STIGMA 'GETS UNDER THE SKIN,' BUT DOES IT 'GET TO THE HEART?'
SEXUAL ORIENTATION AS A DETERMINANT OF SOCIAL RELATIONSHIP
OUTCOMES

AN ABSTRACT
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BY

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Abstract

Some past work indicates that sexual minorities may experience impaired social relationship outcomes relative to heterosexuals. However, a number of limitations of the extant literature imply the need for further work on potential social relationship disparities. Furthermore, if potential disparities are indeed confirmed, researchers should begin to investigate etiologic mechanisms, including both risk and protective factors. The primary aim of Study 1 was to gauge potential disparities in social relationship outcomes (i.e., social network size, loneliness, relationship strain and social capital) based upon sexual orientation among adults in the United States. Consistent with hypotheses, across each of these measures sexual minorities reported impaired social relationship outcomes relative to heterosexuals. Study 1 also explored whether perceived discrimination and structural discrimination may be involved in producing these disparities. Confirming hypotheses, controlling for perceived discrimination attenuated disparities across three of the four social relationship outcomes. Furthermore, among sexual minorities structural discrimination moderated the association between perceived discrimination and both social relationship strain and loneliness. The primary aim of Study 2 was to test both risk and protective factors stemming from the experience of social devaluation that may be tied to social relationship outcomes among sexual minorities. Specifically, indirect paths from perceived discrimination to social relationship strain through emotional suppression, chronic inflammation and group identification were examined. Study 2 built upon Study 1 by explicating stigma-related
variables that potentially exacerbate (suppression, inflammation) and attenuate (group identification) social relationship disparities for sexual minorities. Partial support for the proposed model was found in Study 2. While the pathway through emotional suppression was supported, there was mixed support for the pathway through chronic inflammation and poorer support for the pathway through group identification. Finally, results from these two complementary studies are synthesized and implications for public policy, programmatic interventions and efforts to build resilience among sexual minorities are discussed.
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Sexual Orientation as a Determinant of Social Relationship Outcomes

Researchers and clinicians often overlook the importance of strong, secure social relationships when evaluating overall health. Yet numerous theorists have forwarded the proposition that well-functioning social relationships are a vital component of health and well-being (e.g., Baumeister & Leary, 1995; Bowlby, 1969; Durkheim, 1951) and much empirical research has confirmed this proposition (Berkman, Glass, Brissette, & Seeman, 2000; Hawkley & Cacioppo, 2010; Robles, Slatcher, Trombello, & McGinn, 2014; Ryff & Singer, 2000). Although the term, social relationships, is sometimes used interchangeably with terms such as close relationships, personal relationships or intimate relationships, social relationships generally refer to a broader variety of interpersonal connections. For example, social relationships might encompass ties with siblings, friends, neighbors and even communities. Because interpersonal connections at multiple levels have been shown to be important for health and well-being (Kawachi & Berkman, 2001; Lin, Ye, & Ensel, 1999), the proposed research focuses on social relationships, broadly conceptualized, as the key outcome.

The close associations between social relationships and other facets of health and well-being (e.g., Berkman et al., 2000; Hawkley & Cacioppo, 2010; Robles et al., 2014; Ryff & Singer, 2000) should be of particular importance to researchers interested in upstream determinants of health (Link & Phelan, 1995). Accumulating data are
beginning to indicate potential disparities in social relationship outcomes between members of dominant and devalued groups in the United States (Hatzenbuehler, Phelan, & Link, 2013; Umberson & Montez, 2010). If social relationships are a vital component of overall health and well-being, then these potential disparities in social relationships could contribute to other health disparities between members of dominant and devalued groups, including greater mental health burdens (McGuire & Miranda, 2008; United States Department of Health and Human Services [HHS], 2014) and greater physical health burdens (Adler & Rehkopf, 2008; HHS, 2014; Williams & Mohammed, 2009).

A group for whom social relationship disparities may be especially stark is sexual minorities. Some research does suggest that, on average, sexual minorities may suffer from poorer social relationship outcomes relative to heterosexuals (e.g., Andersson, Noack, Seierstad, & Weedon-Fekjaer, 2006; Bos, Sandfort, de Bruyn, & Hakvoort, 2008; Case et al., 2004; Diamond & Lucas, 2004; Fokkema & Kuyper, 2009; Kurdek, 2004; McCallum & Golombek, 2004; Valanis et al., 2000). However, data on potential social relationship disparities based upon sexual orientation are currently limited for a number of reasons. To begin with, little is known about potential disparities within the United States. Some research has been done in other countries, such as Norway, Sweden and the Netherlands (e.g., Andersson et al., 2006; Bos et al., 2008; Fokkema & Kuyper, 2009). Yet the unique features of these societies, which are generally more accepting of sexual minority individuals and their romantic relationships (Merin, 2010), may make generalizations to the United States and other less tolerant countries somewhat
problematic. Furthermore, research on this topic has tended to focus exclusively on sexual minority youths (i.e., under 18 years of age; e.g., Bos et al., 2008; Diamond & Lucas, 2004) or sexual minority older adults (i.e., over 50 years of age; e.g., Fokkema & Kuyper, 2009; Valanis et al., 2000). Consequently, little is known about potential disparities in social relationships between sexual minority and heterosexual adults (i.e., 18-50 years of age). To address these limitations of the extant research, the primary aim of Study 1 is to gauge potential disparities in social relationships based upon sexual orientation among adults in the United States.

