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Sexual orientation disparities in mental health: the moderating role of educational attainment

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Abstract

Purpose.—Mental health disparities between sexual minorities and heterosexuals remain inadequately understood, especially across levels of educational attainment. The purpose of the present study was to test whether education modifies the association between sexual orientation and mental disorder.

Methods.—We compared the odds of past 12-month and lifetime psychiatric disorder prevalence (any Axis-I, any mood, any anxiety, any substance use, and comorbidity) between lesbian, gay, and bisexual (LGB) and heterosexual individuals by educational attainment (those with and without a bachelor's degree), adjusting for covariates, and tested for interaction between sexual orientation and educational attainment. Data are drawn from the National Epidemiologic Survey on Alcohol and Related Conditions, a nationally representative survey of non-institutionalized US adults (N= 34 653; 577 LGB).

Results.—Sexual orientation disparities in mental health are smaller among those with a college education. Specifically, the disparity in those with versus those without a bachelor's degree was attenuated by 100% for any current mood disorder, 82% for any current Axis-I disorder, 76% for any current anxiety disorder, and 67% for both any current substance use disorder and any current comorbidity. Further, the interaction between sexual orientation and education was statistically

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significant for any current Axis-I disorder, any current mood disorder, and any current anxiety disorder. Our findings for lifetime outcomes were similar.

Conclusions.—The attenuated mental health disparity at higher education levels underscores the particular risk for disorder among LGBs with less education. Future studies should consider selection versus causal factors to explain the attenuated disparity we found at higher education levels.

Keywords

sexual orientation; disparities; education; psychiatric disorder

Lesbians, gay men, and bisexuals (LGBs) have a higher prevalence of psychiatric disorders than heterosexuals in studies using nationally representative samples [1-5]. This disparity is robust whether sexual orientation is classified by sexual behavior [1, 2, 4, 5], sexual identity [1, 3], or romantic attraction [1]. In a meta-analysis, King et al. [6] documented consistent evidence for this disparity across mood, anxiety, and substance use disorder classes for both lifetime and past-year time frames. Understanding how this mental health disparity arises is particularly important in light of the severe toll psychiatric morbidity takes on LGBs, including their elevated levels of suicidal behavior [6, 7].

Education may be an important factor in understanding the sexual orientation mental health disparities. Research in the general population shows flat or inverse relationships between education and psychiatric disorder prevalence, including any mood [8]; any anxiety [8]; and any substance use disorder [8, 9]; any psychiatric disorder [8-10]; major depressive disorder [9, 11, 12]; general anxiety disorder [13, 14], social phobia, post-traumatic stress disorder, panic disorder, and agoraphobia without panic disorder [14]; drug use disorder [15]; alcohol dependence [16]; and comorbidity [8]. That is, those with higher educational attainment are at equal or lower risk of psychiatric disorder compared to those with lower educational attainment.

Prior examinations of the relationship between sexual orientation and mental disorder have incorporated socio-demographic factors, such as education, as control variables [2-5]. This approach provides important information regarding the extent to which sexual orientation, holding these other factors constant, is a risk indicator for adverse mental health outcomes. However, left unexplored is whether and *how* such factors might explain worse mental health in LGBs relative to heterosexuals. One approach is to examine how these factors might mediate the relationship between sexual orientation and psychiatric disorder. In the case of education, however, evidence of equal or greater levels of educational attainment in LGBs compared with heterosexuals [3-5, 17-19], and of a flat or inverse relationship between education and psychiatric disorder, means that education cannot mediate the association between LGB status and psychiatric disorder prevalence.

In contrast, education might be expected to attenuate the finding of higher disorder prevalence in LGB populations. To the extent that education is protective against psychiatric disorder, and LGBs attain higher educational levels than heterosexuals, LGBs should be afforded some protection against psychiatric disorder relative to heterosexuals. However,

evidence suggests a complex relationship between sexual minority status and education. Schools are often hostile environments for LGB students [20-22], which can impair their academic performance [23]. Conversely, there is evidence that some sexual minority students excel academically despite or *because* of this stressful environment [24]. Individual-level psychological factors (e.g., resilience) that predict variation in academic achievement in socially hostile settings could also be related to vulnerability to psychiatric disorder. Therefore, these different educational experiences for LGB students could lead to variation in the disparity across levels of education, suggesting that education may modify the association between sexual orientation and psychiatric disorder.

