

# Familial Factors, Victimization, and Psychological Health Among Sexual Minority Adolescents in Sweden

Kelly Donahue, PhD, Niklas Långström, MD, PhD, Sebastian Lundström, PhD, Paul Lichtenstein, PhD, and Mats Forsman, PhD

**Objectives.** To determine the influences of victimization experience and familial factors on the association between sexual minority status and psychological health outcomes among adolescents.

**Methods.** We used data from the Child and Adolescent Twin Study in Sweden, a prospective, population-based study of all twins born in Sweden since 1992. Cross-sectional analyses included individuals who completed assessments at age 18 years ( $n = 4898$ ) from 2000 to 2013. We also compared psychological health among sexual minority adolescents and their nonminority co-twins.

**Results.** Sexual minority adolescents were more likely than were unrelated nonminority adolescents to report victimization experiences, including emotional abuse, physical abuse or neglect, and sexual abuse. Sexual minority adolescents also reported significantly more symptoms of anxiety, depression, attention-deficit/hyperactivity disorder, disordered eating, and substance misuse in addition to increased parent-reported behavior problems. Victimization experience partially mediated these associations. However, when controlling for unmeasured familial confounding factors by comparing sexual minority adolescents to their same-sex, nonminority co-twins, the effect of sexual minority status on psychological health was almost entirely attenuated.

**Conclusions.** Familial factors—common genetic or environmental influences—may explain decreased psychological adjustment among sexual minority adolescents. (*Am J Public Health.* 2017;107:322–328. doi:10.2105/AJPH.2016.303573)

Adolescents and young adults identifying as sexual minorities (i.e., reporting nonheterosexual sexual orientation or same-sex partners) report collectively poorer mental health outcomes, such as depression, anxiety, self-harm, and suicidality, than those of nonminority peers.<sup>1–3</sup> Sexual minority individuals on average may also be more likely to engage in health risk behaviors, including substance misuse,<sup>4,5</sup> as well as disordered eating and weight control behaviors.<sup>6,7</sup>

The minority stress model is a possible explanation for poorer psychological health among sexual minorities. This model hypothesizes that actual and perceived experiences of social prejudice, discrimination, and stigma among sexual minority individuals are stressors that negatively affect psychological

well-being.<sup>3,8</sup> This discrimination may be specific to the individual's minority status,<sup>9</sup> although experiencing more general discrimination and victimization (i.e., discrimination not specifically targeting the individual's sexual minority status) may also contribute to the relationship between sexual orientation and psychological health.<sup>10,11</sup>

In the minority stress framework, the accrual of stressors—ranging from day-to-day

experiences of perceived stigma to discrete traumatic victimization experiences—can contribute to poor health outcomes. Regarding victimization experiences, sexual minority individuals report sexual abuse, physical abuse or neglect, or emotional neglect during childhood and adolescence more often than do nonminority individuals either in peer relationships or perpetrated by parents or other adults.<sup>12–14</sup> Likely consequences of such victimization experiences on mental health are well documented.<sup>15</sup>

However, minority stress may not fully mediate the association between sexual minority status and poorer psychological health; several studies suggest an elevated risk even after controlling for perceived discrimination or victimization experiences, including sexual abuse.<sup>10,11,13</sup> Additionally, the observed association between sexual minority status and poorer psychological health outcomes could be confounded by shared background factors. Previous research suggests that this confounding could be the result of unmeasured familial factors—genetic or shared environmental influences—that contribute to both an individual's predisposition toward sexual minority status and decreased psychological adjustment.<sup>11,16</sup>

Comparing twins discordant for risk factor exposure allows us to account for unmeasured genetic and shared environmental factors that could explain the association between sexual minority status and poorer psychological adjustment observed in previous

## ABOUT THE AUTHORS

Kelly Donahue is with the Department of Pediatrics Section of Adolescent Medicine, Indiana University School of Medicine, Indianapolis. Niklas Långström, Paul Lichtenstein, and Mats Forsman are with the Department of Medical Epidemiology and Biostatistics, Karolinska Institutet, Stockholm, Sweden. Niklas Långström and Mats Forsman are also with the Swedish Prison and Probation Administration, Norrköping, Sweden. Sebastian Lundström is with the Centre for Ethics, Law and Mental Health and the Gillberg Neuropsychiatry Centre, Gothenburg University, Sweden.

Correspondence should be sent to Kelly Donahue, PhD, Indiana University School of Medicine, Section of Adolescent Medicine, 410 West 10th St., Suite 1001, Indianapolis, IN 46202 (e-mail: kldonahu@iu.edu). Reprints can be ordered at <http://www.ajph.org> by clicking the "Reprints" link.

