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Social Networks and Risk for Depressive Symptoms in a National Sample of Sexual Minority Youth

Mark L. Hatzenbuehler, Ph.D.,
Department of Sociomedical Sciences, Mailman School of Public Health, Columbia University

Katie A. McLaughlin, Ph.D., and
Division of General Pediatrics at Children's Hospital, Harvard Medical School

Ziming Xuan, Sc.D.
Boston University School of Public Health

Abstract

The aim of the study was to examine the social networks of sexual minority youths and to determine the associations between social networks and depressive symptoms. Data were obtained from the National Longitudinal Study of Adolescent Health (Add Health), a nationally representative cohort study of American adolescents (N=14,212). Wave 1 (1994–1995) collected extensive information about the social networks of participants through peer nomination inventories, as well as measures of sexual minority status and depressive symptoms. Using social network data, we examined three characteristics of adolescents' social relationships: (1) social isolation; (2) degree of connectedness; and (3) social status. Sexual minority youths, particularly females, were more isolated, less connected, and had lower social status in peer networks than opposite-sex attracted youths. Among sexual minority male (but not female) youths, greater isolation as well as lower connectedness and status within a network were associated with greater depressive symptoms. Moreover, greater isolation in social networks partially explained the association between sexual minority status and depressive symptoms among males. Finally, a significant 3-way interaction indicated that the association between social isolation and depression was stronger for sexual minority male youths than non-minority youths and sexual minority females. These results suggest that the social networks in which sexual minority male youths are embedded may confer risk for depressive symptoms, underscoring the importance of considering peer networks in both research and interventions targeting sexual minority male adolescents.

Keywords

USA; sexual orientation; social networks; depression; minorities; adolescents

Introduction

Sexual minority youths experience higher levels of depressive symptoms (Hatzenbuehler et al., 2008; Safren & Heimberg, 1999) and depressive disorders (Fergusson et al., 1999) than their heterosexual peers. Elevations in depressive symptomatology are associated with

Corresponding Author's: Mark L. Hatzenbuehler, Ph.D. mlh2101@columbia.edu.

numerous negative consequences for sexual minority youths, including increased vulnerability to suicide attempts (Russell & Joyner, 2001). Moreover, adolescent-onset depression is associated with an increased likelihood of experiencing negative outcomes later in the life course. Specifically, adolescents who have experienced a major depressive episode are at particularly high risk for recurrent problems with depression and for relapse in adulthood, as well as for functional impairment and the onset of additional mental disorders (Lewinsohn et al., 1999; Pine et al., 1998). Consistent with this research, sexual orientation-related disparities in depression persist into adulthood, with lesbian, gay, and bisexual (LGB) adults evidencing higher rates of major depression and other psychiatric disorders than heterosexuals (Bostwick et al., 2010; Cochran & Mays, 2009; Cochran et al., 2003; Sandfort et al., 2001). Consequently, identifying the factors that contribute to the onset of depression among sexual minority adolescents represents a critical priority for mental health researchers.

Social stress, which refers to the chronic stressors resulting from stigma and discrimination, is the predominant theoretical paradigm for understanding the determinants of depressive symptoms in sexual minorities (Meyer, 2003). Multiple empirical studies have demonstrated that a variety of social stressors increase risk for depression among sexual minority youths. For instance, sexual minority youths are exposed to high levels of violence, both within the home (Balsam et al., 2005) and in their schools (Garofalo et al., 1999; Russell et al., 2001), relative to heterosexual adolescents. Sexual minority adolescents are also at elevated risk of being expelled from their homes by family members and of experiencing homelessness (Cochran et al., 2002). Within-group studies of sexual minority youths have documented that increased exposure to these social stressors is associated with adverse mental health outcomes (D'Augelli et al., 2006; Hershberger & D'Augelli, 1995), including psychological distress (Rosario et al., 2002).

There are many psychosocial mechanisms through which exposure to social stress renders sexual minority adolescents vulnerable to mental health problems. One potential pathway was recently proposed in Hatzenbuehler's psychological mediation model (2009), which hypothesized that social stress disrupts social/interpersonal processes that in turn increase risk for the development of psychiatric morbidity, including depression. In the current study, we empirically test this hypothesis by examining the social networks in which sexual minority youths are embedded within their schools. We are unaware of studies that have systematically examined the composition of the social networks of sexual minority youths. One notable exception is a study using friendship nomination data (Ueno, 2005a), which showed that there were no significant differences in the numbers of friends who were nominated by sexual minority and majority youth (this study did not report whether the results were modified by sex).