We are unaware, however, of studies that have specifically examined whether educational attainment is an effect modifier of the relationship between sexual orientation and mental health. Given that LGBs have equal or higher educational attainment than heterosexuals, testing for moderation could elucidate contextual factors that attenuate LGBs' worse mental health outcomes. Accordingly, we test in this study whether the risk of greater psychiatric disorder in LGBs compared with heterosexuals varies between those with and without a bachelor's degree (in the US, this is generally the equivalent of four years of full-time education beyond secondary education). We examine this question using data from the largest nationally representative psychiatric epidemiology study conducted to date in the US, the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). This is also the largest nationally representative sample to date of LGB participants, which allows us to make relatively robust estimates of psychiatric disorder in education subgroups.

METHODS

Sample

Data for our analyses were drawn from the 2004-2005 NESARC study, the second wave of a longitudinal survey in which face-to-face interviews were conducted with participants in 2001-2002 (N=43 093) and in 2004-2005 (N=34 653). The wave 1 response rate was 81%, and of participants eligible for wave 2, the response rate was 86.7%, leading to a cumulative response rate of 70.2%. Our data are limited to wave 2 participants because this is when sexual orientation was assessed. The survey used a civilian, non-institutionalized sample of adults 18 and older living in households and group quarters, including military off-base housing and college housing, in all 50 states. The sampling frame was based on households in the Census 2000-2001 Supplementary Survey and group quarters in the Census 2000 Group Quarters Inventory. Blacks, Hispanics, and young adults (ages 18-24 years at the time of wave 1) were oversampled and data were weighted to adjust for oversampling and household- and person-level non-response to represent the US non-institutionalized population not living on military bases in the 2000 census in terms of region, age, sex, race, and ethnicity. Wave 2 data were weighted for non-response and to ensure that the sample represented wave 1 participants who were still alive, who remained in the US, and who were not institutionalized. Additional information on the study methods can be found elsewhere [11, 25, 26].

Measures

Sexual orientation—Participants were categorized as LGB based on their response to the question "Which of the categories best describes you?" The four response options were: heterosexual (straight), gay or lesbian, bisexual, and not sure. Of the wave 2 sample, 577 (1.67%) identified as gay, lesbian, or bisexual. Individuals who indicated they were "not sure" were removed from the analyses.

Education—Participants were asked to report their highest education level achieved, which was dichotomized as a bachelor's degree or higher (n = 8901, 25.7%) and less than a bachelor's degree (n = 25 752, 74.3%). We chose this cut point because of evidence that a bachelor's degree confers similar or larger incremental gains in economic opportunities compared with lower thresholds [27, 28]. LGBs were more likely than heterosexuals to have a bachelor's degree (n = 237, 41.1% vs. n = 8664, 25.4%, X^2=72.79, $p < 0.01$).

Covariates—All covariates in our analyses were self-reported and were categorized as follows: sex (male or female); age in years (≤ 25, 26-45, 46-64 and ≥ 65); race/ethnicity (White, Black, American Indian, Asian, and Hispanic); and marital status (married or living with someone as if married; widowed, separated, or divorced; and never married). Details on the prevalence of these covariates by sexual orientation in the NESARC sample can be found elsewhere [17].