Beyond quantifying disparities, in order to understand potential gaps in social relationships researchers must also investigate factors involved in their production. Evidence of similarities in social relationship disparities across devalued groups indicates that social stigma may be an important etiologic factor (Hatzenbuehler et al., 2013a). Social stigma refers to an “attribute or characteristic that conveys a social identity that is devalued in a particular social context” (p. 505, Crocker, Major, & Steele, 1998). Social identity devaluation is a common, even daily experience for sexual minority men and women (Silverschanz, Cortina, Konik, & Magley, 2008; Swim, Johnston, & Pearson, 2007). In fact, researchers have developed a minority stress framework (Hatzenbuehler, 2009; Lick, Durso, & Johnson, 2013; Meyer, 2003b) to explain how such experiences affect sexual minorities’ health and well-being. Drawing upon the minority stress framework, the primary aim of Study 2 is to test both risk and protective factors stemming from the experience of social devaluation that may be tied to social
relationship outcomes among sexual minorities. Specifically, indirect paths from perceived discrimination to social relationship strain through emotional suppression, chronic inflammation and group identification will be examined (see Figure 1). In this way, Study 2 will build upon Study 1 by explicating stigma-related variables that potentially exacerbate (suppression, inflammation) and attenuate (group identification) social relationship disparities for sexual minorities.

**Social Relationships and Health**

Inherently a social species, humans rely on one another to both survive and thrive (Brewer & Caporeal, 1990; Buss & Kenrick, 1998). Perhaps unsurprisingly then, in order to understand the human condition it is necessary to understand human social relationships (Baumeister & Leary, 1995; Berscheid, 1999; Reis, Collins, & Berscheid, 2000). Durkheim (1951) conducted some of the earliest research linking social relationships and health, showing that levels of social integration, or close involvement with others, influence suicide rates. Durkheim’s research revealed that, at the aggregate level, shifts in social group cohesion could be stably associated with suicide patterns. From a sociological perspective, he theorized that factors related to social integration, such as social norms and social regulation, are crucial for health and well-being. For example, he found that individuals lacking connection to close relationship partners (e.g., spouses) as well as social institutions (e.g., church) were most likely to commit suicide. Durkheim classified this phenomenon as *anomic* suicide because he posited that it resulted from feelings of alienation and disconnection from society. By contrast,
Durkheim proposed that social integration could be protective of health via health-promoting social norms and regulation of health behaviors. These pathways were primarily functional in nature, in that social relationships were assumed to affect health and well-being through their influence on health-related cognitions and behaviors.

Bowlby (1969) subsequently forwarded an influential theory of social relationships, known as attachment theory. Although originally developed with the parent-child relational bond in mind, attachment theory has since been expanded to include attachment to adult relationship partners (Hazan & Shaver, 1994). From an attachment theory perspective, the presence of caring and responsive relationship partners allows one to explore the social environment and healthfully cope with novel and potentially threatening stimuli. Among adults, attachment patterns are classified along two distinct dimensions: anxiety and avoidance (Fraley, Heffernan, Vicary, & Brumbaugh, 2011). The anxiety dimension captures worry and concern about being abandoned by one’s relationship partner while the avoidance dimension captures unwillingness to depend on one’s relationship partner (Mikulincer & Shaver, 2007). Secure attachment bonds therefore involve low levels of both attachment anxiety and avoidance. Attachment patterns are thought to form early on and persist throughout development, but have been shown to be capable of changing to some extent from one unique relationship partner to another (LaGuardia, Ryan, Couchman, & Deci, 2000). As with Durkheim’s work, attachment theory proposed multiple ways in which close relationships, both in childhood and adulthood, are entwined with psychological and
physical health outcomes. In addition to the functional mechanisms implied by Durkheim (e.g., health behaviors and cognitions), researchers interested in attachment theory have incorporated physiological and affective mechanisms linking social relationship to health outcomes (Pietromonaco, Uchino, & Dunkel Schetter, 2013).