Although this research provided an important first step, social network theory (Bearman & Moody, 2004; Valente, 2010) has identified several dimensions of social networks beyond number of friends that may be important for mental health. In the current study, we evaluate three of these dimensions: social isolation, degree of connectedness, and social status. We focus on social isolation because studies of youths in the general population indicate that adolescents who are more isolated from their peers, or who experience low levels of peer support, are vulnerable to depression (Lewinsohn et al., 1997; 1994). Conversely, peers who are socially integrated experience fewer depressive symptoms (Ueno, 2005b). Importantly, social isolation is a common experience among the stigmatized (Frable et al., 1997; Hatzenbuehler et al., 2009; Link et al., 1997). For instance, sexual minority youths generally report less support from peers than heterosexual youths (Eisenberg & Resnick, 2006; Safren & Heimberg, 1999). Moreover, concerns of rejection can lead individuals with concealable

stigmas, such as homosexuality, to avoid close relationships for fear of others' discovering their stigmatized identity (Pachankis, 2007).

In addition to social isolation, we also examined degree of connectedness within social networks. Sexual minority youths report feeling less connected to their schools than heterosexuals (Eisenberg & Resnick, 2006), but there has been limited investigation of the extent to which these subjective appraisals of school connectedness correspond to "objective" reports of peer relationships in schools. Degree of connectedness within one's social network is a measure that can be used to address this question. We therefore evaluated how connected sexual minorities were to other peers in their schools.

Finally, we were interested in examining an additional characteristic of the social networks of sexual minority adolescents, namely social status. Several lines of evidence indicate the importance of low social status as a risk factor for depression. A large literature documents that low social status is associated with multiple adverse physical health outcomes (Singh-Manoux et al., 2005; Williams, 1999) as well as with depressive symptoms (Marmot et al., 1997). Evidence from animal models also shows strong relationships between low social status and various depression-like behaviors, such as learned helplessness (Sapolsky, 2005). Moreover, researchers in the stigma literature have noted the similarities between stigma and status processes (Lucas & Phelan, 2010), suggesting that understanding the social status of individuals within peer networks may represent a critical, but understudied, dimension of stigma.

To address the mental health consequences of having social networks that are more isolated, less connected, and of lower social status, we utilized social network data collected in a nationally representative study of American adolescents, the National Longitudinal Study of Adolescent Health (Add Health). Add Health is the only national-level data set to provide information on social network characteristics and to simultaneously include information on sexual minority status. Consequently, this provided a unique opportunity to evaluate the following study aims. First, we determined whether sexual minority youths are more isolated, less connected, and of lower social status within peer networks than majority adolescents. Second, we examined the extent to which differences in these social networks (a) are associated with depressive symptoms among sexual minority youths and (b) explain sexual orientation-related disparities in depression (i.e., serve as a mediator of this association). Third, Add Health included extensive data on exposure to peer victimization, which enabled us to determine whether characteristics of social networks are associated with depressive symptoms over and above the effects of peer victimization, an established risk factor for depression (Prinstein et al., 2001). Finally, studies of peer relationships in heterosexual samples have documented that the mental health of female adolescents is strongly shaped by the relational networks in which heterosexual adolescent females are embedded (e.g., Ge et al., 1994; Leadbeater et al., 1995; Rudolph & Flynn, 2007). In contrast, adolescent heterosexual males appear to be "more impervious" to the influence of their peer networks, at least with respect to some mental health outcomes (e.g., suicidality; Bearman & Moody, 2004, p. 94). To our knowledge, no study has examined whether these patterns are similarly observed in samples of sexual minority youths. Consequently, the current study also explored whether there are differential associations between peer networks and depressive symptoms for sexual minority females and males, compared to their heterosexual peers.

Method

Sample and Procedure

Data were drawn from Add Health, a nationally representative survey of American adolescents. The first wave was conducted in 1995 and included adolescents in grades 7–12 (N=90,118) selected using a multi-stage stratified cluster sampling strategy. Adolescents completed in-school interviews, and a core sub-sample (n=20,745; response rate 78.9%) completed in-depth home interviews. Assessment of depressive symptoms occurred during the in-home interviews. The in-home interview was conducted with automated computer-assisted interviewing (ACASI) technology, which was utilized to increase reporting of sensitive outcomes, including depressive symptoms. The data for our analysis were drawn from both the in-school and in-home interviews. Of the 20,745 students who completed the in-home interview, we excluded 6,426 participants who did not complete the in-school interview, were not in the school network roster, or attended schools for which friendship data were not included, yielding a final sample size of 14,319. A more detailed description of the Add Health sample can be found elsewhere (Bearman et al., 1995). Institutional Review Board approval was granted by the University of North Carolina for consent and field procedures and by the Columbia and Harvard Schools of Public Health for analysis.