Psychiatric disorder—NESARC assessed disorder as defined by the Diagnostic and Statistical Manual IV (DSM-IV) using the Alcohol Use Disorder and Associated Disabilities Interview Schedule – DSM-IV Version (AUDADIS-IV), a structured lay interview. Diagnoses included major depressive disorder, dysthymia, mania, hypomania, general anxiety disorder, social phobia, specific phobia, panic disorder, post-traumatic stress disorder, nicotine dependence, alcohol abuse, alcohol dependence, drug abuse, and drug dependence, and were made in lifetime and past-12 month time frames. In accordance with the *DSM-IV*, all diagnoses had to meet the criteria of causing distress or social or occupational dysfunction and mood and anxiety disorders caused by substances or somatic illness were ruled out, as were depressions stemming from bereavement. The reliability and validity of mood, anxiety, and substance use disorders as assessed by the AUDADIS-IV have been extensively documented [11, 29-34]. Similar to other large-scale psychiatric epidemiologic surveys using lay-interviewer administered structured interviews [10, 35], test-retest reliabilities for various diagnostic timeframes ranged from $\kappa = 0.58 - 0.66$ [30-32] for mood disorders; $\kappa = 0.40 - 0.52$ [32] for anxiety disorders; and $\kappa = 0.54 - 0.91$ [31, 34] for substance use disorders.

We considered three classes of disorder in our analyses, in both past 12-month (i.e., current) and lifetime time frames: any mood (major depressive disorder, mania or hypomania, and dysthymia); any anxiety (general anxiety disorder, social phobia, specific phobia, panic disorder (with and without agoraphobia), and post-traumatic stress disorder); and any substance use disorder (nicotine dependence, alcohol dependence, alcohol abuse, drug dependence, and drug abuse). We also assessed comorbidity, defined as two or more diagnosed disorders in the past 12 months or across the lifetime. We had insufficient power

to conduct robust statistical tests using individual disorders as outcomes, although we explored these relations in sensitivity analyses. The direction of the associations was similar for all individual disorders, but we present the broader classes of disorder for ease of interpretation and to increase statistical power.

Statistical Analysis

We first estimated prevalence of any Axis-I, mood, anxiety, substance use, and comorbid disorders in subgroups stratified by sexual orientation and educational attainment. We conducted unadjusted and adjusted logistic regressions in the two educational subgroups (i.e., bachelor's degree or higher, and less than a bachelor's degree) to estimate the odds of psychiatric disorder in the LGB versus heterosexual respondents. We tested whether the association between sexual orientation and psychiatric disorders differed across levels of education by including multiplicative interaction terms between LGB status and educational attainment in all adjusted logistic regression models. Finally, we compared odds of disorder between those with and without a bachelor's degree within sexual orientation subgroups to compare the effect of educational attainment on disorder in LGBs and heterosexuals. All analyses estimated both current and lifetime diagnoses, and all employed SAS-callable SUDAAN software Version 11.0. Sample weights were included to adjust for the complex survey design and for participant non-response.

RESULTS

Our unadjusted (Table 1) and adjusted (Table 2) results show statistically significantly higher odds of psychiatric disorders among LGBs compared to heterosexuals, in both educational strata for any current Axis-I disorder, any current anxiety disorder, any current substance disorder, and current comorbid disorders. These same results obtain for any current mood disorder, except that in our adjusted results, among those with at least a bachelor's degree, the disparity was eliminated (OR=0.96, 95% C.I. 0.87-1.05).

In both unadjusted and adjusted results, the greater odds of disorder among LGBs relative to heterosexuals is consistently more pronounced in the lower education strata, indicating an attenuation of the mental health disparity at a higher level of educational attainment. In our adjusted results, specifically, the disparity in those with versus those without a bachelor's degree was attenuated by 100% for any current mood disorder, 82% for any current Axis-I disorder, 76% for any current anxiety disorder, and 67% for both any current substance disorder and any current comorbidity. Three of these reached statistical significance: any current mood disorder ($F = 5.22$, df = 1, $p = 0.03$), any current Axis-I disorder ($F = 5.88$, df = 1, $p = 0.02$, and any current anxiety disorder ($F = 4.85$, df = 1, $p = 0.03$).

Table 3 shows this pattern of interaction findings from a different angle, comparing adjusted odds of current disorder between those with and without a bachelor's degree within sexual orientation strata. These data demonstrate a statistically significant inverse relationship between education and psychiatric disorder for every outcome in both sexual orientation strata, and underscore that the protective effect of having a bachelor's degree is consistently stronger in LGBs compared with heterosexuals.