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studies, because twin pairs discordant for sexual orientation still share on average 50% (dizygotic twins) or 100% (monozygotic twins) of additive genetic material and most of the family environment.<sup>17</sup> If the association between sexual minority status and psychological health were not confounded by unmeasured genetic and environmental factors, sexual minority status would be similarly associated with poorer psychosocial health among unrelated individuals and within twin pairs discordant for sexual minority status. By contrast, if the association between sexual minority status and psychological health were attributable to unmeasured familial confounds, the association would be weaker among discordant twin pairs than among unrelated individuals.

We explored the associations between sexual minority status, victimization experience, and psychological health outcomes among adolescents, using a representative, population-based sample of twins aged 18 years in Sweden. Specifically, we explored whether the association between sexual minority status and poorer psychological adjustment was mediated by victimization experience. We also examined the effects of unmeasured familial confounding on this association by comparing psychological adjustment among sexual minority individuals and their nonminority co-twins. Building on previous studies with this age group, we anticipated that sexual minority adolescents would report more victimization experiences and poorer psychological adjustment than would nonminority individuals. Further, on the basis of existing research in adults, we hypothesized that victimization experience would partially mediate the association between sexual minority status and poorer psychological adjustment but that the overall association between sexual minority status and psychological health would be largely confounded by unmeasured familial factors.

## METHODS

The Child and Adolescent Twin Study in Sweden (CATSS) is an ongoing prospective, longitudinal study of children's physical and emotional well-being.<sup>18</sup> Data collection for CATSS has targeted all twins born in Sweden since July 1992 (current  $n = 23\ 624$ ).

Parents of study participants were first interviewed by telephone when twins were aged 9 or 12 years (CATSS-9/12), with a response rate of 75.0%. Twins and their parents reported again on child characteristics via paper questionnaires when the children were aged 15 and 18 years (CATSS-15/18). Anckarsäter et al.<sup>18</sup> provide additional details regarding study design and procedures. Our analyses included individuals who had completed assessments at the age of 18 years at the time of data analysis ( $n = 4898$ ), representing 64.7% of all twin individuals born in July 1992 through December 1995 who initially participated in assessments for CATSS-9/12 ( $n = 7570$ ).

We determined twin pair zygosity by a panel of 48 single nucleotide polymorphisms derived for zygosity analyses.<sup>19</sup> For twins without DNA samples, we determined zygosity using an algorithm based on 5 parent report items assessing twin similarity, validated in a subsample of twin pairs with available DNA samples.<sup>18</sup> Our sample consisted of 1422 individuals from monozygotic twin pairs, 1341 from same-sex dizygotic pairs, 1623 from opposite-sex dizygotic pairs, and 512 from pairs of unknown zygosity. We included all individuals in between-person comparisons, regardless of complete twin pair data, whereas we included only same-sex twin pairs with complete data in within-pair comparisons.

## Measures

CATSS-18 participants responded to an item addressing self-defined sexual orientation: "Which alternative do you think best describes your sexual orientation today?" The response options were "homosexual," "bisexual," "heterosexual," and "other." We categorized participants who endorsed a sexual orientation other than heterosexual as having sexual minority status.

Participants completed the Screen for Child Anxiety-Related Disorders,<sup>20</sup> the Center for Epidemiological Studies Depression Scale Iowa form,<sup>21</sup> the Adult Attention-Deficit Hyperactivity Disorder Self-Report Scale,<sup>22</sup> the Eating Disorder Inventory-2,<sup>23</sup> the Alcohol Use Disorders Identification Test,<sup>24</sup> and the Drug Use Disorders Identification Test.<sup>25</sup>

The Screen for Child Anxiety-Related Disorders is a 41-item self-report measure of

anxiety symptoms in the past 3 months. Responses were provided on a 3-point Likert scale (0, 1, and 2 points), with a higher score reflecting increased intensity or frequency of anxiety symptoms and possible scores ranging from 0 to 82. Because of an error in data collection, we did not present the final 3 items to participants. Because all 3 missing items belonged to the social anxiety disorder subscale, we calculated each respondent's mean score for the remaining 4 subscale items and used this score as a substitute response value for each of the 3 missing items.

The Center for Epidemiological Studies Depression Iowa form is an 11-item self-report measure of past-week depressive symptoms. Responses were provided on a 3-point Likert scale, with all items coded so that a higher score indicated increased intensity of depressive symptoms (range = 0–22).