Measures

Demographics—Sex (male/female) and race/ethnicity (white, black, Hispanic, other) were self-reported by participants.

Sexual minority status—The Wave 1 in-home survey included 2 questions on romantic attraction: (1) “Have you ever had a romantic attraction to a female?” and (2) “Have you ever had a romantic attraction to a male?” Youth reporting no romantic attractions (11.4%) were excluded, as were those with missing data (n=107). Analyses compared three groups: (1) youths who reported attractions exclusively to members of the same sex (n=151; 1.1%), which we refer to as “same-sex attracted youths”; (2) youths reporting attractions to both males and females (n=708; 5.0%), which we refer to as “both-sex attracted youths”; and (3) youths reporting attractions exclusively to members of the opposite sex (n=13,353; 94.0%), which we refer to as “opposite-sex attracted youths.”

Dependent variable—Depressive symptoms were assessed using an 11-item version of the Center for Epidemiological Studies Depression Scale (CES-D), a widely used measure of depression symptomatology developed for use in general population samples (Radloff, 1977). Respondents indicated the severity of depressive symptoms in the past week on a scale ranging from “never or rarely” to “most/all of the time.” The scale has sound psychometric properties and is a valid measure of adolescent depression (Radloff, 1977; Roberts et al., 1991). The CES-D was reliable in the Add Health sample (Cronbach’s alpha=0.84). Because the measure of depressive symptoms was not normally distributed, we conducted a log transformation prior to conducting the analyses.

Social network variables—As part of the in-school survey, each student was asked to name his or her 5 best male and 5 best female friends. Students could name friends from both inside and outside the school, but the network variables were constructed using only those nominations in which both the respondent (i.e., ego or sender) and nominated friend (i.e., alter or receiver) were uniquely identifiable students who completed the in-school questionnaire. Only 15% of all friends named by Add Health respondents did not attend their school or sister school (Carolina Population Center, 2001). These nominations were used to create social network variables that captured the size and structure of peer networks.

For the current study, we examined three indicators of social network composition: (1) social isolation, (2) degree of connectedness, and (3) social status. We calculated two measures of social isolation: (a) *in-degree*, which is the number of students in the school who nominated the participant and (b) *out-degree,* which is the number of students in the school that were nominated by the participant.

The second measure of social networks examined the total number of students the participant could reach in three steps (reach 3) in the participant's network. This represents a measure of degree of connectedness, which provides an index of how close or connected the respondent is to other peers in their social network (e.g., if *i* nominates *j*, and *j* nominates *k*, and *k* nominates *l*, then *i* and *l* are 3 steps apart; Carolina Population Center, 2001). Youths with a fewer number of peers that can be reached within three steps are thus less connected to peers in their network.

Third, we examined the participant's centrality within the peer network. Multiple measures of centrality exist. We chose to focus on Bonacich's centrality, given our interest in capturing a measure of social status within the peer network. The concept of centrality is predicated on the notion that one's status is connected to the status of those with whom one is connected (Bonacich, 1972; 1987). One's centrality or status is, therefore, a function of how many connections one has, as well as how well-connected one's peers are to other members of the social network (Haas et al., 2010). We used the beta parameter (0.1) for the Bonacich's centrality measure that was provided in the Add Health dataset.

Covariates—Add Health included multiple measures of exposure to peer violence and victimization in the past 12 months. Two measures of fighting were coded dichotomously as present or absent: one assessed whether the respondent "got into a physical fight," and the other assessed whether the respondent was in a physical fight in which he/she was injured and needed to be treated by a doctor or nurse. Four dichotomous measures of violent victimization were also assessed: (1) "someone pulled a knife or gun on you;" (2) "you were jumped;" (3) "someone shot you;" and (4) "someone cut or stabbed you." Witnessing violence was assessed with a single dichotomous item: "You saw someone shoot or stab another person." We created a composite measure of violence and victimization from these items (range: 0–7), which was used as a covariate. We also included a measure of family structure as a covariate, which previous studies have shown to be associated with depressive symptoms among sexual minority youths (Ueno, 2005a). Students who reported living with both parents were compared to those who did not live with both parents.

