment						
Sexual abuse						
None	83.5 (0.4)	74.5 (1.6)	83.6 (0.4)	61.5 (2.3)	83.3 (0.4)	54.6 (3.5)
Low	3.6 (0.2)	3.4 (0.5)	3.6 (0.2)	2.4 (0.7)	3.6 (0.2)	2.1 (0.8)
Medium	6.1 (0.2)	9.7 (1.0)	6.3 (0.2)	14.0 (1.6)	6.4 (0.2)	18.8 (2.8)
High	6.6 (0.3)	12.4*** (1.1)	6.5 (0.3)	22.1*** (2.0)	6.7 (0.3)	24.6*** (3.0)
Non-sexual maltreatment						
None	36.7 (0.5)	27.0 (1.4)	36.5 (0.4)	20.6 (1.8)	36.2 (0.5)	20.3 (2.5)
Low	34.3 (0.5)	36.3 (1.5)	34.5 (0.4)	32.8 (2.2)	34.5 (0.5)	30.1 (3.2)
Medium	23.3 (0.4)	27.7 (1.5)	23.3 (0.4)	34.6 (2.4)	23.5 (0.4)	34.7 (3.0)
High	5.7 (0.2)	9.0*** (1.0)	5.8 (0.2)	11.9*** (1.5)	5.8 (0.2)	14.9*** (2.5)
Instruments						
Poverty	13.6 (0.4)	15.1 (1.2)	13.6 (0.4)	19.5** (1.3)	13.6 (0.4)	24.8** (3.2)
Parent alcohol problem	23.3 (0.5)	27.8** (1.5)	23.2 (0.5)	37.1*** (2.5)	23.4 (0.5)	39.9*** (3.4)
Parent mental illness	7.3 (0.3)	10.6** (1.0)	7.4 (0.3)	12.0** (1.4)	7.5 (0.3)	11.5 (2.2)
Stepparent before age 5	3.1 (0.2)	2.6 (0.5)	3.0 (0.2)	4.6 (1.0)	3.1 (0.2)	5.6** (1.6)

Open in a separate window

$\chi;^2$ test for same-sex versus non-same-sex,

*$p < .05$
**$p < .01$
***$p < .001$

Table 3

Logistic regression of same-sex sexual attraction, partners, and identity on the instruments, unadjusted and adjusted for sexual abuse and non-sexual maltreatment, U.S. adults, 2004-2005 (n = 34,653)

	Same-sex attraction	Same-sex partners	Same-sex identity
Instruments	**Odds ratio (95% confidence interval)**		
Step-parent before age 5			
Unadjusted	0.95 (0.71, 1.28)	1.50 (1.05, 2.13)	1.82 (1.14, 2.89)
Adjusted[a]	0.77 (0.56, 1.04)	1.05 (0.72, 1.53)	1.18 (0.72, 1.93)
Poverty			
Unadjusted	1.08 (0.93, 1.24)	1.35 (1.13, 1.62)	1.61 (1.23, 2.12)
Adjusted[a]	0.90 (0.77, 1.04)	0.99 (0.82, 1.20)	1.13 (0.85, 1.49)
Parent alcohol problem			
Unadjusted	1.22 (1.07, 1.39)	1.61 (1.39, 1.88)	1.72 (1.39, 2.13)
Adjusted[a]	0.96 (0.83, 1.10)	1.09 (0.91, 1.31)	1.06 (0.82, 1.37)
Parent mental illness			
Unadjusted	1.44 (1.20, 1.74)	1.60 (1.29, 1.98)	1.51 (1.06, 2.15)
Adjusted[a]	1.14 (0.92, 1.41)	0.99 (0.77, 1.27)	0.85 (0.56, 1.29)

[a]Adjusted for sexual abuse, non-sexual maltreatment, and parental drug use.

In conventional probit regressions, we found strong associations between childhood sexual abuse and maltreatment and each dimension of sexual orientation, although non-sexual maltreatment was not significantly associated with same-sex partners among men. All three dimensions of sexual orientation were more strongly associated with sexual abuse than with non-sexual maltreatment. The association of sexual abuse with all three dimensions of same-sex sexual orientation was stronger among men than women (Table 4).

