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Sexual Orientation and Non-Suicidal Self-Injury: A Meta-Analytic Review

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Abstract

Objectives: To conduct the first meta-analysis comparing risk for NSSI between sexual minority and heterosexual persons. Methods: Eleven published and four unpublished studies were reviewed, describing associations between sexual orientation and NSSI in 7,147 sexual minority and 61,701 heterosexual participants. Results: The overall weighted effect size for the relationship between sexual orientation and NSSI using a random-effects model was OR=3.00 (95% CI=2.46–3.66), indicating a medium-to-large effect. Sexual minority adolescents and bisexuals were found to be at particularly high-risk. Conclusion: These findings highlight the need to examine mechanisms linking sexual orientation and NSSI in future research. Building on these findings can add to understanding the associations between sexual orientation, NSSI, and suicidality, as well as prevention/intervention.

Keywords: non-suicidal self-injury; NSSI; sexual orientation; LGBQ; meta-analysis

Sexual orientation and non-suicidal self-injury: A meta-analytic review

For over two decades a fairly large-body of research has examined risk for suicidal ideation and attempts among sexual minority individuals (i.e., identifying as non-heterosexual). Two recent meta-analyses, one focused on adults (King et al., 2008) and the other specific to adolescents (Marshal et al., 2011), provide the most conclusive evidence to date indicating that sexual minority individuals are at elevated risk for experiencing suicidal thoughts and attempted suicide compared to heterosexual individuals. These findings are consistent with minority stress theory, which explains the increased risk for adverse mental health outcomes among members of minority groups (e.g., non-heterosexual individuals) compared to majority populations (e.g., heterosexual individuals) as resulting from the chronic and excessive stress of institutionalized prejudice and stigmatization (Meyer, 1995, 2003). That is, the pervasive stressors, homophobia, and marginalization sexual minorities are faced with may increase their risk of engaging in suicidal behaviors.

The larger domain of self-injurious thoughts and behaviors includes both suicidal and non-suicidal behaviors (Nock & Favazza, 2009). Suicidality and non-suicidal self-injury (NSSI) include acts of self-injury; however, the underlying motivations or reasons for the acts are quite different. Specifically, suicidal thoughts or behaviors include *some* intent to die or end one's life, whereas NSSI involves the direct, deliberate destruction of one's body tissue in the absence of suicidal intent (Nock & Favazza, 2009). Due to the overlap in prevalence of NSSI and suicidality (e.g., Garrison et al., 1993; Muehlenkamp & Gutierrez, 2004, 2007) and the previously identified risk of suicidality among sexual minority persons, it is likely that this population is also at higher risk for engaging in NSSI. To date, risk for NSSI among sexual minority persons has not been systematically examined.

The goal of the current research is to conduct the first meta-analysis of the emerging literature comparing risk for NSSI between sexual minority and heterosexual persons. We begin by providing a brief explanation of minority stress theory and related findings concerning minority stress and mental health outcomes among sexual minority populations. Next we discuss two recent quantitative reviews of the research on links between sexual orientation and suicidality, followed by an overview of NSSI and reasons to suspect sexual minorities may evidence increased risk for engaging in NSSI compared to heterosexual populations.

Minority Stress Theory and Sexual Minority Mental Health

Numerous studies have outlined lesbian, gay, bisexual, and questioning/queer (LGBQ) individuals' increased risk for mental health problems compared to heterosexual populations. For example, LGBQ adolescents and young adults were found to be between 2.8 and 5.9 times more likely to experience major depression, generalized anxiety disorder, conduct disorder, and comorbid disorders compared to heterosexual adolescents and young adults (Fergusson, Horwood, & Beautrais, 1999). A meta-analysis by King et al. (2008) found LGB individuals (this study focused solely on lesbian, gay, and bisexual individuals) were one and a half times more likely to have depression, anxiety, and alcohol/other substance abuse/dependence than heterosexual individuals. Consistent with LGBQ adults, LGBQ youth are at increased risk for mood disorders and substance abuse/dependence compared to heterosexual youth (Marshal et al., 2011).

Minority stress theory suggests that conflict in the social environment develops when there are differences in values between a minority group (i.e., sexual minority [LGBQ] individuals) and the dominant group (i.e., heterosexual individuals; Meyer, 1995, 2003). According to this theory, LGBQ individuals commonly experience internalized homophobia

(negative attitudes about being LGBQ directed at the self), perceived stigma (expectation that society will stigmatize LGBQ individuals), and events of discrimination/violence/prejudice. Internalized homophobia and perceived stigma are thoughts and behaviors experienced by the LGBQ individual, whereas discrimination and prejudice are overt and egregious acts inflicted upon the LGBQ individual by society. Per minority stress theory, it is the combination of these three stressors that contributes to the psychological distress experienced by LGBQ individuals (Meyer, 1995, 2003). In illustration of this point, themes of minority-related stress emerged in a review of Youth Risk Behavior Surveys conducted in the United States (Bagley & Tremblay, 2000) finding LGB youth to be more likely than heterosexual youth to have been threatened or beaten, to feel unsafe at school, and to be heavy drug or alcohol users. These combined factors place LGB youth at a substantial and increased risk for suicidal behavior (Bagley & Tremblay, 2000). In another study, 70% of LGB adolescents admitted to feeling suicidal at least partly related to their sexual orientation; specifically males were more likely to endorse difficulties associated with their sexual orientation as a reason for wanting to be dead compared to females (D'Augelli, Hershberger, & Pilkington, 2001).

Sexual Minority Orientation and Suicidality

Suicide is the tenth leading cause of death in the United States, accounting for 1.5% of all deaths in 2009, and the third leading cause of death among young people aged 15 – 24 (McIntosh, 2012). As mentioned previously, Marshal and colleagues' (2011) meta-analysis examined both suicidality and depression among sexual minority and heterosexual adolescents. Their term, *sexual minority youth* (SMY), intended to capture all facets of the term: attraction, behavior, and identity. Nineteen studies examining suicide between SMY and heterosexual youth were identified (N = 122,955). Twenty eight percent of SMY reported a history of suicidality

compared to 12% of heterosexual youth; SMY were found to have nearly three times the risk for suicidal thoughts and/or behavior compared to heterosexual youth (OR = 2.92; Marshal et al., 2011, p. 117). The increased risk was not equivalent across sexual orientations; bisexual youth in particular demonstrated the greatest risk for suicidality compared to heterosexual youth (OR = 4.92). In sum, results of this review indicated that SMY experienced significantly higher suicidality (i.e., suicidal ideation, suicidal plans, suicide attempts, lethal suicide attempts) than heterosexual youth. Marshal and colleague's review (2011) discussed the stressors SMY face, such as negative responses to gender atypical behavior, high-risk sexual behavior, conflicts related to "coming out" at home/school, and subsequent consequences of "coming out" (i.e., bullying; Rivers, 2002) as minority-stress related factors potentially explaining the observed increased risk for SMY suicidality.

The second meta-analysis to examine sexual orientation and suicidality focused specifically on mental illness, suicide, and deliberate self-harm (DSH) between LGB and heterosexual populations (King et al., 2008). DSH is an intentional injury inflicted by the individual; however, the intent of the injury (i.e., suicidal or non-suicidal) is not typically queried or assumed, and therefore NSSI and suicide attempts are often combined. Seventeen studies were identified that incorporated DSH, suicide attempts, and/or suicidal ideation. Consistent with the findings observed for SMY (Marshall et al., 2011), LGB individuals were found to be at higher risk for suicidal behaviors, DSH, and suicidal ideation compared to heterosexual individuals. However, risk was not uniform. Evidence suggested that lesbian and bisexual women were at particular risk for recent/current suicidal ideation. Gay and bisexual men, on the other hand, were particularly more likely to have attempted suicide at some point in their lives (King et al., 2008).

Cumulatively, it is evident from these meta-analyses that LGBQ adolescents and adults are at an increased risk for suicidality.

Non-Suicidal Self-Injury

Research suggests that NSSI is more prevalent among adolescents and young adults than in older adult samples (Jacobson & Gould, 2007). Typically, the average age of onset of NSSI in community and clinical samples is estimated between 12 and 14 years of age (Glenn & Klonsky, 2009; Jacobson & Gould, 2007; Muehlenkamp & Gutierrez, 2004, 2007; Ross & Heath, 2002; Swannell, Martin, Scott, Gibbons, & Gifford, 2008). Rates are typically low in the general adult population (e.g., 4%; Briere & Gil, 1998) and high among adults diagnosed with borderline personality disorder (e.g., 90%; Zanarini et al., 2006). Examining NSSI in college samples has yielded prevalence rates around 25% (Glenn & Klonsky, 2010; Klonsky & Olino, 2008; Whitlock, Eckenrode, & Silverman, 2006; Whitlock et al., 2011). Observed rates of lifetime NSSI among adolescent samples have ranged from 2.5% to 46.5% in community samples (Garrison et al., 1993; Hilt, Nock, Lloyd-Richardson, & Prinstein, 2008; Lloyd-Richardson, Perrine, Dierker, & Kelley, 2007; Muehlenkamp, Claes, Havertape, & Plener, 2012; Muehlenkamp & Gutierrez, 2004, 2007; Ross & Heath, 2002; Zoroglu et al., 2003) to 13% to 82.4% in inpatient samples (Boxer, 2010; Darche, 1990; DiClemente, Ponton, & Hartley, 1991; Jacobson, Muehlenkamp, Miller, & Turner, 2008; Nock & Prinstein, 2004).