The Adult Attention-Deficit Hyperactivity Disorder Self-Report Scale is an 18-item self-report measure of the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision* (Washington, DC; American Psychiatric Association; 2000) attention-deficit/hyperactivity disorder symptom criteria occurring in the past 6 months. Responses were provided on a 5-point Likert scale, with a higher score indicating increased attention-deficit/hyperactivity disorder symptom intensity (range = 0–72).

The Eating Disorder Inventory-2 is a self-report measure of disordered eating behaviors. Participants responded to items corresponding to 3 subscales: drive for thinness (7 items, range = 0–21), bulimia (7 items, range = 0–21), and body dissatisfaction (8 items, range = 0–28), with all items coded so that a higher score indicated increased intensity of symptoms.

The Alcohol Use Disorders Identification Test is a self-report measure designed to screen for alcohol-related risk behaviors over the past year. The Alcohol Use Disorders Identification Test consists of 10 items, all coded so that a higher score indicates higher risk (range = 0–40). We gave participants responding "never" to the initial screening item "How often do you have a drink containing alcohol?" a score of 0 on the 9 subsequent items assessing signs of alcohol abuse and dependence.

The Drug Use Disorders Identification Test is an 11-item self-report measure developed in parallel to the Alcohol Use Disorders Identification Test with similar scoring methods (range = 0–44). Participants responded to an initial screening item “How often do you use drugs other than alcohol?” and were provided with an extensive list of possible substances for reference. We reminded participants that pills were not to be counted as drugs if they had been prescribed by a physician and were taken in the prescribed manner. We gave participants responding “never” to the initial screening item a score of 0 on the 10 subsequent items assessing signs of drug abuse and dependence.

We included the Adult Behavior Checklist<sup>26</sup> as a parent report measure of the child’s overall functioning at age 18 years. The Adult Behavior Checklist consists of 32 items assessing internalizing behaviors, 35 items assessing externalizing behaviors, and 26 items assessing other behavior problems. Responses are measured on a 3-point Likert scale, with higher scores indicated increased problem intensity (range = 0–186). The Adult Behavior Checklist also contains 11 items comprising a personal strengths scale. However, because an initial analysis indicated no differences between sexual minority (mean = 15.47; SD = 3.43) and nonminority (mean = 15.34; SD = 3.42) individuals concerning parent-reported personal strengths ( $t(2687) = -0.50$ ;  $P = .62$ ), we did not use the personal strengths subscale in subsequent analyses.

For each of the psychological health outcomes we have described, we used unweighted sum scores of all scale items in our analyses.

CATSS-18 participants reported whether they had ever experienced any of the following: emotional abuse, physical abuse or neglect, sexual abuse (“ever been touched or forced to touch someone else in a sexual way because you felt forced or because you or someone else was threatened”), or sexual assault (“ever had sex because you were forced in some way or you or someone else was threatened”). For our analyses, we created a dichotomous variable indicating history of any type of victimization experience because of low prevalence of most specific types. We included victimization experience as a covariate in our analyses.

## Statistical Analyses

We employed a similar analytical approach to that of Frisell et al.,<sup>11</sup> exploring the association between sexual minority status and each continuous measure of psychological health using the *t* test, which are robust to nonnormality of data in sufficiently large samples<sup>27</sup> and allowed us to test for mean differences between groups of interest. We conducted the statistical analyses using SAS version 9.4 (SAS Institute, Cary, NC).

First, we estimated the mean difference in overall symptom scores between sexual minority and nonminority individuals. Second, we estimated the mean difference in symptom scores between these groups after adjusting for gender. To do so, we regressed each outcome on gender and calculated residuals representing the variance in that outcome score not explained by gender. We then performed a second *t* test for each outcome in which we compared these residuals. Third, we estimated the mean difference in symptom scores between the 2 groups after adjusting for gender and victimization experience to determine whether victimization experience mediated the effect of sexual minority status on each outcome. To do so, we regressed each outcome on both gender and victimization experience, calculated the residuals, and then performed an additional *t* test for each outcome comparing these residuals.

Next, we performed a paired *t* test to explore the association between sexual minority status and each continuous outcome measure after controlling for unmeasured familial confounding.<sup>11</sup> To control for potential familial confounding, we estimated the mean difference in symptom score between discordant twin pairs (i.e., comparing sexual minority individuals with their same-sex nonminority co-twin). We then conducted a second *t* test to compare symptom scores within discordant pairs after adjusting for the effects of victimization experience, using the residual process we have described. We calculated residual scores in the within-pair comparisons by regressing the symptom score on victimization experience only, because the within-pair comparison among same-sex

twins automatically controls for the effect of gender. We combined same-sex twin pairs, regardless of zygosity, to increase statistical power because of the relatively low number of discordant pairs. Hence, we were able to control for unmeasured familial confounding broadly but unable to partition this confounding into genetic and environmental influences.