Table 4

Probit regression of same-sex sexual attraction, partners, and identity on child sexual abuse and non-sexual maltreatment, U.S. adults, 2004-2005[a]

	Sexual abuse			Non-sexual maltreatment		
Same-sex attraction	Estimate	Lower 95% CI	Upper 95% CI	Estimate	Lower 95% CI	Upper 95% CI
Both sexes (n = 34,192)	0.13***	0.10	0.16	0.07***	0.04	0.10
Men only (n = 14,397)	0.22***	0.17	0.27	0.07**	0.02	0.11
Women only (n = 19,795)	0.09***	0.05	0.12	0.07**	0.03	0.11
Same-sex partners						
Both sexes (n = 34,191)	0.23***	0.20	0.26	0.07***	0.04	0.11
Men only (n = 14,391)	0.33***	0.28	0.38	0.06	−0.01	0.12
Women only (n = 19,800)	0.15***	0.11	0.19	0.10***	0.06	0.14
Same-sex identity						
Both sexes (n = 33,974)	0.22***	0.17	0.27	0.10***	0.07	0.13
Men only (n = 14,316)	0.27***	0.19	0.35	0.10***	0.05	0.16
Women only (n = 19,658)	0.18***	0.11	0.26	0.10***	0.06	0.14

[a]Adjusted for race/ethnicity, immigrant status, and age, income and education at year of survey, parental problem drug use, other violent victimization in childhood, and adjusted for sex or stratified by sex.
**$p < .01$
***$p <. 001$

Instrumental variable estimates of the effect of childhood sexual abuse on same-sex attraction, behavior, and identity were large and statistically significant among both men and women (Table 5). Overall, effect estimates from the instrumental analyses were similar to estimates from the conventional probit analyses. For example, the probit coefficient for the effect of sexual abuse on same-sex attraction was 0.15 in conventional analyses and 0.19 in instrumental variable analyses. Converting the instrumental probit coefficients to absolute effect estimates suggests that a one unit increase in sexual abuse (from none to low, low to medium, or medium to high) predicted a 2.0 percentage point (95% confidence interval [CI] = 1.4, 2.5) increased prevalence of same-sex attraction, a 1.4 percentage point (95% CI = 1.0, 1.9) increased prevalence of any same-sex partners, and a 0.7 percentage point (95% CI = 0.4, 0.9) increased prevalence of same-sex identity.

Table 5

Instrumental probit regression of same-sex sexual attraction, partners, and identity on child sexual abuse and non-sexual maltreatment, U.S. adults, 2004-2005[a]

	Sexual abuse			Non-sexual maltreatment		
Same-sex attraction	Estimate	Lower 95% CI	Upper 95% CI	Estimate	Lower 95% CI	Upper 95% CI
Both sexes (n = 34,192)	0.17***	0.12	0.22	0.02	−0.04	0.08
Men only (n = 14,397)	0.33***	0.24	0.42	0.02	−0.10	0.14
Women only (n = 19,795)	0.11**	0.04	0.17	0.03	−0.05	0.11
Same-sex partners						
Both sexes (n = 34,191)	0.23***	0.15	0.30	0.08	−0.01	0.16
Men only (n = 14,391)	0.41***	0.28	0.54	0.08	−0.06	0.23
Women only (n = 19,800)	0.11*	0.00	0.22	0.14**	0.03	0.25
Same-sex identity						
Both sexes (n = 33,974)	0.25***	0.16	0.33	0.09*	0.00	0.18
Men only (n = 14,316)	0.39***	0.21	0.58	0.11	−0.01	0.24
Women only (n = 19,658)	0.17***	0.08	0.27	0.10	−0.02	0.22

[a]Adjusted for race/ethnicity, immigrant status, parental problem drug use, other violent victimization in childhood, and age, income and education at year of survey, and stratified by sex or adjusted for sex.
*$p < .05$
**$p < .01$
***$p < .001$

The instrumental variable estimate of the effect of non-sexual maltreatment on same-sex identity indicated that a one-level increase in maltreatment increased same-sex identity by 0.2 percentage points (95% CI = 0.0, 0.5). A one-level increase in non-sexual maltreatment was also estimated to increase prevalence of any same-sex partners for women by 0.7 percentage points (95% CI = 0.2, 1.3). In sex-stratified analyses, the estimated effects of child maltreatment on the three dimensions of sexual orientation were consistently smaller for women than for men (Table 5).