Lifetime outcome results (online Tables 1-3) were in the same direction as current outcome results. Additionally, we conducted adjusted logistic regressions predicting both current and lifetime psychiatric disorder in males and females separately because of prevalence differences by sex across disorder classes [8, 10]. Results in sex strata (online Table 4) were largely consistent with those in the overall sample; of note, the sexual orientation disparity was eliminated among males with a bachelor's degree for any current mood disorder, any current anxiety disorder, and any lifetime substance disorder. Finally, we conducted a sensitivity analysis using a lower cut-point for our education variable (such that the higher education group included those with some college but not a bachelor's degree); this yielded results in the same direction as our original findings (results upon request).

DISCUSSION

Studies documenting the mental health disparity of LGBs relative to heterosexuals have either ignored or controlled for socio-demographic factors, such as education, in their analyses [2-5], obscuring *how* these factors might shape this disparity. Interaction analyses examining how education influences the mental health disparity allow us to better identify subgroups that may be at particular risk for disorder. We show that the risk of psychiatric disorder in LGBs is most pronounced in those without a bachelor's degree. Specifically, the odds ratios comparing current disorder in LGBs and heterosexuals were attenuated among those with a bachelor's degree across three diagnostic categories, any Axis-I disorder, and any comorbidity. Our statistical tests of interactions between sexual orientation and educational attainment predicting disorder were significant for any current Axis-I disorder and any current mood disorder, indicating particularly robust differences in the disparity across education levels for these outcomes. This same pattern of findings was obtained for lifetime diagnoses and, for the most part, in male and female strata.

Explanations for sexual orientation disparities in mental health often reference social or minority stress theory [1, 3-5, 17, 36-39]. These closely related theories posit that socially disadvantaged groups are exposed to more social stressors, such as discrimination [4, 37], and have access to fewer coping resources, such as social support [3, 4], than more advantaged groups, which entails worse mental health [39]. Thus, hostile social environments are a key mechanism linking sexual orientation with poor mental health outcomes. For LGBs, a hostile social environment ranges from restrictive social policies such as anti-gay marriage amendments [36] to the more proximal home and school environments [39]. Consistent with the minority stress framework, we find a mental health disparity between LGB and heterosexuals at both lower and higher education levels. To understand why this disparity is attenuated at a higher education level, we suggest complementary social selection and social causation hypotheses [9], both informed by minority stress theory.

We propose a social selection hypothesis whereby LGB individuals with lower vulnerabilities to psychiatric disorders may be disproportionately selected, compared with heterosexuals, for higher educational attainment. By virtue of their non-normative sexuality, LGB students experience an additional stressor burden compared with their heterosexual peers. In school settings, LGB students are more likely than heterosexual students to

experience discrimination [20, 40, 41], to be threatened or injured at school [42], to skip school as a result of feeling unsafe [43], and to suffer educational punishments that are not explained by greater engagement in transgressive behaviors [44]. As environments become more stressful, psychological coping resources, such as effective reappraisal strategies and attentional control, become more relevant because possessing them confers an advantage in negotiating stressful circumstances [45, 46]. This advantage may translate into greater school achievement and likelihood of pursuing and completing a four-year college degree among some sexual minorities. Although some LGB students may be motivated to achieve academically because of family or friendship network norms, or a trait characteristic, others could be motivated by a compensatory strategy to enhance self-worth. For example, a hostile social climate may motivate a subset of sexual minorities to compensate for their social devaluation through success in achievement-related domains, including academic accomplishment [24]. Regardless of the motivation, however, the ability for LGBs to follow through and achieve academic success in a threatening social environment may be related to psychological resilience. Accordingly, although the more stressful school environment sexual minority students face compared with their heterosexual peers compromises the academic performance and subsequent educational attainment of many LGB youth (23), such environments also serve as a sorting factor [9], whereby psychologically resilient LGB adolescents are particularly selected into college. To the degree this psychological resilience is protective against psychiatric disorder [47, 48], this selection factor would augment in LGBs compared with heterosexuals the inverse association we see in our data between educational attainment and poor mental health outcomes.