Statistical analysis

Analyses proceeded in four steps. First, we examined whether the three indicators of social networks (isolation, connectedness, and status) differed across the three sexual orientation groups, using Analysis of Variance (ANOVA). Second, we evaluated whether each of the social network variables was associated with depressive symptoms among same-sex and both-sex attracted youths in bivariate models. Third, we examined whether social networks mediated the association between sexual minority status and depressive symptoms, controlling for established risk factors for depression, including race/ethnicity, peer victimization, and family structure. Fourth, we examined gender and sexual orientation differences in the strength of the association between social networks and depressive symptoms by examining a three-way interaction in a model controlling for established risk factors.

Linear regression models were estimated for these analyses. Given marked gender differences in the prevalence of depressive symptoms during adolescence (Hankin et al., 1998; Twenge & Nolen-Hoeksema, 2002), and the differential impact of social networks on

the mental health of male and female adolescents (Bearman & Moody, 2004), all analyses were conducted separately for males and females. Statistical analyses were conducted using SUDAAN 10.0 to adjust variance estimates for the complex survey design of Add Health. Statistical significance was evaluated using .05-level, 2-sided tests.

Results

Social Networks of Same- and Both-Sex Attracted Youths

Table 1 summarizes the social networks of the same- and both-sex attracted youths, compared to their opposite-sex attracted peers. ANOVAs indicated group differences in the following network variables: number of peers the respondent nominated (F=12.05, p<0.0001), social status (F=8.31, p<0.0001), and connection (F=10.31, p<0.0001). These group differences were largely driven by female sexual minority youths. Pairwise comparisons indicated that same-sex (t=−3.15, p<.01) and both-sex (t=−3.26, p<.01) attracted females nominated a significantly smaller number of friends than opposite-sex attracted females (there were no significant differences between the same- and both-sex attracted females). Additionally, same-sex (t=−2.37, p=.02) and both-sex (t=−3.34, p<.01) attracted females had significantly lower status in their networks compared to their opposite-sex attracted peers (there were no significant differences between the same- and both-sex attracted females). Finally, same-sex (t=−4.34, p<.001) and both-sex (t=−2.02, p=.05) attracted females had significantly lower connection in their networks than their opposite-sex attracted peers. Moreover, same-sex attracted females had lower connection in their networks than both-sex attracted females (t=−2.12, p=.04).

Among males, there were significant group differences in the number of peers nominated by the respondent (F=3.20, p=0.04); no group differences were observed for any of the other social network variables (p>0.05). Pairwise comparisons indicated that both-sex attracted males nominated fewer friends than opposite-sex attracted males (t=−2.03, p=0.04); however, there were no significant differences between same- and opposite-sex attracted males, nor between same- and both-sex attracted males, in number of peers nominated.

Social Networks and Depressive Symptoms

Each of the social network variables examined here was associated with depressive symptoms in the total sample (Table 2). Higher levels of depressive symptoms were observed in youths who were nominated by fewer friends, β=−0.02, p<0.01, nominated fewer friends, β=− 0.02, p<0.01, were less central in their network, β=−0.10, p<0.01, and had lower social status, β=−0.01, p<0.01.

Among sexual minority male youths, social network variables were associated strongly with depressive symptoms (Table 2). Sexual minority males who nominated a smaller number of friends in the school had higher levels of depressive symptoms than those who were nominated by a greater number of friends, β=−0.06, p<0.01. These associations were present among same-sex attracted, β=−0.15, p<0.01, and both-sex-attracted, β=−0.07, p<0.01, males. A similar pattern was observed for status, such that males with lower social status in their networks had higher number of depressive symptoms, β=−0.33, p<0.01; this was observed among same-sex attracted (β=−0.69, p<0.01) and both-sex attracted males β= −0.39, p (<0.01). Finally, males with lower connection in their networks exhibited higher levels of depressive symptoms, β=−0.01, p<0.01. This pattern was similar in same-sex attracted, β=−0.01, p=0.01, and both-sex attracted males, β=−0.01, p<0.01. In contrast to the sexual minority males, none of the social network variables were significantly associated with depression among females who were same- or both-sex attracted.