## RESULTS

Sexual minority status was reported by 8.3% of the sample (9.4% of females and 6.8% of males). These prevalence rates were comparable with rates reported in other population-based samples (e.g., among those aged 13–18 years in the United States, 7.5% of females and 4.5% of males self-identified as having a nonheterosexual sexual orientation<sup>28</sup>; among Swedish adults aged 20–47 years, 7.8% of females and 5.6% of males reported at least 1 lifetime same-sex sexual partner).<sup>11</sup> Sexual minority status was not available for 911 individuals (18.6% of the sample).

We first explored the potential mediating effect of victimization experience on the association between sexual minority status and psychological health outcomes.<sup>29</sup> First, victimization experiences were significantly more common among sexual minority adolescents than among unrelated nonminority peers (Table 1). We observed this pattern among both males and females (Table A, available as a supplement to the online version of this article at <http://www.ajph.org>) for all victimization experiences, albeit not reaching the *P* level of less than .05 in some cases. The prevalence of specific victimization experiences in our sample was comparable with that found in an older population-based cohort in Sweden. (Lichtenstein et al.<sup>30</sup> provides a description of the cohort; however, the specific prevalence rates have not been published.) Of note, 39.2% of the older Swedish cohort reported a history of emotional abuse or neglect after being provided behavioral definitions of the construct: “For example, being frequently shamed, embarrassed, ignored, or repeatedly told that you were ‘no good.’” These behavioral anchors were not

**TABLE 1—Victimization Experience by Sexual Minority Status Among Twins Aged 18 Years: Child and Adolescent Twin Study in Sweden, 2000–2013**

Victimization Experience	Sexual Minority Status, No. (%)		<i>P</i> <sup>a</sup>
	Yes <sup>b</sup>	No	
Total	331 (8.3)	3656 (91.7)	
Any type <sup>c</sup>			< .001
Yes	176 (53.2)	1289 (35.3)	
No	151 (45.6)	2342 (64.1)	
Missing	4 (1.2)	25 (0.7)	
Emotional abuse			< .001
Yes	157 (47.4)	1146 (31.3)	
No	173 (52.3)	2503 (68.5)	
Missing	1 (0.3)	7 (0.2)	
Physical abuse			< .001
Yes	47 (14.2)	287 (7.9)	
No	280 (84.6)	3354 (91.7)	
Missing	4 (1.2)	15 (0.4)	
Physical neglect			< .001
Yes	15 (4.5)	60 (1.6)	
No	314 (94.9)	3591 (98.2)	
Missing	2 (0.6)	5 (0.1)	
Sexual abuse			< .001
Yes	40 (12.1)	182 (5.0)	
No	289 (87.3)	3463 (94.7)	
Missing	2 (0.6)	11 (0.3)	
Sexual assault			< .001
Yes	21 (6.3)	94 (2.6)	
No	307 (92.7)	3551 (97.1)	
Missing	3 (0.9)	11 (0.3)	

<sup>a</sup>*P* value is for 2-sided  $\chi^2$  test of independence comparing victimization experience (yes vs no) by sexual minority status (yes vs no).

<sup>b</sup>"Yes" included individuals identifying sexual orientation as homosexual: *n* = 88; bisexual: *n* = 203; or other: *n* = 40.

<sup>c</sup>"Yes" included report of ever having been the victim of emotional abuse, physical abuse or neglect, or sexual abuse or assault.

provided to CATSS-18 participants, of whom 32.7% reported a history of emotional abuse.

Second, victimization experience was still significantly associated with all psychological health outcomes when adjusting for sexual minority status (Table B, available as a supplement to the online version of this article at <http://www.ajph.org>), which is 1 of the conditions that must be met<sup>29</sup> to test the

possible mediating effect of victimization experience.

Third, we found significant decreases in psychological adjustment in sexual minority compared with nonminority adolescents (Table 2). This difference remained significant for all psychological health measures after adjusting for participant gender. Fourth, whereas significant differences remained after adjusting for the effect of victimization experience for all measures (except the Alcohol Use Disorders Identification Test and the Adult Behavior Checklist), the magnitudes of effect were substantially reduced.