One theoretical model for understanding the motivations for NSSI is consideration of a functional approach to NSSI. This approach considers antecedents and consequences of NSSI, allowing for a greater understanding of the psychosocial correlates associated with NSSI (e.g., anxiety, depression, anger; Nock, 2009; Nock & Cha, 2009; Nock & Prinstein, 2004, 2005). Nock and Prinstein's (2004, 2005) four-function model conceptualizes engagement in NSSI for

automatic and/or social reinforcement. Specifically, the model describes NSSI based on automatic positive (e.g., generate feeling) or negative (e.g., escape from aversive affective/cognitive state) reinforcement and/or social positive (e.g., access to help/attention) or negative (e.g., removal of an interpersonal demand) reinforcement. The four-function model has contributed to the field's understanding of the development and maintenance of NSSI.

While relations between sexual orientation and NSSI are largely understudied, several recent studies have qualitatively examined LGBQ individuals' endorsement of NSSI and their understanding of the behaviors' functions. For example, many lesbian and bisexual women describe engaging in NSSI for automatic and social reasons typically endorsed among heterosexual populations (e.g., childhood negative/traumatic experiences, suppression of painful emotions; Alexander & Clare, 2004). However, some experiences discussed were specific to lesbian and bisexual women, including 'feeling different' (i.e., not conforming to society's notions of gender expectations). These women also described being bullied/teased, feelings of self-hatred/self-loathing, and feelings of shame/confusion as a result of feeling different. Interestingly, NSSI engagement contributed to their sense of feeling different over and above their minority-related stressors (Alexander & Clare, 2004). These findings were largely replicated in a similar qualitative study of LGBQ young adults' self-destructive behaviors, including NSSI (McDermott, Roen, & Scourfield, 2008).

Current Study

It is evident that suicidality is a prevalent problem in LGBQ individuals (King et al., 2008; Marshal et al., 2011). Given this evidence, and the overlap in rates of NSSI and suicidality (Garrison et al., 1993; Muehlenkamp & Gutierrez, 2004, 2007), it is also likely that LGBQ individuals engage in NSSI at higher rates than heterosexual individuals. The current meta-

analysis offers a quantitative summary of the emerging literature comparing risk for NSSI between sexual minority and heterosexual persons.

Method

Literature Search

Four inclusion criteria were set for the reports included in this meta-analytic review: (1) the study assessed NSSI in both sexual minority and heterosexual participants, (2) the assessment of NSSI described NSSI as a physically damaging act intended to cause harm, without suicidal reasons/motives (i.e., differentiated NSSI from suicidal thoughts/behaviors and from DSH), (3) adequate data for computing an effect size could be extracted from the report or from the author(s) of the report, and (4) the report was written in English.

Four systematic search strategies were employed to discover all pertinent studies published or presented through July 2012 (see Figure 1 for results). First, keywords were entered into four electronic databases: PsycINFO, Medline, SocINDEX, and ERIC. This search included a total of 83 NSSI keywords (e.g., NSSI, self-injury) and 36 sexual orientation keywords (e.g., gay, queer; see Appendix A for complete list of keywords). Second, the reference sections of the identified manuscripts meeting the inclusion criteria described above were examined for additional relevant studies. Third, forward searching via the Web of Science Cited Reference Index was utilized to detect additional studies that cited the included reports. Finally, experts in the NSSI field were contacted for access to unpublished data (e.g., conference presentations, manuscripts in press or not yet submitted for publication).

Screening for Eligible Studies

A total of 492 abstracts that included at least one NSSI term and one sexual orientation term were identified through the electronic database searches. Two trained members of the

research team reviewed the studies' abstracts (the first author reviewed all identified abstracts). Full-text copies of manuscripts were obtained for further evaluation if either reviewer identified an abstract as potentially relevant.

Four hundred forty one studies (89.6% of identified abstracts) were excluded based on (a) terminology inconsistent with the aims of this research (e.g., use of the term "cutting edge" that did not relate to NSSI), (b) foreign language, (c) conceptual papers lacking data, (d) assessments conflating suicidality and NSSI or failing to assess intent (e.g., DSH), and one meta-analytic review (King et al., 2008) (see Figure 1). Fifty-one studies that included at least one sexual orientation term and at least one NSSI term were identified for further review. Of these, fifty manuscripts were examined further (one dissertation could not be retrieved; Stevens, 2006).

The next step entailed systematically reviewing the methods and results section of the articles (i.e., the 50 studies identified in the previous step). At this stage, 39 studies were excluded based on the following: (a) intent of behavior was unclear or the NSSI term included both non-suicidal and suicidal behaviors (18 studies), (b) the NSSI term described a suicide attempt (4 studies), (c) the report described a qualitative study lacking numerical data (6 studies), (d) the self-destructive behavior described was not consistent with NSSI (e.g., eating disorders, poor hygiene; 4 studies), (e) no NSSI-related data available for LGBQ participants specifically (3 studies), and (f), no heterosexual comparison group (4 studies).

Next, we used reference chasing to examine the reference sections of the 11 identified manuscripts, which yielded one additional study (Oswalt & Wyatt, 2011). Forward searching was then employed and two additional studies were identified (Gollust, Eisenberg, & Golberstein, 2008; Wilcox, Arria, Caldeira, Pinchevsky, & O'Grady, 2012). Finally, three unpublished studies were included after presentations of relevant data at an international self-

injury conference (Muehlenkamp, Swenson, Batejan, & Jarvi, 2013; Silva, Monahan, Hagan, & Joiner, 2012) and contact with experts in NSSI (Wester, 2012). This left a total of 17 reports describing 15 studies involving original data. The article by Whitlock, Eckenrode, and Silverman (2006) included the same dataset presented in Whitlock and Knox (2007) and were treated as a single study in this meta-analytic review. Similarly, the article by Balsam, Lehavot, and Beadnell (2011) reported on a dataset previously included in Balsam, Beauchaine, Mickey, and Rothblum (2005) and was treated as a single study in this meta-analysis.

Data Extraction and Analysis

A rating system was prepared and revised several times throughout the data extraction. Variables coded included study year, first author, country, participant composition, NSSI assessment strategy, NSSI timeframe, sexual orientation assessment strategy, and prevalence of NSSI by sexual orientation designation. Table 1 presents the study-level data extracted from each report for use in the present analyses.

The NSSI outcome variables were categorical (i.e., present or absent), and the meta-analytic results were reported using an odds ratio (OR) effect size metric calculated using equations provided by Lipsey and Wilson (2001). Data on specific NSSI behaviors were generally lacking; therefore, these meta-analyses focused on presence/absence of NSSI. Effect sizes were combined using weighted random effects analyses (e.g., Borenstein, Hedges, & Rothstein, 2007; Hedges & Vevea, 1998; Lipsey & Wilson, 2001). Specifically, individual study effects were weighted by the inverse of its variance, which included the original within-study variance plus the between-studies variance tau-squared (Borenstein et al., 2007). However, power for these analyses was limited (i.e., $k = 15$). Therefore, for comparison purposes the primary analyses also included weighted effect sizes combined using fixed effects models.

The data analysis proceeded in several steps. First, the overall effect was calculated. In this analysis each study contributed one effect. For studies reporting multiple effects, preference was given to lifetime estimates over past-year estimates (e.g., Oswalt & Wyatt, 2011; see Table 1) and to self-reported sexual orientation over behavioral indices (i.e., Chakraborty, McManus, Brugha, Bebbington, & King, 2011). This analysis involved comparing NSSI among sexual minority participants to heterosexual participants. For studies that reported on distinct sexual orientation populations (e.g., lesbians, bisexuals; e.g., Kokaliari, 2005), prevalence was calculated for the sexual minority participants as a whole prior to meta-analyses.

Second, methodological characteristics were tested as moderators of the overall effect by estimating $Q_{between}$, using procedures analogous to analysis of variance (Lispey & Wilson, 2001; see also Card, Stucky, Sawalani, & Little, 2008). A significant $Q_{between}$ indicates moderation of the overall effect. For these analyses five methodological characteristics were examined: publication status (i.e., published, unpublished), publication date (i.e., 2005–2010, 2011–2012), NSSI assessment timeframe (i.e., life-time, past year), sexual orientation assessment (i.e., self-report, behavior/attraction), and sample studied (i.e., adolescent, college student, adult).

Nine of the 15 studies also included NSSI data for specific sexual orientation populations. For exploratory purposes, the third set of analyses estimated the effect of sexual orientation and NSSI for these specific populations in an effort to identify whether particular populations demonstrated particular increased odds for engaging in NSSI. Given the relatively small number of studies available for this set of analyses, additional moderation of effects (e.g., publication status) was not examined.