Mediation Analyses

To provide evidence for mediation, four criteria must be met (MacKinnon et al., 2002). First, an association between the independent and dependent variables must be established. Similar to previous studies, we find that same-sex (β=0.26, $p<0.01$) and both-sex (β=0.09, $p=0.10$) attracted males have higher levels of depressive symptoms than their heterosexual peers (Wald $F=5.26$, $p<.01$). Second, the independent variable must be associated with the putative mediator. As we showed above, sexual minority status was associated with greater social isolation (out-degree) among males ($F=3.20$, $p=0.04$). Third, the putative mediator must be associated with the outcome. Evidence for this step was demonstrated in Table 2: social isolation (out-degree) is associated with depressive symptoms among males. The final test of mediation involves evaluating the degree of attenuation in the association between the independent and dependent variables in a model that includes the mediator. Table 3 depicts the results for the final mediation model. Model 1 is the baseline model showing relationships between sexual minority status and depression, controlling for race/ethnicity, peer victimization and family structure. After controlling for social isolation in the full mediation model (Model 2), the association between same-sex attraction and depression is no longer significant (β=0.27, $p>.05$). The association between same-sex attraction and depressive symptoms was reduced by 4% after adjusting for social isolation.

Moderation Analyses

The results presented thus far have indicated that social isolation (a) predicts depressive symptoms among same-sex attracted males and (b) partially explains sexual orientation disparities in depressive symptoms among males. However, given that social isolation also predicts depressive symptoms within the sample of opposite-sex attracted males (β=−0.01, $p=0.04$) and females (β=−0.01, $p=0.02$), these analyses have not determined whether the effect of social isolation on depression is stronger for sexual minority males than opposite-sex attracted males and females. To address this question, we conducted a 3-way interaction between sexual orientation, sex, and social isolation in predicting depressive symptoms, controlling for established risk factors. This interaction was statistically significant (β=−0.05, $p=0.001$), indicating that the observed association between social isolation and depression was stronger for the sexual minority male youth (β=−0.06) than both sexual minority females (β=−0.04) and opposite-sex attracted youths (β=−0.01).

Discussion

Peer relationships serve as a primary social influence during adolescence. As youths spend less time with parents and more time with peers, social acceptance within their peer networks becomes increasingly important (Eccles, 1999; Larson & Richards, 1991). Previous research has shown that, compared to heterosexual youths, sexual minority youths report less support from peers (Safren & Heimberg, 1999) and feel less connected to their schools (Eisenberg & Resnick, 2006), which is likely a consequence of the stigma associated with sexual orientation and gender non-conformity (Meyer, 2003).

In the current study, we extend this literature by using multiple measures of the composition of the social networks in which sexual minority youths are embedded in their schools. Our results demonstrated that, on average, youths who report same- and both-sex attractions are more isolated and have lower social status and lower connection in their social networks than opposite-sex attracted youths. These results were particularly pronounced among females. One possible explanation for these sex differences in social networks comes from prior research on the gender composition of sexual minority youths' friendships, which has shown that sexual minority males have more cross-gender than same-gender friendships (Diamond & Dubé, 2002). Results from the Add Health study (results not shown but

available on request) confirm that for sexual minority youths, reciprocity is more common from opposite-sex best friends than from same-sex best friends. Specifically, males with same-sex attractions were more likely to have their best female friends nominate them as a friend than their best male friends, and females with same-sex attractions were more likely to have their best male friends nominate them as a friend than their best female friends. Both women (Herek, 2002) and female adolescents (Poteat et al., 2009) are more accepting of gender non-conformity than men and boy adolescents, respectively, which may result in more supportive friendships for same-sex attracted males, relative to same-sex attracted females, consistent with our results.

In addition to documenting differences in the social networks of sexual minority and majority youths, we also found that greater isolation, less connection, and lower social status in peer networks were strong correlates of depressive symptoms among sexual minority male (but not female) adolescents. Social isolation remained significantly associated with depressive symptoms among sexual minority males even after adjusting for peer victimization, the risk factor most commonly assessed in studies of the peer relationships of sexual minority youths (Garofalo et al., 1999; Russell et al., 2001). Importantly, among males, social isolation partially mediated the association between sexual minority status and depressive symptoms. To our knowledge, this is the first study to document that social networks may be one mechanism explaining the higher rates of depression among sexual minority males, a finding that warrants replication in prospective designs. Although social network factors explained a relatively small proportion of the relationship between sexual minority status and depressive symptoms among males, these findings nonetheless highlight a novel and relatively understudied risk factor for depressive symptoms among adolescents that may have particular relevance for sexual minority male youths. Indeed, analyses indicated that the association between social isolation and depression was strongest for sexual minority males compared to all other groups (i.e., sexual minority females and opposite-sex attracted males and females).