We next explored the potential role of unmeasured familial confounding in explaining the association between sexual minority status and psychological adjustment by comparing twins discordant for sexual minority status. By contrast to the significant differences in psychological adjustment when comparing sexual minority and unrelated nonminority adolescents, mean differences were markedly attenuated when comparing discordant twin pairs—that is, when accounting for unmeasured familial confounds. In other words, sexual minority individuals did not report poorer psychological adjustment than did their same-sex heterosexual co-twins. This suggests that the association between sexual minority status and these psychological health outcomes may be driven primarily by shared genetic or environmental influences. Further adjustment for victimization experiences had either no or limited additional impact on the already substantially weakened magnitude. This loss of association did not seem to result solely from poor statistical power, as we found substantial reductions in the magnitude of effect sizes in addition to lack of statistical significance. Descriptive statistics for sexual minority and heterosexual co-twins from discordant twin pairs for each of the measured outcomes are provided in Table C (available as a supplement to the online version of this article at <http://www.ajph.org>).

Although we adjusted for gender through the use of residuals in between-family comparisons and by comparing same-sex twins in the within-twin pair comparison, we collapsed sexual minority status across gender in our main analyses. We ran

additional parallel analyses separately for males and females, with a similar pattern of results (Table D, available as a supplement to the online version of this article at <http://www.ajph.org>).

## DISCUSSION

We used data from a large, contemporary, population-based cohort of Swedish twins aged 18 years to explore the associations between sexual minority status, victimization experience, and psychological health outcomes. To our knowledge, this is the first study to examine the possible impact of familial confounding on poorer psychological health outcomes specifically among sexual minority adolescents, hereby extending a small body of literature exploring this issue in adults.

Male and female sexual minority adolescents were more likely than were nonminority adolescents to report victimization experiences, including emotional abuse, physical abuse or neglect, and sexual abuse or assault, as well as poorer psychological health, including anxiety, depression, attention-deficit/hyperactivity disorder symptoms, disordered eating and body image, and hazardous use of alcohol and other substances. These findings were consistent with previous research in both adolescents and adults.<sup>1–7</sup>

In our sample of adolescents, the association between sexual minority status and poorer psychological well-being was partially mediated by victimization experience. In keeping with previous research,<sup>10,11,13</sup> this suggests that victimization experiences do not fully explain the difference in psychological well-being observed between sexual minority and nonminority adolescents. It is worth noting that the direction of effect cannot be unequivocally determined from this analysis, for instance, decreased psychological well-being could also increase individuals' risk of victimization. Although victimization could have preceded individuals' "coming out" regarding sexual minority status, individuals may have exhibited gender nonconforming characteristics or behaviors as young children<sup>31</sup> that increased risk of victimization.<sup>32</sup>

**TABLE 2—Psychological Functioning in Twins Aged 18 Years Endorsing Minority vs Nonminority Sexual Orientation: Child and Adolescent Twin Study in Sweden, 2000–2013**

Measure	Between-Family Comparison								Within Same-Sex Twin Pair Comparison, n = 119			
	Sexual Minority, Yes (n = 331), Mean (SD)	Sexual Minority, No (n = 3656), Mean (SD)	Mean Difference <sup>a</sup> (SE)	P	Mean Difference <sup>a</sup> Adjusted for Gender (SE)	P	Mean Difference <sup>a</sup> Adjusted for Gender and VE (SE)	P	Mean Difference <sup>b</sup> (SE)	P	Mean Difference <sup>b</sup> Adjusted for VE (SE)	P
SCARED	20.90 (13.65)	16.31 (11.29)	4.60 (0.68)	<.001	3.96 (0.65)	<.001	2.74 (0.62)	<.001	-0.15 (1.34)	.91	-0.70 (1.32)	.60
CES-D	10.22 (5.60)	7.77 (5.35)	2.46 (0.33)	<.001	2.27 (0.32)	<.001	1.55 (0.31)	<.001	0.79 (0.58)	.18	0.34 (0.54)	.53
ADHD	27.41 (12.37)	22.63 (10.78)	4.78 (0.61)	<.001	4.57 (0.67)	<.001	3.52 (0.65)	<.001	-0.10 (1.40)	.94	-0.55 (1.37)	.69
EDI, drive for thinness	4.02 (4.41)	2.76 (3.70)	1.27 (0.22)	<.001	1.04 (0.20)	<.001	0.83 (0.20)	<.001	0.39 (0.46)	.41	0.20 (0.47)	.67
EDI, bulimia	2.16 (3.22)	1.20 (2.36)	0.96 (0.14)	<.001	0.91 (0.14)	<.001	0.74 (0.14)	<.001	0.38 (0.29)	.19	0.27 (0.29)	.35
EDI, body dissatisfaction	6.66 (4.94)	5.03 (5.45)	1.63 (0.29)	<.001	1.35 (0.27)	<.001	1.04 (0.27)	<.001	0.34 (0.47)	.48	0.08 (0.50)	.88
AUDIT	5.60 (5.40)	4.92 (4.31)	0.68 (0.26)	.029	0.72 (0.26)	.020	0.43 (0.25)	.16	0.02 (0.43)	.97	-0.10 (0.43)	.81
DUDIT	0.78 (2.93)	0.27 (1.59)	0.52 (0.10)	.002	0.53 (0.10)	.001	0.48 (0.10)	.003	0.27 (0.17)	.12	0.24 (0.17)	.16
ABCL	14.56 (13.92)	11.71 (11.36)	2.85 (0.90)	.008	2.77 (0.89)	.010	1.91 (0.89)	.07	0.47 (1.27)	.71	0.00 (1.33)	.99