Results

As mentioned previously, the literature search yielded 17 reports describing 15 studies included in the meta-analyses (Table 1). Before presenting the results, we briefly discuss general characteristics of the retained reports. Eleven studies came from published journal articles; the four unpublished studies included one doctoral dissertation (Kokaliari, 2005), one conference presentation (Silva et al., 2012), one undergraduate thesis (Wester, 2012), and one unpublished dataset (Muehlenkamp et al., 2013). Fourteen of the studies were conducted in the United States; the one exception was conducted in England (Chakraborty et al., 2011). Six of the reports were published/prepared 2005–2010, and nine of the reports were published/prepared in 2011–2012; we did not find any reports published/prepared prior to 2005 that met inclusion criteria.

The studies varied in terms of populations studied: three studies focused on adolescents (Bakken & Gunter, 2012; Deliberto & Nock, 2008; Kidd, White, & Johnson, 2012), 10 studies focused on undergraduate students (Kokaliari, 2005; Muehlenkamp et al., 2012; Serras, Saules, Cranford, & Eisenberg, 2010; Silva et al., 2012; Wester, 2012; Whitlock et al., 2006 [see also Whitlock & Knox, 2007]; Whitlock et al., 2011; Wilcox, Arria, Caldeira, Pinchevsky, & O'Grady, 2012) or undergraduate and graduate students (Gollust, Eisenberg, & Golberstein, 2008; Oswalt & Wyatt, 2011), and two studies focused on adults (Balsam et al., 2005 [see also Balsam et al., 2011]; Chakraborty et al., 2011). All of the studies involved community-based samples with the exception of Deliberto and Nock (2008), which involved a mixed sample of adolescents recruited from the community and from outpatient treatment centers. Self-reported sexual orientation was the primary method of assessing orientation although one study assessed same- and opposite-sex sexual behavior (Chakraborty et al., 2011) and two studies assessed same- and opposite-sex attraction (Wester, 2012; Whitlock et al., 2011). With regard to NSSI, one study presented findings for past-month NSSI (Gollust et al., 2008), three studies presented

findings for past-year NSSI (Bakken & Gunter, 2012; Kidd et al., 2012; Serras et al., 2010), two studies presented findings for both past-year and lifetime NSSI (Oswalt & Wyatt, 2011; Silva et al., 2012), and the remaining nine studies presented findings for lifetime NSSI only (Balsam et al., 2011; Chakraborty et al., 2011; Deliberto & Nock, 2008; Kokaliari, 2005; Muehlenkamp et al., 2012; Wester, 2012; Whitlock et al., 2006; Whitlock et al., 2011; Wilcox et al., 2012).

Sexual Orientation and NSSI

The 15 studies yielded information on 7,147 sexual minority participants and 61,701 heterosexual participants. On average, 40.5% of the sexual minority participants reported a history of NSSI (ranging from 8.6% [Chakraborty et al., 2011] to 75% [Kokaliari, 2005]), compared to a prevalence estimate of 24.4% of heterosexual participants (ranging from 4.6% [Chakraborty et al., 2011] to 75% [Wester, 2012]). The overall weighted effect size for the relationship between sexual orientation and NSSI using a random-effects model was OR = 3.00 (95% CI = 2.46 – 3.66), indicating a medium-to-large effect. The overall weighted effect size using a fixed-effects model was comparable (OR = 3.17, 95% CI = 2.98 – 3.36). Study-level effects ranged from .27 (Wester, 2012) to 6.34 (Bakken & Gunter, 2012); effect sizes for the remaining 13 studies ranged from 2.22 (Balsam et al., 2005) to 4.40 (Deliberto & Nock, 2008) (see Figure 2). Removing the smallest effect (Wester, 2012) produced a re-estimated overall weighted random effect OR = 3.09 (95% CI = 2.54 – 3.75). Removing the largest effect (Bakken & Gunter, 2012) produced a re-estimated overall weighted random effect OR = 2.76 (95% CI = 2.39 – 3.19). Regardless of which study was removed, the overall effect remained moderate-to-large and significant. In sum, findings indicate that the odds of engaging in NSSI are approximately three times greater for sexual minorities compared to heterosexual participants.

Two approaches were used to evaluate publication bias. First, Rosenberg's weighted Fail-safe N test (Rosenberg, 2005) indicated that 110 missing studies with null effects would be needed to reduce the overall effect to a small effect (i.e., OR = 1.50). A total of 5,331 missing studies with null effects would be needed to reduce the overall *p* value to > .05 (i.e., OR = 1). Both of these numbers exceed the recommended threshold value $N_{minimum} = 5k + 10$ (i.e., 85) (Rosenthal, 1979), suggesting that publication bias does not likely threaten the meta-analytic results of this review. In addition, we also plotted effect size estimates against the inverse of the standard error (Rothstein & Bushman, 2012); this funnel plot (available from the first author) was symmetrical and provides further support to refute the threat of publication bias.

Moderation of the Association Between Sexual Orientation and NSSI

Significant heterogeneity in effects was evident, $Q_{Total}(14) = 88.85$, $p < .001$. This finding supports the systematic examination of the moderating influence of the five methodological characteristics mentioned previously (i.e., publication status, publication date, NSSI assessment timeframe, sexual orientation assessment, and sample studied). The results of these analyses are presented in Table 2.

Under the assumption of fixed-effects, publication date, NSSI assessment timeframe, and sexual orientation assessment were found to significantly moderate the overall effect (i.e., $Q_{Between}$ *p*-value < .05). The effect was slightly smaller among older studies (i.e., dated 2005–2010) compared to recent studies (2011–2012), for lifetime NSSI compared to past year NSSI, and for behavioral/attraction-based assessments of sexual orientation compared to self-reported sexual orientation (see Table 2). However, these methodological characteristics were not found to moderate the overall effect under random-effects assumptions (see Table 2). These findings could be interpreted as "trends."

Importantly, under both fixed- and random-effects assumptions, the effect of sexual orientation on NSSI was found to be statistically significantly increased among adolescent samples compared to college student populations and to adult samples. In addition, the effect observed for college students was significantly increased compared to adult samples. The number of effects available for this analysis was small (i.e., $k = 3$ for adolescents, $k = 2$ for adults compared to $k = 10$ for college students), but overall this finding suggests that sexual minority adolescents in particular are at particular risk for NSSI, with overall risk compared to heterosexual populations decreasing (but remaining statistically significant) with age. In addition, it should also be noted that publication status (i.e., published vs. unpublished) was not a significant moderator of effects ($p > .05$ for both fixed- and random-effects models). This further suggests that potential publication bias or failure to retrieve relevant studies is not likely a threat to the results of these meta-analyses.

Association of Sexual Orientation and NSSI for Specific Sexual Orientation Populations

Nine of the 15 identified studies provided sufficient information to calculate overall weighted effects sizes of the association between sexual orientation and NSSI for specific sexual orientation comparisons (the effect from Whitlock et al. [2011] involving "mostly gay/lesbian" participants and the effect from Serras et al. [2010] involving gay/lesbian/queer participants were excluded from these analyses). These findings are presented in Table 3. These results suggest that the odds of engaging in NSSI are increased for bisexual participants compared to heterosexual participants, gay/lesbian participants, and to participants who identify as "questioning" or do not identify with a specific sexual orientation label (i.e., "other"). In addition, participants identified as "questioning/other" demonstrated increased risk compared to heterosexual participants and to gay/lesbian participants. However, the odds of engaging in NSSI

among gay/lesbian populations specifically were 1.91 times the odds of engaging in NSSI for heterosexual populations. Given the small number of studies available for these analyses, systematically examining moderation of these effects was not undertaken.

Discussion

This meta-analysis aggregated findings from over 7,000 sexual minorities and over 61,000 heterosexual individuals across 15 studies. Although there was considerable methodological variability across studies, we found that sexual minority individuals are at significantly greater risk for engaging in NSSI compared to heterosexual individuals. Prior research has illustrated that sexual minority individuals are at increased risk for a number of high-risk behaviors and psychological disorders, including substance use (e.g., King et al., 2008; Marshal, Friedman, Stall, & Thompson, 2009; Robin et al., 2002), suicidal behaviors (e.g., Eisenberg & Resnick, 2006; Garofalo, Wolf, Wissow, Woods, & Goodman, 1999; Jorm, Korten, Rodgers, Jacomb, & Christensen, 2002; Robin et al., 2002; King et al., 2008; Marshal et al., 2011), and depression (e.g., Jorm et al., 2002; King et al., 2008; Marshal et al., 2011). It seems logical, then, that sexual minority individuals would also be at increased risk for a high-risk behavior like NSSI. According to minority stress theory, the experience of stress among sexual minorities, such as discrimination and prejudice, may lead to detrimental mental health effects and at-risk behaviors such as NSSI (Meyer, 2003).