Within the field of social psychology, Baumeister and Leary (1995) also posited that the need to belong, fulfilled through social relationships, represents a fundamental human motivation. In their extensive review of the literature, Baumeister and Leary showed that the drive for belonging influences human emotions, cognitions and behaviors. They claimed that fulfillment of this need is essential for health and well-being and reviewed evidence showing that thwarted belonging leads to swift and determined attempts to regain interpersonal connections. While most of the studies reviewed by Baumeister and Leary were not explicitly designed to test the consequences of the need to belong, a recent review of the updated literature confirmed their initial hypotheses (Gere & MacDonald, 2010). Of note, this updated review also highlighted research on the biological underpinnings of the belonging need, including associations with cortisol reactivity, respiratory sinus arrhythmia and relevant genetic polymorphisms. Furthermore, the authors reviewed evidence from neuroscience suggesting an overlap between the neural processing of physical pain and the pain of social exclusion (e.g., Eisenberger, Lieberman, & Williams, 2003).

In further support of these influential theories, for many decades now researchers have been empirically examining the associations between social relationships and other
health outcomes. Consistently, studies have shown that social isolation and loneliness are predictive of increased rates of psychological and physical illnesses (Berkman, 1995; Hawkley & Cacioppo, 2010). For example, a five-year longitudinal population-based investigation (Cacioppo, Hawkley, & Thisted, 2010) revealed that loneliness, or the subjective experience of a lack of social relationships, was prospectively predictive of increased depressive symptomatology. These findings held above and beyond other factors, including demographic characteristics, personality factors and perceived stress. Another study (Pressman et al., 2005) examined the effects of loneliness as well as social network size on the immune system. While loneliness refers to the subjective lack of social relationships, social network size refers to the objective lack. Results revealed that both greater loneliness and smaller social networks independently predicted weakened immune response to the influenza vaccination (gauged via antibody titer production).

Other studies have confirmed a host of other negative psychological and physical health outcomes associated with a lack of social relationships, ranging from increased rates of Alzheimer’s disease and impaired cognitive functioning to elevated mortality risk following myocardial infarction (see Berkman, 1995; Hawkley & Cacioppo, 2010, for reviews). As perhaps the most extreme example, a lack of social relationships has been shown to be predictive of increased mortality risk (Berkman & Syme, 1979; Holt-Lunstad, Smith, & Layton, 2010; House, Landis, & Umberson, 1988) to an extent that is on par with or even exceeds other extreme health risks such as smoking (Holt-Lunstad et al., 2010; House et al., 1988).
As reviewed previously, the subjective experience and objective fact of having social relationship partners is related to health and well-being, but also of import is the quality of the social relationships to which one has access (Brooks & Dunkel Schetter, 2011; Kiecolt-Glaser & Newton, 2001). While well functioning social relationships are protective for health outcomes, poorly functioning social relationships may be damaging for health and well-being (Brooks & Dunkel Schetter, 2011). For example, in one study (Holt-Lunstad, Birmingham, & Jones, 2008), married individuals evidenced lower (i.e., healthier) ambulatory blood pressure compared to singles. However, this effect was moderated by marital quality such that those in higher quality marriages showed significantly lower blood pressure and those in lower quality marriages showed significantly higher blood pressure relative to singles. Similar moderating effects of relationship functioning have been reported for well-being outcomes (Dush & Amato, 2005) and psychological health, including depressive symptomatology (Kiecolt-Glaser et al., 1987).

Evidence for Social Relationship Disparities by Sexual Orientation

Given the preponderance of evidence for the importance of social relationships to health, it is surprising that researchers have not devoted more attention to uncovering the upstream determinants of social relationship outcomes. However, potential disparities in social relationship outcomes between members of dominant and devalued groups are beginning to gain the attention of researchers (e.g., Doyle & Molix, 2014a, in preparation; Trail, Goff, Bradbury & Karney, 2012). Patterns of relationship functioning
appear to differ somewhat consistently between dominant and devalued groups (Hatzenbuehler et al., 2013a; Umberson & Montez, 2010), suggesting an important role for social determinants. For example, among African Americans, marital rates are lower while divorce and separation rates are both higher relative to Whites (Dixon, 2009; Elliott, Krivickas, Brault, & Kreider, 2012). African American men and women may also have fewer social relationship partners (Ajrouch, Antonucci, & Janevic, 2001; Barnes, de Leon, Bienias, & Evans, 2004; Reynolds et al., 1994) and be less likely to be involved in social activities compared to Whites (Barnes et al., 2004).