Note. ABCL = Adult Behavior Checklist; ADHD = Adult Attention-Deficit/Hyperactivity Disorder Self-Report Scale; AUDIT = Alcohol Use Disorders Identification Test; CES-D = Center for Epidemiological Studies Depression Scale; DUDIT = Drug Use Disorders Identification Test; EDI = Eating Disorders Inventory; SCARED = Screen for Childhood Anxiety-Related Emotional Disorders; VE = victimization experience. The table shows links to victimization experience and familial confounding. All P values are derived from the Satterthwaite method, assuming unequal variances.

<sup>a</sup>Mean difference between sexual minority adolescents and unrelated nonminority adolescents.

<sup>b</sup>Mean difference between sexual minority twins and their same-sex nonminority co-twins.

The decreased psychological adjustment in sexual minority adolescents was almost entirely eliminated when comparing sexual minority individuals with their same-sex nonminority co-twins. This suggests that familial factors—common genetic or environmental influences—may actually contribute to elevations in both reported symptoms and nonheterosexual sexual orientation. This finding is in keeping with previous studies examining the contribution of familial confounding to this association in adults.<sup>11,16</sup>

However, the importance of familial confounding in explaining observed associations between sexual minority status and psychological health does not entirely exclude possible effects of minority stress or victimization. Rather, our findings suggest that decreased psychological well-being may not result directly from minority stress or sexual minority status per se but rather from shared genetic or environmental influences. Previous research in adults suggests that the genetic influences on nonheterosexuality and depression<sup>16</sup>

overlap the genetic influences on non-heterosexuality and trait markers for psychiatric vulnerability, such as neuroticism.<sup>33</sup> Similarly, familial influences contributing to sexual orientation and psychological health may also contribute to the risk of victimization experiences.

The decrease in psychological adjustment observed among both sexual minority adolescents and their heterosexual co-twins may also be understood from a family systems perspective.<sup>34</sup> Dynamic interplay occurs between the sexual minority adolescent and his or her family members, as all members of the family may face challenges in adapting to the sexual identity development and psychosocial adjustment of the sexual minority adolescent. In addition to the effect of familial risk on the sexual minority adolescent, the struggles of the adolescent may affect the well-being of the family. The difficulties faced by the sexual minority adolescent, as suggested by the minority stress hypothesis, may also be experienced by other family members, particularly siblings, perhaps

resulting in poorer psychological adjustment. Such a family systems model would be compatible with the mechanisms of familial confounding. Indeed, heterosexual co-twins of sexual minority individuals have been found to exhibit higher rates of depression outcomes relative to twins in concordant heterosexual twin pairs.<sup>16</sup>

Several methodological limitations should be considered in interpreting our results. Although data were collected as part of the larger longitudinal CATSS study, the analyses we have presented involved only cross-sectional data collected at age 18 years. Therefore, temporal relationships between variables cannot be established, and the assessment of lifetime victimization experience is derived from retrospective reports. Additionally, our within-pair analyses were limited to pairs in which twins were discordant for sexual minority status. The resulting sample size did not allow us to partition familial confounding into genetic versus environmental effects, which requires a separate analysis of monozygotic and dizygotic twins, and the study design did

not allow us to identify specific causal mechanisms contributing to familial confounding. These research questions are important targets of future behavior genetic research. We were also unable to compare specific sexual minority subgroups in the between-family or within-twin pair comparisons. Previous research suggests that prevalence rates of victimization and psychosocial health disparities may differ among subgroups of sexual minority youths,<sup>35</sup> and this possibility should be explored in future research. Although supplemental analyses did explore these effects separately by gender, these findings should also be interpreted with caution because of reduced power to detect statistically significant effects.