In addition to general risk associated with LGBQ identity, the results of this meta-analysis show that bisexual individuals are at higher risk for engaging in NSSI compared to heterosexual, gay/lesbian, and questioning/other individuals. Bisexuals may face additional stressors compared to gay and lesbian individuals. Specifically, the experience of biphobia (i.e., prejudice towards bisexual individuals) and monosexism (i.e., only single gender orientations are

legitimate) can detrimentally affect bisexuals leading to issues with self-esteem, identify conflict, and mental health (Ross, Dobinson, & Eady, 2010; Volpp, 2010). Bisexual individuals may face stressors unique to them, including feeling a lack of support from both heterosexual and gay/lesbian communities, considered a "doubly stigmatized identity" (Ross et al., 2010, p. 501), putting them at greater risk than both groups (Fredriksen-Goldsen, Kim, Barkan, Balsam, & Mincer, 2010; Loosier & Dittus, 2010). Although this meta-analysis demonstrated an increased risk for NSSI among bisexual individuals, other research has found similar results pertaining to at-risk and high-risk behaviors among bisexual individuals. For example, bisexual high school students were five times more likely to attempt suicide compared to their gay and lesbian counterparts (Robin et al., 2002). Similarly, bisexual youth reported worse mental health outcomes including depressive symptoms, suicidal thoughts, drinking, and delinquency when compared to heterosexual and gay/lesbian youth (Loosier & Dittus, 2010). Thus, bisexual individuals may be among the most at-risk sexual minorities for mental health concerns.

Questioning/other individuals were also found to be at a higher risk for engaging in NSSI compared to both heterosexual and gay/lesbian individuals. Less research has examined mental health outcomes and risk-taking behaviors among this population, as this identity tends to be less endorsed compared to other identities in the historical literature. It can be posited that individuals questioning their sexual orientation may be at higher risk for NSSI because their identities are undetermined, which may be stressful and confusing. Or, because these individuals have not identified with a specific sexual orientation, their experiences may be similar to the experiences bisexuals reportedly have in relation to heterosexual and gay/lesbian communities (i.e., non-acceptance by either).

This meta-analysis also found that sexual minority youth are at particularly higher risk for engaging in NSSI compared to sexual minority adults. LGBQ youth are coming out at an earlier age compared to adolescents 30 years ago (Riley, 2010) and may therefore experience more stressors related to and negative reactions from disclosing their sexual orientations. For instance, one study found that younger age was correlated with more suicide attempts and self-harm behaviors in a sexual minority population (House, Van Horn, Coppeans, & Stepleman, 2011). On the other hand, LGBQ adolescents may still be navigating their sexual identities, and therefore remain closeted to prevent disclosure among potentially unsupportive people (e.g., parents). Remaining closeted during adolescence can have adverse impacts on mental health (e.g., feelings of isolation/loneliness) and create interpersonal difficulties (e.g., fear of rejection or ridicule; Riley, 2010). Coming out during adolescence, however, may in turn reduce emotional distress, such as isolation, and thereby other risk factors such as NSSI (Ford, 2003). As NSSI tends to be most prevalent among adolescents and young adults in general (Jacobson & Gould, 2007), it is not surprising then, that NSSI would be higher among LGBQ adolescents.

The majority of the data used for this meta-analysis was taken from community samples; therefore, these results may be generalizable to other samples of at-risk sexual minorities. Also, the literature search conducted to support this meta-analysis did not find any studies fitting our inclusion criteria that were published/prepared prior to 2005, suggesting that examining NSSI among sexual minorities is a newer interest in the field. However, the study of NSSI itself is not a considerably new field, nor is the mental health of sexual minorities. It is important to note that some studies may have touched upon NSSI among sexual minorities before 2005 but were excluded from our sample for a number of reasons (e.g., combined data with suicide, qualitative studies). Results suggest that further research and clinical attention in this area is sorely needed

to address ways in which LGBQ individuals can cope with stressors that may be associated with a sexual minority identity. Further, it is crucial that equality for sexual minority individuals is established to combat the prejudice and discrimination that homophobia and heterosexism continue to fuel in our society.

Limitations

A few limitations warrant mention in consideration of the results presented. First, we did not include data from manuscripts or unpublished reports that were not written in English. Second, among the 18 studies not included in these analyses due to unclear intent of the behavior studied (e.g., DSH) and those studies that combined suicidal and non-suicidal behavior, some NSSI data may have been lost. In regards to methods, we utilized a categorical (i.e., presence or absence of NSSI) variable for analyses. Although this approach was necessary given the data available for analyses, we were unable to look at specific types of NSSI behavior, or examine differences in severity of NSSI (e.g., frequency, course/duration, number of methods, damage to body). It is worth noting the heterosexual population's NSSI prevalence of 24.4% is slightly higher than what is typically seen in community populations (e.g., 5.9% in adults [Klonsky, 2011], 15 – 19% among college students [Glenn & Klonsky, 2011], and up to 30% of adolescents [Muehlenkamp, Walsh, & McDade, 2010]). This could partly be a result of collapsing studies that employed varied measures assessing different types of NSSI (e.g., wound picking, burning) into a single dichotomous indicator. Third, given the nature of the literature included in the analyses we were unable to look at additional variables, such as psychiatric diagnoses (e.g., Borderline Personality Disorder which is often comorbid with NSSI; Zanarini et al., 2013; see also Ploderl, Kralovec, & Fartacek, 2010), that may have affected relations between sexual orientation and NSSI. Further, although exhaustive efforts were undertaken to

identify all relevant published and unpublished research on the association between sexual orientation and NSSI, the relatively small number of studies identified (i.e., $k = 15$) reduced power for analyses.

Implications and Future Directions

While these findings demonstrate a considerably increased risk for NSSI among individuals identifying themselves as a sexual minority, many important questions remain unanswered. NSSI has been associated with increased morbidity and suicidality (Andover, Morris, Wren, & Bruzzese, 2012), and prior research has demonstrated an association between sexual orientation and suicidality (King et al., 2008; Marshall et al., 2011). However, the mechanisms potentially linking sexual orientation, NSSI, and suicidality are unknown and merit immediate attention. Also, the present research found that risk for NSSI was not uniform across sexual orientation identities/labels; therefore, future research in these domains will benefit from querying sexual orientation by asking questions about identity, attraction, and behavior, as each of these components of sexual orientation and identity may elicit different responses (e.g., identification as "straight" plus endorsement of same-sex sexual behavior; Igartua, Thombs, Burgos, & Montor, 2009). Relatedly, it will also be important to separate sexual minority identities (e.g., gay vs. bisexual), so as not to combine these categories under a larger 'homosexual' group (Fredriksen-Goldsen et al., 2010), as meaningful differences may be lost if the assumption is made that all non-heterosexual individuals are similar. Individuals identifying as lesbian, gay, bisexual, or questioning/other are unique groups and display different levels of risk, specifically risk for NSSI.

Considerable efforts should be made in developing NSSI interventions that will be acceptable to and meaningful for sexual minorities. As this meta-analysis shows sexual minority

adolescents are most at-risk for NSSI, it is crucial to specifically target this group for intervention and treatment. From the literature, NSSI is most prevalent during adolescence and the behaviors typically decrease over time (see Jacobson & Gould, 2007), yet engaging in NSSI can increase adolescents' risk for engaging in other behaviors such as suicide (Andover et al., 2012). The combined risk of being a sexual minority adolescent and engaging in NSSI during adolescence puts this adolescent at a significant risk, which can also lead to other high-risk behaviors and mental health concerns.

In sum, these findings highlight the need to explicitly examine mechanisms linking sexual orientation and NSSI in future research. Such research, building on the findings of the current meta-analyses, has the potential to add understanding of associations between sexual orientation, NSSI, and suicidality and may highlight particularly relevant targets for prevention and intervention.

References

*References marked with an asterisk indicate studies included in the meta-analysis.

Alexander, N., & Clare, L. (2004). You still feel different: The experience and meaning of women's self-injury in the context of a lesbian or bisexual identity. *Journal of Community & Applied Social Psychology, 14,* 70-84. doi:10.1002/casp.764

Andover, M. S., Morris, B. W., Wren, A., & Bruzzese, M. E. (2012). The co-occurrence of non-suicidal self-injury and attempted suicide among adolescents: Distinguishing risk factors and psychosocial correlates. *Child and Adolescent Psychiatry and Mental Health, 6,* 11. doi:10.1186/1753-2000-6-11

Bagley, C., & Tremblay, P. (2000). Elevated rates of suicidal behavior in gay, lesbian, and bisexual youth. *Crisis, 21,* 111-117. doi:10.1027//0227-5910.21.3.111

*Bakken, N. W., & Gunter, W. D. (2012). Self-cutting and suicidal ideation among adolescents: Gender differences in the causes of correlates of self-injury. *Deviant Behavior, 33,* 339-356. doi:10.1080/01639625.2011.584054

*Balsam, K. F., Beauchaine, T. P., Mickey, R. M., & Rothblum, E. D. (2005). Mental health of lesbian, gay, bisexual, and heterosexual siblings: Effects of gender, sexual orientation, and family. *Journal of Abnormal Psychology, 114,* 471-476. doi:10.1037/0021-843X.114.3.471

*Balsam, K. F., Lehavot, K., & Beadnell, B. (2011). Sexual revictimization and mental health: A comparison of lesbians, gay men, and heterosexual women. *Journal of Interpersonal Violence, 26,* 1798-1814. doi:10.1177/0886260510372946

Borenstein, M., Hedges, L., & Rothstein, H. (2007). *Meta-Analysis: Fixed effect vs. random effect.* Retrieved January 10, 2013, from http://www.meta-analysis.com/downloads/Meta-analysis%20fixed%20effect%20vs%20random%20effects_orig.pdf.