Because the instrumental and non-instrumental probit effect estimates were very similar, with the instrumental variable estimates slightly larger, we conservatively calculated population attributable fraction of same-sex sexuality due to sexual abuse using effect estimates from conventional models. We estimated 9% of same-sex attraction, 21% of any lifetime same-sex sexual partnering, and 23% of homosexual or bisexual identity was due to childhood sexual abuse, assuming the conventional effect estimates are correct.

As two of the four threats to validity seemed least applicable to the stepparent instrument, we conducted supplemental analyses with a modified version of the stepparent variable as the sole instrument. Estimating the effect of both sexual and non-sexual abuse simultaneously required an instrument with at least three levels; therefore, we created a variable as: stepparent before age 5, single parent before age 5 (participants reported death of a parent or divorce before age 5), or two parents, with risk of abuse in our data highest for stepparent, lower for single-parent, and lowest for two-parent families. Results were nearly identical, with sexual abuse predicting same-sex attraction (coefficient =

0.17, $p < .001$), partners (coefficient = 0.20, $p < .001$), and identity (coefficient = 0.28, $p < .001$). However, the estimated effect of non-sexual abuse was attenuated and no longer significant in the model for same-sex identity (coefficient =0.003).

Overidentification and inequality constraint tests of the instrumental variable models did not indicate violations of the model assumptions. To further assess the robustness of our results, we repeated analyses using each instrument in separate models to independently estimate the effect of sexual abuse on sexuality. In these models, non-sexual maltreatment was treated as exogenous to enable estimation of effects with a single instrument. Results were remarkably consistent across models (Table 6).

Table 6

Instrumental probit regression of same-sex sexual attraction, partners, and identity on child sexual abuse, models with all instruments and each instrument separately[a]

	Sexual abuse		
	Estimate	**Lower 95% CI**	**Upper 95% CI**
Same-sex attraction			
All instruments	0.13	0.08	0.18
Problem drinker	0.13	0.01	0.26
Poverty	0.13	0.04	0.23
Stepparent	0.13	0.07	0.19
Adult mental illness	0.13	0.01	0.25
Same-sex partners			
All instruments	0.23	0.16	0.29
Problem drinker	0.23	0.05	0.40
Poverty	0.23	0.05	0.41
Stepparent	0.23	0.16	0.30
Adult mental illness	0.23	0.06	0.40
Same-sex identity			
All instruments	0.22	0.13	0.31
Problem drinker	0.22	−0.08	0.52
Poverty	0.22	−0.02	0.46
Stepparent	0.22	0.13	0.31
Adult mental illness	0.35	0.17	0.53

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[a]Adjusted for nonsexual maltreatment, race/ethnicity, immigrant status, parental problem drug use, other violent victimization in childhood, and age, income and education at year of survey, and sex.

Note: Estimates from these models differ somewhat from those presented in Table 4 because nonsexual abuse is treated as exogenous to permit estimation of effects of sexual abuse using only one instrument.

DISCUSSION

Numerous studies document an association between childhood physical and sexual abuse, neglect, and witnessing violence in childhood and same-sex sexuality. The present study used instrumental variable methods to analyze data from natural experiments to provide novel evidence that maltreatment may shape sexual orientation. Although no psychosocial determinants of sexual orientation have been demonstrated, studies using other samples have reported associations between same-sex sexuality and parental depression, parental substance use, and changes in caregivers during childhood, factors potentially associated with our instruments (Corliss, Austin, Roberts, & Molnar, 2009; Fergusson, Horwood, Ridder, & Beautrais, 2005). Furthermore, a recent large population-based twin study indicated that individual-specific environmental factors accounted for between 0.61 and 0.66 of the variance in same-sex sexual behavior in both sexes, a moderate to large effect of environment on same-sex sexuality (Langstrom, Rahman, Carlstrom, & Lichtenstein, 2010), raising the question of whether those environmental factors might include psychosocial influences.