Future research aimed at exploring the relationship between adolescent sexual orientation and psychological health may benefit from using a broader definition of adolescent sexual orientation, including reported sexual behavior history. Future studies should also explore additional variables that may contribute to the association between sexual minority status, victimization experience, and psychological health. For example, previous studies suggest that gender nonconformity may be more strongly associated with childhood victimization experiences and poorer psychological health than is sexual orientation,<sup>32</sup> and such a measure was not available in this study.

Despite the elevated risk of victimization and poorer psychological health outcomes observed among sexual minority youths, it is important that our findings not be used to further stigmatization or pathologization of nonheterosexuality. Indeed, such negative experiences are not inevitable for sexual minority youths: many do not experience high levels of psychological distress.<sup>3</sup> Rather, these research findings should be used to further our understanding of the causes of psychological distress, improve the identification and well-being of individuals at higher risk for distress, and develop appropriate interventions on the basis of modifiable, causal mechanisms contributing to poorer psychological health. Such mechanisms may involve individual-level processes—perhaps strengthening sources of resilience, such as skills for coping with stress and adversity and building individual networks of social

support.<sup>3,8</sup> However, such a focus on strengthening individual resiliency should not occur at the expense of targeting processes occurring at the societal level, where existing health disparities must be addressed by building political and social environments that respect and support the well-being of all individuals.<sup>8</sup> AJPH

### CONTRIBUTORS

K. Donahue analyzed and interpreted the data and drafted the article. N. Långström and M. Forsman interpreted the data. N. Långström, S. Lundström, P. Lichtenstein, and M. Forsman conceptualized and designed the study. All authors reviewed, edited, and approved the final version of the article.

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### HUMAN PARTICIPANT PROTECTION

The Child and Adolescent Twin Study in Sweden study protocol was approved by the Regional Ethics Committee at Karolinska Institutet. All participants consented to participate in the study.

### REFERENCES

1. Strutz KL, Herring AH, Halpern CT. Health disparities among young adult sexual minorities in the US. *Am J Prev Med*. 2015;48(1):76–88.
2. Marshal MP, Dietz LJ, Friedman MS, et al. Suicidality and depression disparities between sexual minority and heterosexual youth: a meta-analytic review. *J Adolesc Health*. 2011;49(2):115–123.
3. Herek GM, Garnets LD. Sexual orientation and mental health. *Annu Rev Clin Psychol*. 2007;3:353–375.
4. Corliss HL, Rosario M, Birkett MA, Newcomb ME, Buchting FO, Matthews AK. Sexual orientation disparities in adolescent cigarette smoking: intersections with race/ethnicity, gender, and age. *Am J Public Health*. 2014;104(6):1137–1147.
5. Dermody SS, Marshal MP, Cheong J, et al. Longitudinal disparities of hazardous drinking between sexual minority and heterosexual individuals from adolescence to young adulthood. *J Youth Adolesc*. 2014;43(1):30–39.
6. Laska MN, VanKim NA, Erickson DJ, Lust K, Eisenberg ME, Rosser BS. Disparities in weight and weight behaviors by sexual orientation in college students. *Am J Public Health*. 2015;105(1):111–121.
7. Austin SB, Nelson LA, Birkett MA, Calzo JP, Everett B. Eating disorder symptoms and obesity at the intersections of gender, ethnicity, and sexual orientation in US high school students. *Am J Public Health*. 2013;103(2):e16–e22.
8. Meyer IH. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: conceptual issues and research evidence. *Psychol Bull*. 2003;129(5):674–694.

9. Burton CM, Marshal MP, Chisolm DJ, Sucato GS, Friedman MS. Sexual minority-related victimization as a mediator of mental health disparities in sexual minority youth: a longitudinal analysis. *J Youth Adolesc*. 2013;42(3):394–402.

10. Mays VM, Cochran SD. Mental health correlates of perceived discrimination among lesbian, gay, and bisexual adults in the United States. *Am J Public Health*. 2001;91(11):1869–1876.

11. Frisell T, Lichtenstein P, Rahman Q, Långström N. Psychiatric morbidity associated with same-sex sexual behavior: influence of minority stress and familial factors. *Psychol Med*. 2010;40(2):315–324.

12. Friedman MS, Marshal MP, Guadamuz TE, et al. A meta-analysis of disparities in childhood sexual abuse, parental physical abuse, and peer victimization among sexual minority and sexual nonminority individuals. *Am J Public Health*. 2011;101(8):1481–1494.

13. Priebe G, Svedin CG. Online or off-line victimization and psychological well-being: a comparison of sexual-minority and heterosexual youth. *Eur Child Adolesc Psychiatry*. 2012;21(10):569–582.