Boxer, P. (2010). Variations in risk and treatment factors among adolescents engaging in different types of deliberate self-harm in an inpatient sample. *Journal of Clinical Child & Adolescent Psychology, 39,* 470-480. doi:10.1080/15374416.2010.486302

Briere, J., & Gil, E. (1998). Self-mutilation in clinical and general population samples: Prevalence, correlates, and functions. *American Journal of Orthopsychiatry, 68,* 609-620. doi:10.1037/h0080369

Card, N. A., Stucky, B. D., Sawalani, G. M., & Little, T. D. (2008). Direct and indirect aggression during childhood and adolescence: A meta-analytic review of gender-differences, intercorrelations, and relations to maladjustment. *Child Development, 79,* 1185-1229. doi:10.1111/j.1467-8624.2008.01184.x

*Chakraborty, A. McManus, S., Brugha, T. S., Bebbington, P., & King, M. (2011). Mental health of the non-heterosexual population of England. *The British Journal of Psychiatry, 198,* 143-148. doi:10.1192/bjp.bp.110.082271

Darche, M. (1990). Psychological factors differentiating self-mutilating and non-self-mutilating adolescent inpatient females. *Psychiatric Hospital, 21,* 31–35.

D'Augelli, A. R., Hershberger, S. L., & Pilkington, N. W. (2001). Suicidality patterns and sexual orientation-related factors among lesbian, gay, and bisexual youths. *Suicide and Life-Threatening Behavior, 31,* 250-264. doi:10.1521/suli.31.3.250.24246

*Deliberto, T. L., & Nock, M. K. (2008). An exploratory study of correlates, onset, and offset of non-suicidal self-injury. *Archives of Suicide Research, 12,* 219-231. doi:10.1080/13811110802101096

DiClemente, R. J., Ponton, L. E., & Hartley, D. (1991). Prevalence and correlates of cutting behavior: Risk for HIV transmission. *Journal of the American Academy of Child and Adolescent Psychiatry, 30,* 735-739. doi:10.1097/00004583-199109000-00006

Eisenberg, M. E., & Resnick, M. D. (2006). Suicidality among gay, lesbian and bisexual youth: The role of protective factors. *Journal of Adolescent Health, 39,* 662-668. doi:10.1016/j.jadohealth.2006.04.024

Fergusson, D. M., Horwood, J., & Beautrais, A. L. (1999). Is sexual orientation related to mental health problems and suicidality in young people? *Archives of General Psychiatry, 56,* 876-880. doi:10.1001/archpsyc.56.10.876

Ford, V. E. (2003). Coming out as lesbian or gay: A potential precipitant of crisis in adolescence. *Journal of Human Behavior in the Social Environment, 8,* 93-110. doi:10.1300/J137v8n02_06

Fredriksen-Goldsen, K. I., Kim, H., Barkan, S. E., Balsam, K. F., & Mincer, S. L. (2010). Disparities in health-related quality of life: A comparison of lesbians and bisexual women. *American Journal of Public Health, 100,* 2255-2261. doi:10.2105/AJPH.2009.177329

Garofalo, F., Wolf, C., Wissow, L. S., Woods, E. R., & Goodman, E. (1999). Sexual orientation and risk of suicide attempts among a representative sample of youth. *Archives of Pediatric Adolescent Medicine, 153,* 487-493.

Garrison, C. Z., Addy, C. L., McKeown, R. E., Cuffe, S. P., Jackson, K. L., & Waller, J. L. (1993). Nonsuicidal physically self-damaging acts in adolescents. *Journal of Child and Family Studies, 2,* 339-352. doi:10.1007/BF01321230

Glenn, C. R., & Klonsky, E. D. (2009). Social context during non-suicidal self-injury indicates suicide risk. *Personality and Individual Differences, 46,* 25-29. doi:10.1016/j.paid.2008.08.020

Glenn, C., & Klonsky, E. (2010). A multimethod analysis of impulsivity in nonsuicidal self-injury. *Personality Disorders: Theory, Research, and Treatment, 1,* 67–75. doi:10.1037/a0017427

Glenn, C. R. & Klonsky, E. D. (2011). Prospective prediction of non-suicidal self-injury: A one-year longitudinal study in young adults. *Behavior Therapy, 42,* 751-762. doi: 10.1016/j.beth.2011.04.005

*Gollust, S. E., Eisenberg, D., & Golberstein, E. (2008). Prevalence and correlates of self-injury among university students. *Journal of American College Health, 56,* 491-497. doi:10.3200/JACH.56.5.491-498

Hedges, L. V., & Vevea, J. L. (1998). Fixed- and random-effects models in meta-analysis. *Psychological Methods, 3,* 486-504. doi:10.1037/1082-989X.3.4.486

Hilt, L., Nock, M., Lloyd-Richardson, E., & Prinstein, J. (2008). Longitudinal study of non-suicidal self-injury among young adolescents: Rates, correlates, and preliminary test of an interpersonal model. *Journal of Early Adolescence, 28,* 455-469. doi:10.1177/0272431608316604

House, A. S., Van Horn, E., Coppeans, C., & Stepleman, L. M. (2011). Interpersonal trauma and discriminatory events as predictors of suicidal and nonsuicidal self-injury in gay, lesbian,

bisexual, and transgender persons. *Traumatology, 12,* 75-85. doi:10.1177/1534765610395621

Igartua, K., Thombs, B. D., Burgos, G., & Montor, R. (2009). Concordance and discrepancy in sexual identity, attraction, and behavior among adolescents. *Journal of Adolescent Health, 45,* 602-608. doi:10.1016/j.jadohealth.2009.03.019

Jacobson, C. M., & Gould, M. (2007). The epidemiology and phenomenology of non-suicidal self injurious behavior among adolescents: A critical review of the literature. *Archives of Suicide Research, 11,* 129-147. doi:10.1080/13811110701247602

Jacobson, C., Muehlenkamp, J., Miller, A., & Turner, J. (2008). Psychiatric impairment among adolescents engaging in different types of deliberate self-harm. *Journal of Clinical Child & Adolescent Psychology, 37,* 363–375. doi:10.1080/15374410801955771

Jorm, A. F., Korten, A. E., Rodgers, B., Jacomb, P. A., & Christensen, H. (2002). Sexual orientation and mental health: Results from a community survey of youth and middle-aged adults. *The British Journal of Psychiatry, 180,* 423-427. doi:10.1192/bjp.180.5.423

*Kidd, J. D., White, J. L., & Johnson, R. M. (2012). Mental health service contacts among sexual minority and heterosexual girls in Boston public high schools. *Journal of Gay & Lesbian Mental Health, 16,* 111-123. doi:10.1080/19359705.2012.653907

King, M., Semlyen, J., Tai, S. S., Killaspy, H., Osborn, D., Popelyuk,. D., & Nazareth, I. (2008). A systematic review of mental disorder, suicide, and deliberate self harm in lesbian, gay and bisexual people. *BMC Psychiatry, 8,* 70. doi:10.1186/1471-244X-8-70

Klonsky, E. D. (2011). Non-suicidal self-injury in United States adults: Prevalence, sociodemographics, topography and functions. *Psychological Medicine, 41*, 1981-1986. doi:10.1017/S0033291710002497

Klonsky, E., & Olino, T. (2008). Identifying clinically distinct subgroups of self-injurers among adults: A latent class analysis. *Journal of Consulting and Clinical Psychology, 76,* 22–27. doi:10.1037/0022-006X.76.1.22

*Kokaliari, E. D. (2005). Deliberate self-injury: An investigation of the prevalence and psychosocial meanings in a nonclinical female college population. (Doctoral Dissertation). Retrieved from PsycInfo. (AAI3154935).

Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis.* Thousand Oaks, CA: Sage.

Loosier, P. S., & Dittus, P. J. (2010). Group differences in risk across three domains using an expanded measure of sexual orientation. *Journal of Primary Prevention, 31,* 261-272. doi:10.1007/s10935-010-0228-2

Lloyd-Richardson, E., Perrine, N., Dierker, L., & Kelley, M. (2007). Characteristics and functions of non-suicidal self-injury in a community sample of adolescents. *Psychological Medicine, 37,* 1183-1192. doi:10.1017/S003329170700027X

Marshal, M. P., Dietz, L. J., Friedman, M. S., Stall, R., Smith, H. A., McGinley, J., . . . Brent, D. A. (2011). Suicidality and depression disparities between sexual minority and heterosexual youth: A meta-analytic review. *Journal of Adolescent Health, 49,* 115-123. doi:10.1016/j.jadohealth.2011.02.005

Marshal, M. P., Friedman, M. S., Stall, R., & Thompson, A. L. (2009). Individual trajectories of substance use in lesbian, gay and bisexual youth and heterosexual youth. *Addiction, 104,* 974-981. doi:10.1111/j.1360-0443.2009.02531.x

McDermott, E., Roen, K., & Scourfield, J. (2008). Avoiding shame: Young LGBT people, homophobia and self-destructive behaviours. *Culture, Health & Sexuality, 10,* 815-829. doi:10.1080/13691050802380974

McIntosh, J. L. (for the American Association of Suicidology). (2012). *U.S.A. suicide: 2009 official final data.* Washington, DC: American Association of Suicidology, dated January 12, 2012, downloaded from http://www.suicidology.org.