We also propose a social causation hypothesis, starting with the proposition that LGB college students' exposure to minority stressors are likely to lessen in the more socially tolerant and affirming atmospheres found on many college and university campuses [49-51], compared with high school campuses. This diminished exposure would be expected to persist after college as a function of social networks formed in college carrying forward [52]. Although some heterosexual students have stigmatized statuses, all LGB students do; therefore, the mental health benefits of a socially more open and affirming environment will accrue to LGBs more than to heterosexuals. Thus, there would be a narrowing in stressor exposures between LGBs and heterosexuals at higher education levels, resulting in an attenuated mental health disparity between them. That the stressor exposure gap is not fully closed may explain the residual mental health disparity. In short, these two hypotheses suggest mechanisms leading to a stronger inverse relationship between education and psychiatric disorder in LGBs compared with heterosexuals, first via a selection factor more operant in sexual minorities, and second via a narrowing disparity in stressor burdens at higher education levels.

Several limitations of our study should be noted. First, all diagnoses were based on self-report and therefore lack external validation, though clinical reappraisal studies demonstrate good-to-excellent validity of the AUDADIS instrument [29, 53]. Nevertheless, self-reporting symptoms may have led to some misclassification of the diagnostic outcomes. However, there is no evidence to suggest that LGB individuals misreport psychiatric disorder symptoms more or less than heterosexual individuals; thus, our results are likely conservative estimates of the mental health disparity by sexual orientation. Second, LGBs

represent a smaller proportion in the NESARC sample (1.67%) than in the National Survey of Midlife Development in the United States (MIDUS) (2.5%), also a nationally representative adult sample basing its classification of sexual orientation on self-identification [3]. This raises the possibility of misclassification of sexual orientation in our sample. NESARC ascertained sexual orientation through an interviewer-administered survey whereas MIDUS used a self-administered questionnaire; NESARC's less anonymous approach may have led some participants to conceal their LGB status. However, LGBs were 1.75% of a nationally representative sample in England in which participants responded to a question about sexual orientation in a computer assisted self-completed format which afforded a degree of privacy similar to the MIDUS survey [54]. In sum, it is unclear the degree to which variation in LGB population proportions across samples owes to interview format, to sampling frames, to chance, or, in cross-national comparisons, to differences in true prevalence and disclosure norms. Further, the association between non-disclosure and psychiatric disorder is unknown [17]. However, evidence that concealment of one's sexual orientation is associated with greater psychological distress [39] suggests concealment could be a risk for psychiatric disorder. Therefore, misclassification of LGB status may have lead to an underestimate of the disparity. We are unaware of data documenting that disclosure of sexual orientation varies by education; therefore, it is unclear if this underestimation of the disparity would vary by educational attainment. Third, the study is cross-sectional; therefore, we cannot make causal inferences about associations between educational attainment and disorder prevalence. However, as discussed, the associations observed here could reflect complementary processes: first, a selection factor whereby sexual minorities are more likely than heterosexuals to be sorted into higher education based on psychological resilience and a lower risk of psychiatric disorder, and second, college education may enhance this lower risk of psychiatric disorder especially among LGBs.

Our findings have several clinical, theoretical, and research implications. Clinically, our results point to a particular vulnerability to psychiatric disorder in LGBs with lower educational attainment. We posit that this is associated with heightened exposure to minority stressors, which may select vulnerable LGB individuals into lower educational strata, creating a cascade of potentially adverse mental health consequences. This reinforces the clinical imperative to focus on LGBs' stressor exposures and cognitive coping strategies. With respect to theory, our results bolster minority stress theory generally because we show that both lower educational attainment and sexual minority status increase the risk of psychiatric morbidity. A further implication for minority stress theory is that there may be contexts where memberships in two or more disadvantaged groups interact such that membership in one group further heightens the baseline risk of psychiatric disorder resulting from membership in the other group, as is the case in our sample, where we observe a wider mental health disparity among LGBs with lower, compared to higher, educational attainment. Regarding implications for future research, our results underscore the importance of examining other socio-demographic factors (e.g., income) as effect modifiers, rather than simply mediators or confounders of the relationship between sexual orientation and psychiatric morbidity. A series of effect modification findings complementing those we report here could specify the conditions under which disparities emerge and persist, leading to more efficient prevention efforts and richer etiologic theory. By extension, an