14. Rothman EF, Exner D, Baughman AL. The prevalence of sexual assault against people who identify as gay, lesbian, or bisexual in the United States: a systematic review. *Trauma Violence Abuse*. 2011;12(2):55–66.

15. Gilbert R, Widom CS, Browne K, Fergusson D, Webb E, Janson S. Burden and consequences of child maltreatment in high-income countries. *Lancet*. 2009;373(9657):68–81.

16. Zietsch BP, Verweij KJ, Heath AC, et al. Do shared etiological factors contribute to the relationship between sexual orientation and depression? *Psychol Med*. 2012;42(3):521–532.

17. McGue M, Osler M, Christensen K. Causal inference and observational research: the utility of twins. *Perspect Psychol Sci*. 2010;5(5):546–556.

18. Anckarsäter H, Lundström S, Kollberg L, et al. The Child and Adolescent Twin Study in Sweden (CATSS). *Twin Res Hum Genet*. 2011;14(6):495–508.

19. Hannelius U, Gherman L, Mäkelä VV, et al. Large-scale zygosity testing using single nucleotide polymorphisms. *Twin Res Hum Genet*. 2007;10(4):604–625.

20. Birmaher B, Brent DA, Chiappetta L, Bridge J, Monga S, Baugher M. Psychometric properties of the Screen for Child Anxiety Related Emotional Disorders (SCARED): a replication study. *J Am Acad Child Adolesc Psychiatry*. 1999;38(10):1230–1236.

21. Kohout FJ, Berkman LF, Evans DA, Cornoni-Huntley J. Two shorter forms of the CES-D depression symptoms index. *J Aging Health*. 1993;5(2):179–193.

22. Kessler RC, Adler L, Ames M, et al. The World Health Organization Adult ADHD Self-Report Scale (ASRS): a short screening scale for use in the general population. *Psychol Med*. 2005;35(2):245–256.

23. Garner D. *Eating Disorder Inventory-2: Professional Manual*. Odessa, FL: Psychological Assessment Resources; 1991.

24. Saunders JB, Aasland OG, Babor TF, De La Fuente JR, Grant M. Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO Collaborative Project on Early Detection of Persons with Harmful Alcohol Consumption—II. *Addiction*. 1993;88(6):791–804.

25. Berman AH, Bergman H, Palmstierna T, Schlyter F. Evaluation of the Drug Use Disorders Identification Test

(DUDIT) in criminal justice and detoxification settings and in a Swedish population sample. *Eur Addict Res*. 2005; 11(1):22–31.

26. Achenbach T, Rescorla L. *Manual for the ASEBA Adult Forms & Profiles*. Burlington, VT: ASEBA; 2003.

27. Lumley T, Diehr P, Emerson S, Chen L. The importance of the normality assumption in large public health data sets. *Annu Rev Public Health*. 2002;23:151–169.

28. Talley AE, Hughes TL, Aranda F, Birkett M, Marshal MP. Exploring alcohol-use behaviors among heterosexual and sexual minority adolescents: intersections with sex, age, and race/ethnicity. *Am J Public Health*. 2014; 104(2):295–303.

29. Baron RM, Kenny DA. The moderator–mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *J Pers Soc Psychol*. 1986;51(6):1173–1182.

30. Lichtenstein P, Sullivan PF, Cnattingius S, et al. The Swedish Twin Registry in the third millennium: an update. *Twin Res Hum Genet*. 2006;9(6):875–882.

31. Rieger G, Linsenmeier JA, Gygax L, Bailey JM. Sexual orientation and childhood gender nonconformity: evidence from home videos. *Dev Psychol*. 2008;44(1):46–58.

32. Roberts AL, Rosario M, Corliss HL, Koenen KC, Austin SB. Childhood gender nonconformity: a risk indicator for childhood abuse and posttraumatic stress in youth. *Pediatrics*. 2012;129(3):410–417.

33. Zietsch BP, Verweij KJ, Bailey JM, Wright MJ, Martin NG. Sexual orientation and psychiatric vulnerability: a twin study of neuroticism and psychoticism. *Arch Sex Behav*. 2011;40(1):133–142.

34. Diamond L, Butterworth M, Allen K. Sexual-minority development in the family context. In: Kerig P, Schulz M, Hauser S, eds. *Adolescence and Beyond: Family Processes and Development*. New York, NY: Oxford University Press; 2012:249–267.

35. Mustanski B, Andrews R, Herrick A, Stall R, Schnarrs PW. A syndemic of psychosocial health disparities and associations with risk for attempting suicide among young sexual minority men. *Am J Public Health*. 2014;104(2): 287–294.