Meyer, I. H. (1995). Minority stress and mental health in gay men. *Journal of Health and Social Behavior, 36,* 38-56. doi:10.2307/2137286

Meyer, I. H. (2003). Prejudice, social stress, and mental health in lesbian, gay and bisexual populations: Conceptualization issues and research evidence. *Psychological Bulletin, 129,* 674-697. doi:10.1037/0033-2909.129.5.674

Muehlenkamp, J., Claes, L., Havertape, L., & Plener, P. (2012). International prevalence of adolescent non-suicidal self-injury and deliberate self-harm. *Child and Adolescent Psychiatry and Mental Health, 6,* 10. doi:10.1186/1753-2000-6-10

Muehlenkamp, J. J., & Gutierrez, P. M. (2004). An investigation of differences between self-injurious behavior and suicide attempts in a sample of adolescents. *Suicide and Life-Threatening Behavior, 34,* 12-23. doi:10.1521/suli.34.1.12.27769

Muehlenkamp, J. J., & Gutierrez, P. M. (2007). Risk for suicide attempts among adolescents who engage in non-suicidal self-injury. *Archives of Suicide Research, 11,* 69-82. doi:10.1080/13811110600992902

*Muehlenkamp, J. J., Swenson, L. S., Batejan, K. B., & Jarvi, S. M. (2013). *Participating in NSSI survey research: Affective reactions and urges to self-injure.* Manuscript in preparation.

Muehlenkamp, J. J., Walsh, B. W., & McDade, M. (2010). Preventing non-suicidal self-injury in adolescents: The signs of self-injury program. *Journal of Youth and Adolescence, 39*, 306-314. doi: 10.1007/s10964-009-9450-8

Nock, M. K. (2009). Why do people hurt themselves? New insights in the nature and functions of self-injury. *Current Directions in Psychological Science, 18,* 78-83. doi:10.1111/j.1467-8721.2009.01613.x

Nock, M. K., & Favazza, A. R. (2009). Nonsuicidal self-injury: Definition and classification. In M. K. Nock (Ed.), *Understanding nonsuicidal self-injury: Origins, assessment, and treatment* (pp. 9-18). Washington, DC: American Psychological Association.

Nock, M. K., & Cha, C. B. (2009). Psychological models of nonsuicidal self-injury. In M. K. Nock (Ed.), *Understanding nonsuicidal self-injury: Origins, assessment, and treatment* (pp. 65-77). Washington, DC: American Psychological Association.

Nock, M. K., & Prinstein, M. J. (2004). A functional approach to the assessment of self-mutilative behavior. *Journal of Consulting and Clinical Psychology, 72,* 885-890. doi:10.1037/0022-006X.72.5.885

Nock, M. K., & Prinstein, M. J. (2005). Contextual features and behavioral functions of self-mutilation among adolescents. *Journal of Abnormal Psychology, 114,* 140-146. doi:10.1037/0021-843X.114.1.140

*Oswalt, S. B., & Wyatt, T. J. (2011). Sexual orientation and differences in mental health, stress, and academic performance in a national sample of U.S. college students. *Journal of Homosexuality, 58,* 1255-1280. doi:10.1080/00918369.2011.605738

Ploderl, M., Kralovec, K., & Fartacek, R. (2010). The relation between sexual orientation and suicide attempts in Austria. *Archives of Suicide Behavior, 39,* 1403-1414. doi: 10.1007/s10508-009-9597-0

Riley, B. H., (2010). GLB adolescent's "coming out." *Journal of Child and Adolescent Psychiatric Nursing, 23,* 3-10. doi:10.1111/j.1744-6171.2009.00210.x

Rivers, I. (2002). Developmental issues for lesbian and gay youth. In A. Coyle & C. Kitzinger (Eds.), *Lesbian and gay psychology: New perspectives* (pp. 30-44). Malden, MA: Blackwell Publishing.

Robin, L., Brener, N. D., Donahue, S. F., Hack, T., Hale, K., & Goodenow, C. (2002). Associations between health risk behaviors and opposite-, same-, and both-sex sexual partners in representative samples of Vermont and Massachusetts high school students. *Archives of Pediatric Adolescent Medicine, 156,* 349-355.

Rosenberg, M. S. (2005). The file-drawer problem revisited: A general weighted method for calculating fail-safe numbers in meta-analysis. *Evolution, 59,* 464-468.

Rosenthal, R. (1979). The "file drawer problem" and tolerance for null results. *Psychological Bulletin, 86,* 638-664. doi:10.1037/0033-2909.86.3.638

Ross, L. E., Dobinson, C., & Eady, A. (2010). Perceived determinants of mental health for bisexual people: A qualitative examination. *American Journal of Public Health, 100,* 496-502. doi:10.2105/AJPH.2008.156307

Ross, S., & Heath, N. (2002). A study of the frequency of self-mutilation in a community sample of adolescents. *Journal of Youth and Adolescence, 31,* 67-88. doi:10.1023/A:1014089117419

Rothstein, H. R., & Bushman, B. J. (2012). Publication bias in psychological science: Comment on Ferguson and Brannick (2012). *Psychological Methods, 17,* 129-136. doi:10.1037/a0027128

*Serras, A. Saules, K. K., Cranford, J. A., & Eisenberg, D. (2010). Self-injury, substance use, and associated risk factors in a multi-campus probability sample of college students. *Psychology of Addictive Behaviors, 24,*119-128. doi:10.1037/a0017210

*Silva, C., Monahan, K. R., Hagan, C. R., & Joiner, T. E. (2012). Sexual orientation and non-suicidal self-injury: The role of perceived burdensomeness. Poster presented at the annual conference of the International Society for the Study of Self-Injury, Chapel Hill, NC.

Stevens, B. C. (2006). Self-reported versus implicit predictors of high-risk sexual behavior among men who have sex with men. (Doctoral Dissertation). Retrieved from PsycInfo. (AAI3195363).

Swannell, S., Martin, G., Scott, J., Gibbons, M., & Gifford, S. (2008). Motivations for self-injury in an adolescent inpatient population: development of a self-report measure. *Australian Psychiatry, 16,* 98-103. doi:10.1080/10398560701636955

Volpp, S. Y. (2010). What about the "B" in LGB: Are bisexual women's mental health issues same or different? *Journal of Gay & Lesbian Mental Health, 14,* 41-51. doi:10.1080/19359700903416016

*Wester, P. B. (2012). *Risk factors associated with non-suicidal self-injury in a LGB sample.* (Unpublished undergraduate thesis). Fordham University, NY.

*Whitlock, J., Eckenrode, J., & Silverman, D. (2006). Self-injurious behaviors in a college population. *Pediatrics, 117,* 1939-1948. doi:10.1542/peds.2005-2543

*Whitlock, J., & Knox, K. L. (2007). The relationship between self-injurious behavior and suicide in a young adult population. *Archives of Pediatric Adolescent Medicine, 161,* 634-640.

*Whitlock, J., Muehlenkamp, J., Purington, A., Eckenrode, J., Barreira, P., Abrams, G. B., … Knox, K. (2011). Nonsuicidal self-injury in a college population: General trends and sex differences. *Journal of American College Health, 59,* 691-698. doi:10.1080/07448481.2010.529626

*Wilcox, H. C., Arria, A. M., Caldeira, K. M., Vincent, K. B., Pinchevesky, G. M., & O'Grady, K. E. (2012). Longitudinal predictors of past-year non-suicidal self-injury and motives among college students. *Psychological Medicine, 42,* 717-726. doi:10.1017/S0033291711001814

Zanarini, M. C., Frankenburg, F. R., Ridolfi, M. E., Jager-Hyman, S., Hennen, J., & Gunderson, J. G. (2006). Reported childhood onset of self-mutilation among borderline patients. *Journal of Personality Disorders, 20,* 9-15. doi:10.1521/pedi.2006.20.1.9

Zanarini, M. C., Laudate, C. S., Frankenburg, F. R., Wedig, M. M., & Fitzmaurice, G. (2013). Reasons for self-mutilation reported by borderline patients over 16 years or prospective follow-up. *Journal of Personality Disorders, 27,* 783-794. doi:10.1521/pedi_2013_27_115

Zoroglu, S., Tuzun, U., Sar, V., Tutkun, H., Savas, H., Ozturk, M., . . . Kora, M. (2003). Suicide attempt and self-mutilation among Turkish high school students in relation with abuse, neglect and dissociation. *Psychiatry and Clinical Neurosciences, 57,* 119–126. doi:10.1046/j.1440-1819.2003.01

Table 1

Descriptive Statistics and Study Characteristics for Studies that Examined Non-suicidal Self-Injury (NSSI) Among Heterosexual and Sexual Minority (SM) Participants

Study	Publication Status	Sample	NSSI Timeframe	Sexual Orientation Assessment	Sexual Orientation Designation	N_{SM}	% endorsing NSSI	$N_{Heterosexual}$	% endorsing NSSI
(1) Bakken & Gunter (2012)	Published	Community Adolescents	Past Year	Orientation	SM	501	43%	6825	11%
(2) Balsam et al. (2005; see also Balsam et al., 2011)	Published	Community Adults	Lifetime	Orientation	SM	721	25%	533	13%
					Gay/Lesbian	558	21%		
					Bisexual	163	39%		
(3) Chakraborty et al. (2011)[1]	Published	Community Adults	Lifetime	Orientation	SM	650	9%	6811	5%
				Behaviors	SM	667	10%	6794	4%
(4) Deliberto & Nock (2008)	Published	Adolescents (Community & Outpatient Treatment-Seeking)	Lifetime	Orientation	SM	24	88%	70	61%

(Table 1 cont.)