Our finding that social isolation is associated with depressive symptoms among sexual minority males has important implications for the development of preventive interventions. In particular, efforts to reduce sexual minority stigma and discrimination in schools, including through implementation of anti-discrimination policies and anti-bullying initiatives, can help to improve school climates (Hatzenbuehler, 2011), which in turn may change social norms regarding students' treatment of sexual minority and gender-nonconforming youths. School curricula that promote tolerance and acceptance of diversity, such as the Teaching Tolerance campaign (Southern Poverty Law Center, 2010), may also minimize the social isolation experienced by sexual minority youths. In addition, creating safe spaces for sexual minority youths to develop supportive peer relationships, such as Gay Straight Alliances, can also have important mental health benefits, as indicated by several recent studies (Russell et al., 2009; Walls et al., 2008).

This research raises several noteworthy questions for future study. First, although sexual minority populations continue to confront stigma and discrimination at both individual (Mays & Cochran, 2001) and structural levels (Hatzenbuehler et al., 2010), recent research has indicated that attitudes towards gays and lesbians are improving, especially among younger generations (Pew Research Center, 2011). Moreover, with the advent of on-line social media, sexual minority youths may now have a wider range of options for social interactions, and some research has indicated that such on-line communities provide important forms of social support for individuals with concealed stigmas (McKenna & Bargh, 1998). As social environments become more accepting, and opportunities for social interactions expand, the social networks of sexual minority youths are likely to reflect these changes. In particular, sexual minority youths may now be less isolated, more socially

connected, and have higher status than when the first wave of Add Health data collection was completed in the mid-1990's. Studies that examine cohort effects of social networks among sexual minority youths could begin to shed light on this issue. Future studies should also expand the range of social network variables to include social media and other online networks to examine whether, and how, these newer forms of media have influenced the size and density of social networks among sexual minority youths.

Second, recent research by Ueno (2010) has indicated that there are several characteristics of heterosexuals that influence their tendency to have friendships with sexual minorities, including gender, race/ethnicity, academic aptitude, and parental education. The extent to which these various characteristics of cross-orientation friendships influence the mental health of sexual minority youths awaits future investigation. Third, research is needed to determine how social networks are shaped by, and in turn influence, other social contexts surrounding sexual minority youths. For instance, lesbian, gay, and bisexual (LGB) youths living in counties with supportive school climates (e.g., schools that have anti-bullying and anti-discrimination policies that include sexual orientation as a protected class status) are less likely to attempt suicide than LGB youths living in less supportive climates (Hatzenbuehler, 2011). It is possible that sexual minority youths experience less social isolation from their peers in these supportive school environments. However, there is currently a dearth of research on how these broader contextual factors moderate the impact of social networks on the mental health of sexual minority adolescents.

Finally, future research is needed to understand why social isolation increased risk for depression among sexual minority males, but not sexual minority females. At first glance, these findings may appear counterintuitive. Because heterosexual women have higher rates of depression than heterosexual men (Nolen-Hoeksema & Hilt, 2009), studies examining sex differences in depression typically document that established risk factors for depression are more common among females compared to males. Thus, we might expect social isolation to be more strongly associated with depressive symptoms among sexual minority females compared to sexual minority males. However, recent evidence from epidemiologic surveys indicates that the sex patterns in mental health that are consistently observed in heterosexuals tend to be reversed among sexual minority populations, such that gay men have rates of depression that are both higher than heterosexual men and comparable to (and in some cases higher than) heterosexual women (e.g., Bostwick et al., 2010; Cochran & Mays, 2009; Cochran et al., 2003; Sandfort et al., 2001). There has been little empirical investigation of the factors that explain this sex reversal in depression among gay men, but the available evidence suggests that gay men and heterosexual women may share certain risk factors for depression, given their similar rates of this disorder.