intersectionality framework [55] that goes beyond the categories of sexual orientation and education (our primary focus in the present study) could yield additional insights into factors that contribute to the observed relationship between sexual orientation and mental health outcomes.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Association between sexual orientation and past 12-month psychiatric disorder by educational attainment, from the National Epidemiologic Survey on Alcohol and Related Conditions, wave 2 sample (2004-5)

	Bachelor's degree				Less than a bachelor's degree		
	LGB	Heterosexual	OR (95% CI)		LGB	Heterosexual	OR (95% CI)
	% (SE)	% (SE)			% (SE)	% (SE)	
Any Axis-I disorder	40.9 (0.03)	27.8 (0.005)	1.86 (1.72, 2.02)		66.2 (0.03)	36.9 (0.003)	3.54 (3.09, 4.06)
Any mood disorder	11.0 (0.02)	8.4 (0.003)	1.42 (1.32, 1.53)		27.7 (0.02)	11.6 (0.002)	3.00 (2.70, 3.33)
Any anxiety disorder	19.8 (0.03)	13.9 (0.004)	1.59 (1.44, 1.74)		36.2 (0.03)	18.1 (0.002)	2.93 (2.64, 3.24)
Any substance disorder	26.6 (0.03)	13.7 (0.004)	2.29 (2.11, 2.48)		44.4 (0.03)	21.7 (0.003)	3.32 (2.86, 3.84)
Any comorbidity	14.4 (0.02)	6.9 (0.003)	2.34 (2.21, 2.47)		31.8 (0.03)	11.8 (0.002)	3.89 (3.50, 4.33)

Note. LGB = lesbian, gay, and bisexual; OR = unadjusted odds ratio; CI = confidence interval

Table 2

Adjusted association between sexual orientation and past 12-month psychiatric disorder by educational attainment, from the National Epidemiologic Survey on Alcohol and Related Conditions, wave 2 sample (2004-5)

	Bachelor's degree	Less than a bachelor's degree	Interaction
	AOR (95% CI)	AOR (95% CI)	F, df, p-value
Any Axis-I disorder	1.25 (1.14, 1.36)	2.36 (2.01, 2.75)	5.88, 1, 0.02
Any mood disorder	0.96 (0.87, 1.05)	2.02 (1.80, 2.25)	5.22, 1, 0.03
Any anxiety disorder	1.30 (1.17, 1.44)	2.24 (2.00, 2.50)	4.85, 1, 0.03
Any substance disorder	1.40 (1.28, 1.54)	2.21 (1.86, 2.62)	2.07, 1, 0.15
Any comorbidity	1.48 (1.37, 1.59)	2.47 (2.21, 2.77)	2.32, 1, 0.13

Note. AOR = adjusted odds ratio; CI = confidence interval; odds ratios were adjusted for age, sex, race/ethnicity, and marriage status.

Table 3

Adjusted association between educational attainment and past 12-month psychiatric disorder by sexual orientation, from the National Survey on Alcohol and Related Conditions, wave 2 sample (2004-2005)

	LGB	Heterosexual
	AOR (95% CI)	AOR (95% CI)
Any Axis-I disorder	0.32 (0.28, 0.37)	0.58 (0.57, 0.60)
Any mood disorder	0.36 (0.33, 0.39)	0.67 (0.64, 0.70)
Any anxiety disorder	0.40 (0.37, 0.44)	0.70 (0.67, 0.73)
Any substance disorder	0.31 (0.27, 0.35)	0.49 (0.47, 0.51)
Any comorbidity	0.31 (0.29, 0.34)	0.50 (0.47, 0.52)

Note. LGB = lesbian, gay, or bisexual; AOR = adjusted odds ratio; CI = confidence interval; odds ratios were adjusted for age, sex, race/ethnicity, and marriage status.