Study	Publication Status	Sample	NSSI Timeframe	Sexual Orientation Assessment	Sexual Orientation Designation	N_{SM}	% endorsing NSSI	$N_{Heterosexual}$	% endorsing NSSI
(5) Gollust et al. (2008)	Published	College Students (Undergraduate & Graduate)	Past Month	Orientation	SM	141	15%	2,621	8%
					Bisexual	67	16%		
					Gay/Lesbian/Queer	74	14%		
(6) Kidd et al. (2012)	Published	Community Adolescents	Past Year	Orientation	SM	89	33%	800	8%
(7) Kokaliari (2005)	Dissertation	College Students	Lifetime	Orientation	SM	47	75%	114	47%
					Lesbian	13	92%		
					Bisexual	25	60%		
					Questioning	9	89%		
(8) Muehlenkamp et al. (2013)	Unpublished	College Students	Lifetime	Orientation	SM	36	75%	324	54%
					Gay Males[2]	4	50%		
					Bisexual	6	83%		
					Other[3]	26	77%		

(Table 1 cont.)

Study	Publication Status	Sample	NSSI Timeframe	Sexual Orientation Assessment	Sexual Orientation Designation	N_{SM}	% endorsing NSSI	$N_{Heterosexual}$	% endorsing NSSI
(9) Oswalt & Wyatt (2011)	Published	College Students (Undergraduate & Graduate)	Lifetime	Orientation	SM	1,708	36%	25,746	15%
					Gay/Lesbian	508	26%		
					Bisexual	785	45%		
					Unsure	415	32%		
			Past Year	Orientation	SM	1,708	16%	25,746	4%
					Gay/Lesbian	508	16%		
					Bisexual	785	17%		
					Unsure	415	15%		
(10) Serras et al. (2010)	Published	College Students	Past Year	Orientation	SM	313	28%	5,382	13%
					Bisexual	119	35%		
					Gay/Lesbian/Queer	148	24%		
					Other	46	24%		

(Table 1 cont.)

Study	Publication Status	Sample	NSSI Timeframe	Sexual Orientation Assessment	Sexual Orientation Designation	N_{SM}	% endorsing NSSI	$N_{Heterosexual}$	% endorsing NSSI
(11) Silva et al. (2012)[4]	Unpublished	College Students	Lifetime	Orientation	SM	25	56%	56	23%
					Gay/Lesbian	12	58%		
					Bisexual	13	54%		
			Past Year	Orientation	SM	25	28%	56	11%
					Gay/Lesbian	12	25%		
					Bisexual	13	31%		
(12) Wester (2012)	Honors Thesis	College Students	Lifetime	Self-Reported: Attraction	SM	9	44%	16	75%
(13) Wilcox et al. (2012)	Published	College Students	Lifetime	Orientation	SM	84	19%	997	6%

(Table 1 cont.)

Study	Publication Status	Sample	NSSI Timeframe	Sexual Orientation Assessment	Sexual Orientation Designation	N_{SM}	% endorsing NSSI	$N_{Heterosexual}$	% endorsing NSSI
(14) Whitlock et al. (2006; see also Whitlock & Knox, 2007)	Published	College Students	Lifetime	Self-Reported	SM	223	34%	2632	16%
					Gay/Lesbian	63	19%		
					Bisexual	84	45%		
					Questioning/Other	76	34%		
(15) Whitlock et al. (2011)	Published	College Students	Lifetime	Self-Reported: Attraction	SM	2,575	28%	8,771	12%
					Mostly Straight	1,660	27%		
					Bisexual	495	38%		
					Mostly Gay/Lesbian	152	26%		
					Gay/Lesbian	268	15%		

[1]Reported findings separately for self-reported orientation and for history of same-sex sexual behavioral.

[2]No women self-identified as lesbian.

[3]Included responses of "mostly straight/heterosexual."

[4]Reported findings separately for lifetime NSSI and for past year NSSI.

Table 2

Potential Methodological Moderators of the Meta-Analytic Association Between Sexual Orientation and Non-Suicidal Self-Injury

Moderator	*k*	Fixed Effects $Q_{Between}$	Fixed Effects OR (95% CI)	Random Effects $Q_{Between}$	Random Effects OR (95% CI)
Publication Status		.56		.41	
Unpublished	4		2.66 (1.68 – 4.21)		2.52 (1.43 – 4.45)
Published	11		3.17 (2.99 – 3.38)		3.08 (2.48 – 3.81)
Publication/Preparation Date		10.87**		1.77	
2005 – 2010	6		2.51 (2.16 – 2.92)		2.54 (1.85 – 3.49)
2011 – 2012	9		3.31 (3.10 – 3.54)		3.35 (2.59 – 4.34)
NSSI Timeframe		30.25**		2.90	
Lifetime Prevalence	9		2.72 (2.49 – 2.97)		2.56 (1.95 – 3.36)
Past Year Prevalence	6		4.26 (3.86 – 4.71)		3.79 (2.81 – 5.11)
Sexual Orientation Assessment		17.90**		2.91	
Self-Report	12		3.44 (3.19 – 3.71)		3.28 (2.62 – 4.11)
Behavior/Attraction	3		2.83 (2.56 – 3.13)		2.44 (1.57 – 3.78)
Sample		71.03***		10.15**	
Adolescents	3		6.17 (5.16 – 7.38)		5.76 (3.61 – 9.19)
College Students	10		3.00 (2.80 – 3.21)		2.75 (2.14 – 3.54)
Adults	2		2.08 (1.68 – 2.57)		2.08 (1.29 – 3.36)

Notes. Odds ratios > 1 indicate that sexual minority participants evidence higher odds of engaging in non-suicidal self-injury compared to heterosexual participants. *k* = number of studies contributing to the estimate.

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

Table 3

Meta-Analytic Associations Between Sexual Orientation and Non-Suicidal Self-Injury for Specific Sexual Orientation Comparisons

Comparison	*k*	OR (95% CI)
Gay/Lesbian vs. Heterosexual	7	1.91 (1.66 – 2.19)
Bisexual vs. Heterosexual	9	4.37 (3.95 – 4.84)
Questioning/Other vs. Heterosexual	5	2.77 (2.49 – 3.07)
Bisexual vs. Gay/Lesbian	7	2.36 (2.00 – 2.78)
Bisexual vs. Questioning/Other	5	1.65 (1.41 – 1.93)
Questioning/Other vs. Gay/Lesbian	5	1.48 (1.22 – 1.78)

Note. Odds Ratios and 95% confidence intervals were calculated using fixed effects models given the limited number of studies (*k*) available for analyses. Odds ratios > 1 indicate that the first grouping evidenced higher odds of engaging in nonsuicidal self-injury compared to the second grouping.