Our results relied on the strong assumption that the instruments did not affect sexual orientation directly or through pathways other than abuse or maltreatment and that no omitted factors, including genes (Zietsch, Verweij, Bailey, Wright, & Martin, 2011), affected both the instruments and sexual orientation. Alternative explanations for the associations that we report should, therefore, focus on factors that influence both childhood family characteristics and sexual orientation. We consider this a fertile area for future empirical research. Such research is especially important because showing violations of the instrumental variable assumptions entails demonstrating other factors that determine sexual orientation. We are aware of one study that suggests there may be common genetic causes of same-sex sexual orientation and personality factors (Zietsch et al., 2011). The personality factors studied may increase risk for exposure to our instruments.

The associations of sexual orientation with our instruments were entirely attenuated in models including childhood maltreatment and sexual abuse. In other words, there was no elevated frequency of same-sex sexuality in persons with stepparents in early childhood, poverty, parental mental illness or alcohol abuse, except for children who were maltreated or abused. This would be unlikely to be the case were these factors associated with sexual orientation due to pleiotropic genetic effects, which would function irrespective of maltreatment status. Persons willing to identify as homosexual or bisexual may also be more willing to report parental alcohol abuse, mental illness, or poverty. We emphasize results using stepparent as an instrumental variable, because we expect that quality of retrospective reporting for this factor is likely to be the most reliable and reporting is unlikely to be affected by sexual orientation.

Our results suggest that from half to all of the increased prevalence of childhood sexual abuse experienced by sexual orientation minorities compared with heterosexuals may be due to the effects of sexual abuse on sexual orientation, possibly through previously proposed pathways: (1) abuse of boys perpetrated by men causes boys to believe they are gay; (2) abuse of girls by men leads them to be averse to sexual relationships with men; (3) abuse survivors may feel stigmatized and different from others and may, therefore, be more willing to behave in ways that are socially stigmatized, including acknowledging same-sex attraction or having same-sex partners (Saewyc et al., 2006). If this third pathway is a primary mechanism behind our findings, it follows that the true prevalence of same-sex sexuality is far higher than presently estimated by surveys: among participants with a high level of sexual abuse, 8.9% of men were gay or bisexual and 5.1% of women were lesbian or bisexual (versus, respectively, 1.3% and 1.0% among persons not abused). It would also follow that in societies where same-sex sexuality is more accepted and less stigmatized, prevalence of same-sex sexual orientation would be higher and sexual orientation disparities in abuse would be lower. This hypothesis could be tested by examining sexual orientation prevalence and abuse disparities across countries differing in acceptance of minority sexual orientation.

Other pathways may also link abuse and maltreatment with sexual orientation. Research in related fields suggests possible hormonal and behavioral mechanisms linking diverse types of maltreatment with sexuality. In animals, estrogen and related neuropeptides oxytocin and arginine vasopressin are involved in pair bonding, sexual behaviors, and the expression of gender-typical behavior, and may serve similar functions in humans (Cushing & Kramer, 2005; Lim & Young, 2006). Quality of parenting affects expression of estrogen, oxytocin, vasopressin, and their receptors in offspring, and has

been hypothesized to affect later sexual behavior through epigenetic changes, particularly in the stria terminalis and the medial amygdala, brain regions that regulate social behavior (Cushing & Kramer, 2005). Thus, abuse and maltreatment may affect sexual orientation through biological mechanisms responsive to postnatal social environment.