Of particular relevance to the present study, heterosexual women and girls have a stronger interpersonal orientation than heterosexual men and boys (Feingold, 1994). Because heterosexual women place a high value on interpersonal relationships, they become more distressed than heterosexual men if these interpersonal relationships are disrupted or become dissonant (Nolen-Hoeksema & Hilt, 2009). In addition to experiencing more interpersonal stress than heterosexual men (Hammen, 2003), heterosexual women appear to be more sensitive to the effects of interpersonal stress than heterosexual men. For example, interpersonal stress predicts depressive symptoms in adolescent females but not in males (e.g., Ge et al., 1994; Rudolph & Flynn, 2007), and adolescent females are more likely than adolescent males to report that interpersonal stressors impact their wellbeing (e.g., Leadbeater et al., 1995). Importantly, research has also indicated that gay men are more interpersonally focused, and more sensitive to interpersonal rejection, than heterosexual men (Pachankis & Goldfried, 2006). Thus, similar to heterosexual females, sexual minority males may be particularly vulnerable to social isolation and rejection in their interpersonal

relationships, thereby heightening sexual minority males' risk of developing depression when their interpersonal relationships are disrupted or become inharmonious. The determinants of these sex differences warrant further investigation.

Although the present study provides unique insights into correlates of depressive symptoms among sexual minority youths, our findings should be considered in light of the study's limitations. First, these data are cross-sectional. Thus, we cannot rule out the possibility that depression causes more social isolation. Although several prospective studies have shown that social isolation predicts the subsequent onset of major depression and increases in depressive symptoms (Stice et al., 2004; Wade & Kendler, 2000), recent evidence also indicates that depressive symptoms predict position within social networks (Schaefer et al., 2011). Given the cross-sectional design of this study, causal relationships between social networks and depressive symptoms cannot be inferred.

Second, the only measures of sexual minority status that are available in Wave 1 are those that assess romantic attraction, and sexual identity (i.e., self-identification as lesbian, gay, or bisexual) was not assessed until Wave 3. Although correlated with other dimensions of sexual orientation, including sexual behavior and sexual identity (Laumann et al., 1994), the prevalence of same- and both-sex attraction is higher than that of same-sex behaviors (Sell et al., 1995) and non-heterosexual sexual identity (Bostwick et al., 2010). Thus, the operationalization of sexual minority status can lead to different population groups (Sell, 2007). As such, it is unclear whether our results are generalizable to all youths who identify as lesbian, gay and bisexual. A third limitation is the use of self-reported symptoms of depression. Although administration of a structured interview to establish DSM-IV clinical diagnoses would represent a methodological improvement, the validity of the self-report measure used in this study is well established (Radloff, 1977; Roberts et al., 1991).

Despite these limitations, this study has many notable strengths, including the use of a nationally representative sample of adolescents that assessed sexual minority status, with adequate statistical power to examine sex differences. In addition, Add Health included a comprehensive assessment of the composition of social networks. In particular, we were able to evaluate several different measures of social isolation, including how many peers nominate the respondent and how many peers the respondent nominates, as well as the status of respondents within their social networks, and how close/connected the respondents are to other peers in their network. Moreover, an advantage of the peer nomination inventories that were used in Add Health is that such measures do not rely solely on the perceptions of the respondent, which are influenced by mental health status, particularly depression (De Los Reyes & Prinstein, 2004). Peer nomination methods are considered the gold standard in research on social networks in children and adolescents (Ladd & Kochenderfer-Ladd, 2002). This measurement approach provides a methodological advancement over previous studies of sexual minority adolescents' peer relationships, which have tended to rely on perceptions of peer social support and acceptance (Eisenberg & Resnick, 2006; Safren & Heimberg, 1999). Although such self-report measures capture how respondents construe their peer relationships, these measures are confounded with mental health status (De Los Reyes & Prinstein, 2004) and can therefore lead to biased estimates of the association between social relationships and mental health.

Taken together, our results demonstrate the importance of considering peer networks as a correlate of depressive symptoms among sexual minority male adolescents. Peer support (Safren & Heimberg, 1999) and exposure to peer violence/victimization (Garofalo et al., 1999) are established correlates of depressive symptoms within sexual minority youth. In the current study, we broadened the lens of peer relationships to consider how properties inherent to the composition of these relationships—including isolation, connection, and

status—contribute to the mental health of sexual minority youths. In so doing, we highlight the importance of expanding theoretical models of social stress to include a wider range of social/contextual determinants of adverse mental health outcomes among this population.

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- We examined associations between social networks and depressive symptoms among sexual minority youth in a national sample.
- Sexual minority youths' social networks were more isolated, less connected, and of lower status than majority youths' networks
- These characteristics of social networks are strongly associated with depressive symptoms among sexual minority males.
- Isolated social networks mediate the association between sexual minority status and depressive symptoms among males.