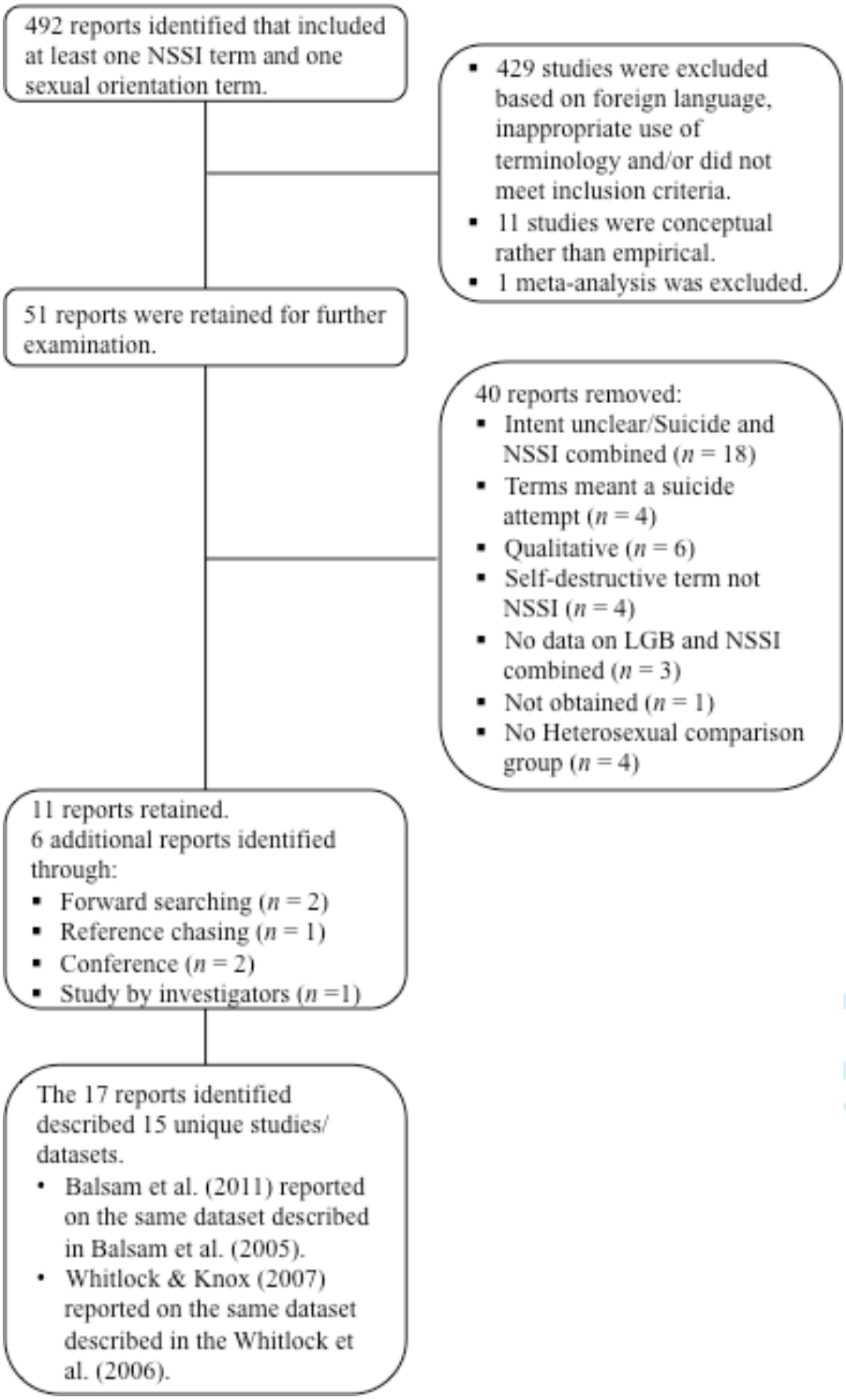

Figure 1. Flowchart describing the identification and screening of studies.

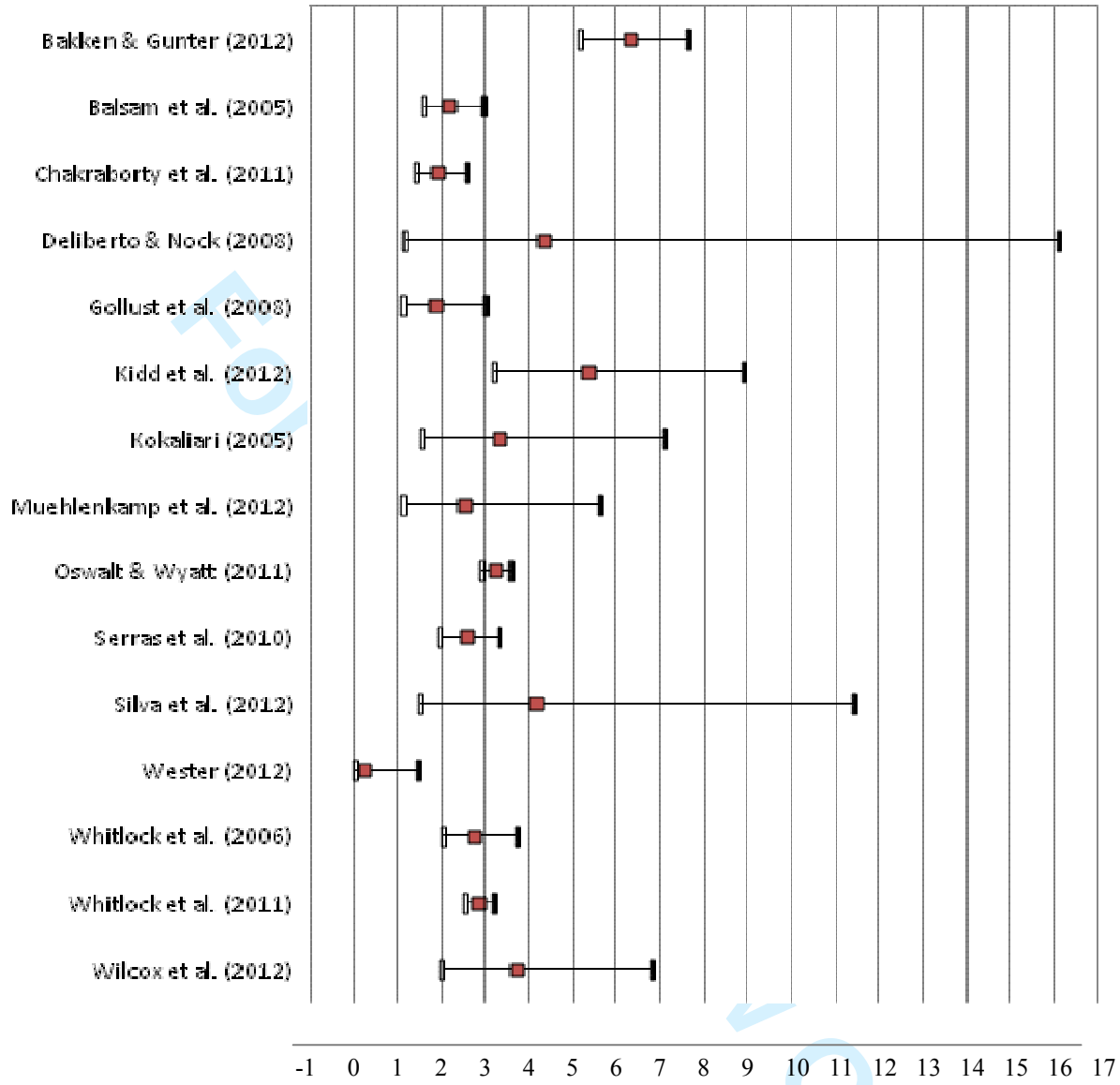

Figure 2. Odds ratios and 95% confidence intervals for studies testing the association between sexual orientation and non-suicidal self-injury. The data described in Balsam et al. (2005) was also included in Balsam, Lehavot, and Beadnell (2011). The data described in Whitlock et al. (2006) was also included in Whitlock and Knox (2007).

Appendix A

Keywords Used in the Electronic Database Search

Non-Suicidal Self-Injury Terms (n = 86)

- anti-suicide
- bone-breaking
- burning
- carving
- cutter(s)
- cutting
- deliberate self-harm
- deliberate self harm syndrome
- delicate self-cutting
- DSH
- DSH/RSM syndrome
- intentional self harm
- mutilation
- non-lethal suicide related behavior(s)
- non-suicidal self-injury
- non-suicidal self-injuries
- non-suicidal self-injurious behavior(s)
- non-suicidal self-injurious behaviour(s)
- NSSI
- NSSIB
- parasuicidal behavior(s)
- parasuicidal behaviour(s)
- parasuicide(s)
- pathological self-mutilation
- repetitive self mutilation syndrome
- self-abuse
- self-aggression
- self-cutting
- self-destructive
- self-destructive behavior(s)
- self-destructive behaviour(s)
- self-embedding
- self-hitting
- self-maltreatment
- SIB
- self-inflicted impairment
- self-inflicted injury
- self-inflicted injuries
- self-inflicted pain
- self-inflicted physical injury
- self-inflicted violence
- self-inflicted wound(s)
- self-injuries
- self-injurious behavior(s)
- self-injurious behaviour(s)
- self-injurious thoughts
- self-injury
- self-injury behavior(s)
- self-injury behaviour(s)
- self-harm
- self-mutilation
- self-mutilative behavior(s)
- self-mutilative behaviour(s)
- self-mutilator(s)
- self-poisoning
- self-violence
- self-wounding
- skin-picking
- SMB
- suicide gesture(s)
- wrist banging
- wrist cutter(s)
- wrist cutting syndrome
- wrist slashing

(Appendix A cont.)

Sexual Orientation Terms (n = 36)

bicurious	heteroflexible	lesbigay	sexual minority
bisexual(s)	homosexual(s)	men who have sex with men	sexual orientation
bisexuality	homosexuality	MSM	women who have sex with women
gay(s)	lesbian(s)	queer(s)	
GLB	LGB	same sex attracted	WSW
GLBQ	LGBQ	same sex attracted youth	
GLBS	LGBS	SSA	
GLBT	LGBT	SSAY	
GLBTQ	LGBTQ	same-sex relations	

Note. "(s)" indicates that the singular and plural version of the term was entered separately as part of the keyword search (e.g., the search strategy included both "cutter" and "cutters").