Maltreatment, including sexual abuse, can have persistent effects on mood and behavior, which may increase likelihood of same-sex sexuality. Maltreatment causes emotional numbing, motivating survivors to seek stronger stimuli to experience positive states, leading to novelty-seeking and risk-taking behaviors (Fergusson & Horwood, 1998), which have been associated with same-sex sexuality (Fergusson, Horwood, Ridder, & Beautrais, 2005). Maltreatment also increases risk of substance abuse (Browne & Finkelhor, 1986), which may, in turn, increase likelihood of acting on same-sex attraction through disinhibition. Moreover, maltreatment leads to stress, depression, and anger (Briere & Elliott, 1994). The drive for intimacy and sex to repair depressed, stressed, or angry moods (Shrier, Shih, Hacker, & de Moor, 2007) may increase the likelihood of same-sex partners and attractions. Maltreatment also increases risk for borderline personality disorder, which has been associated with non-heterosexual orientation (Singh, McMain, & Zucker, 2011). To the extent these mechanisms exist, changes in social acceptance of minority sexual orientation will likely not affect differences in the prevalence of history of early childhood maltreatment by sexual orientation.

Maltreatment may also influence sex of partners and sexual orientation identity through housing insecurity, because young adults may sever connections to families subsequent to abuse. Poorly-housed youth may trade sex for housing, money or drugs (Greene, Ennett, & Ringwalt, 1999). For men especially, this sex work may involve same-sex sexual acts. Having had same-sex sexual contact, whether as victims of abuse or for compensation, people may be more likely to consider themselves bisexual or homosexual (Gartner, 1999). Our finding that sexual partners and identity were more strongly influenced by abuse for men than for women is in keeping with these hypothesized pathways. However, these pathways do not explain the strong estimated effect of sexual abuse on men's attraction.

Prior research has indicated that women's sexual orientation changes more across the lifespan than does men's (Kinnish, Strassberg, & Turner, 2005; Ott, Corliss, Wypij, Rosario, & Austin, 2011), suggesting that women's sexual orientation may be more readily influenced by environmental factors. Our findings do not support this hypothesis with regard to childhood abuse, although we know of no studies that compare male and female changes in sexual orientation in response to environmental exposures. Moreover, women and men in our sample were most likely exposed to sexual abuse that was qualitatively different. Because men are the principal perpetrators of sexual abuse of both boys and girls (Holmes & Slap, 1998; Vogeltanz et al., 1999), most men in our sample were likely exposed to same-sex abuse, while most women were likely exposed to opposite-sex abuse; thus, it is difficult to generalize from our findings to sex differences in response to environmental exposures more broadly.

Our results should be considered in the context of three further limitations. First, childhood measures were assessed retrospectively; therefore, recall error could attenuate estimates. A substantial minority of adults with court-documented abuse do not report abuse retrospectively (Williams, 1994). Second, because the NESARC questionnaire did not exclude unwanted encounters when asking about sexual partners, and because sexual abuse perpetrators are overwhelmingly male (Holmes & Slap, 1998), men may be referring to an abuser when they endorse same-sex partners. However, this limitation does not apply to results for same-sex attraction or identity or to any of the results for women. Third, the instrumented analyses estimated the effect of abuse and maltreatment among participants who were maltreated as a consequence of poverty, parental alcohol abuse, parental mental illness or having a stepparent. These estimates may not apply to people who were maltreated under other circumstances.

Our results suggest that the causal relationships driving the association between sexual orientation and abuse and maltreatment may be bidirectional, may differ by type of maltreatment, and may differ by sex. Better understanding of this potentially complex causal structure is critical to developing targeted strategies to reduce sexual orientation disparities in maltreatment. Our findings indicated that sexual abuse may increase the likelihood of the three dimensions of same-sex sexuality for both sexes, and that non-sexual maltreatment may affect sexual orientation identity and women's same-sex sexual

partnering. While point estimates suggest that much of the association between maltreatment and sexual orientation may be due to the effects of maltreatment on sexual orientation, rather than the reverse, confidence intervals were wide. Results were, therefore, also consistent with approximately half the association between sexual abuse and minority sexual orientation being due to nascent sexual orientation leading to increased risk of maltreatment, and all or nearly all of the association between non-sexual maltreatment and sexual orientation being due to sexual orientation leading to maltreatment. Whether maltreatment influences sexuality or sexuality influences maltreatment, or both, public health interventions to increase tolerance and reduce assault and harassment of sexual orientation minorities are needed.

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Footnotes

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