Table 1

Social Networks of Sexual Minority and Majority Youths in the National Longitudinal Study of Adolescent Health

Social Network Variables	Same-Sex Attracted Youths (N=151)	Both-Sex Attracted Youths (N=708)	Opposite-Sex Attracted Youths (N=13,353)		Same-sex Attracted Males (N=62)	Both-sex Attracted Males (N=426)	Opposite-sex Attracted Males (N=6,479)		Same-sex Attracted Females (N=89)	Both-sex Attracted Females (N=282)	Opposite-sex Attracted Females (N=6874)	
	Mean (SE)	Mean (SE)	Mean (SE)	ANOVA P-Value	Mean (SE)	Mean (SE)	Mean (SE)	ANOVA P-Value	Mean (SE)	Mean (SE)	Mean (SE)	ANOVA P-Value
In-degree	3.83 (0.51)	4.51 (0.20)	4.63 (0.12)	F=1.69 p=0.19	3.81 (0.78)	4.57 (0.27)	4.34 (0.12)	F=0.49 p=0.61	3.86 (0.64)	4.41 (0.34)	4.92 (0.14)	F=2.83 p=0.06
Out-degree	3.75 (0.36)	4.02 (0.15)	4.63 (0.10)	F=12.05 p<0.001	3.75 (0.57)	3.87 (0.21)	4.32 (0.12)	F=3.20 p=0.04	3.75 (0.38)	4.27 (0.22)	4.94 (0.10)	F=11.8 p<0.0001
Status	0.67 (0.07)	0.72 (0.03)	0.83 (0.01)	F=8.31 p<0.001	0.68 (0.12)	0.71 (0.04)	0.78 (0.02)	F=1.71 p=0.18	0.67 (0.08)	0.73 (0.04)	0.87 (0.01)	F=9.41 p<0.0001
Connection	42.87 (6.64)	54.06 (3.32)	60.91 (2.74)	F=10.30 p<0.001	44.22 (10.43)	57.20 (2.87)	57.2 (2.87)	F=2.15 p=0.12	41.75 (6.36)	64.52 (2.79)	64.53 (2.79)	F=12.25 p<0.0001

Notes. In-degree=# of students in the school who nominated the participant; Out-degree=# of students in the school that were nominated by the participant. Status=participant's centrality, weighted by the centrality of those to whom he/she sends ties. Connection=total # of peers that the participant can reach in 3 steps.

Table 2

Bivariate Associations between Social Networks and Depressive Symptoms among Same-Sex and Both-Sex Attracted Youths

Social Network Variables	Overall Sample (N=14212)	Same-Sex Attracted Males (N=62)	Same-Sex Attracted Females (N=89)	Both-Sex Attracted Males (N=426)	Both-Sex Attracted Females (N=282)
	Beta (SE)	Beta (SE)	Beta (SE)	Beta (SE)	Beta (SE)
In-degree	−0.02 (0.00) **	−0.06 (0.04)	−0.07 (0.05)	−0.03 (0.02)	−0.01 (0.02)
Out-degree	−0.02 (0.00) **	−0.15 (0.03) **	−0.04 (0.06)	−0.07 (0.02) **	−0.03 (0.02)
Status	−0.10 (0.02) **	−0.69 (0.15) **	−0.37 (0.30)	−0.39 (0.12) **	−0.14 (0.10)
Connection	−0.01 (0.00) **	−0.01 (0.00) **	−0.00 (0.00)	−0.01 (0.00) *	−0.01 (0.00)

Note.

** $p \leq 0.01$,

* $p < .05$

Table 3

Social Networks Mediate Association between Sexual Minority Status and Depressive Symptoms among Males

Variables	Model 1 (β, SE)	Model 2 (β, SE)
Same-Sex Attraction	0.28 (0.14) *	0.27 (0.14)
Both-Sex Attraction	0.05 (0.06)	0.05 (0.07)
Opposite-Sex Attraction	REF	REF
Non-White	0.15 (0.04) **	0.14 (0.04) **
White	REF	REF
Family Structure (both parents)	−0.09 (0.04) *	−0.08 (0.04)
Family Structure (other)	REF	REF
Peer-Victimization	0.04 (0.01) **	0.04 (0.01) **
Social Isolation	--	−0.02 (0.01) **

Note.

** $p<0.01$,

* $p<0.05$