Similar patterns emerge among sexual minorities relative to heterosexuals, but there are a number of limitations to the extant research. First, much of the research has been conducted in a few European countries (e.g., the Netherlands, Norway, Sweden) that have historically been relatively accepting of sexual minority individuals and their romantic relationships (Merin, 2010). For example, population-level data on divorce among sexual minorities are not currently available in the United States, but research in Norway and Sweden, where registered partnerships have been legal since the mid 1990’s, shows that sexual minorities are at greater risk for divorce compared to heterosexuals (Andersson et al., 2006). Another study (Fokkema & Kuyper, 2009), conducted in the Netherlands, used self-report data from two large surveys of institutionalized and independently living elders (i.e., over 55 years of age) to explore disparities in social relationship outcomes by sexual orientation. The first of these surveys, a national probabilistic survey conducted in 1995, included both sexual minority and heterosexual
participants, but only data from the heterosexual participants were utilized. The second of these surveys, conducted with a supplemental convenience sample in 2003, included only sexual minority participants. Data were combined and comparisons were made across various types of objective social relationships as well as self-reported loneliness. Results showed that sexual minority older adults had fewer social relationships, including with romantic partners, children and other family members, and participated less frequently in church activities compared to heterosexual older adults. Sexual minority older adults also reported significantly greater levels of loneliness, with further analyses suggesting that the objective lack of social relationships may have driven differences in self-reported loneliness. Research in the Netherlands (Bos et al., 2008) has also shown that youths reporting same-sex sexual attractions feel less socially accepted by their peers and report greater strain within peer relationships compared to youths not reporting same-sex sexual attractions. Dutch youths reporting same-sex sexual attractions also had poorer quality relationships with their parents on average. If these social relationship disparities between sexual minorities and heterosexuals exist in relatively tolerant societies, they may be exaggerated in more socially conservative societies, including the United States.

Another limitation of the extant research on social relationship disparities among sexual minorities is a predominant focus on sexual minority youths (i.e., under 18 years of age) and sexual minority older adults (i.e., over 50 years of age). Even most of the studies from European countries reviewed above included samples composed of either
sexual minority youths or older adults. Within the United States, a fair number of studies have linked same-sex attraction in youths to impaired social relationship outcomes (Radkowsky & Siegel, 1997). Sexual minority youths are more likely to have fewer peer relationships compared to heterosexuals and they are also more likely to fear the loss of current friendships (Diamond & Lucas, 2004). They also spend less time with their best friends and report less closeness with their mothers (Williams, Connolly, Pepler, & Craig, 2005). In fact, strained relationships with families of origin are commonly reported by sexual minority youths in the United States (D’Augelli, Hershberger, & Pilkington, 1998; Savin-Williams, 1998). Among older adults in the United States, poorer social relationship outcomes have been shown in sexual minority compared to heterosexual women participating in the Women’s Health Initiative Study (Valanis et al., 2000).

While research on these two developmental stages (i.e., adolescence and older adulthood) is understandable in light of the importance of social relationships across the life span, our knowledge of social relationship disparities among sexual minority adults (i.e., 18-50 years of age) is currently limited. Perhaps because romantic relationships are a defining component of adulthood (Erikson, 1968) and often the most important type of social relationship during this developmental stage (Reis, Clark, & Holmes, 2004), a few studies have examined romantic relationship disparities between sexual minorities and heterosexual adults. Data from these studies do in fact suggest that sexual minority adults in the United States may be more likely to end their romantic relationships relative to heterosexuals (Biblarz & Stacey, 2010; Kurdek, 2005). For example, two longitudinal
studies (Kurdek, 2004; McCallum & Golombok, 2004) including same-sex and heterosexual couples revealed significantly higher relationship dissolution rates over time for same-sex couples of both sexes. If these social disparities among sexual minority adults exist for other types of social relationships as well, then sexual minority adults may have access to fewer social relationships on average. Evidence for these social relationship disparities would have significant implications for other health disparities disproportionally burdening sexual minority men and women in the United States (Institute of Medicine [IOM], 2011).

**Social Stigma as a Cause of Health Disparities**

Laypersons and researchers alike have sometimes assumed that disparities in health outcomes between members of dominant and devalued groups are caused by innate or essential group characteristics (e.g., genetic predispositions; Dar-Nimrod & Heine, 2011; Krieger, 2005). Early research on mental health disparities between sexual minorities and heterosexuals tended to espouse essentialist causes for increased rates of psychopathology among sexual minorities (Cochran, 2001; Herek, 2010). In the past few decades, however, theorists have challenged these essentialist explanations for health disparities, arguing that the stress of living in a society that devalues one’s social identity can lead to impaired health outcomes (Clark, Anderson, Clark, & Williams, 1999; Krieger, 1999; Meyer, 2003b).

Goffman (1963) highlighted the concept of social stigma in order to focus researchers’ attention on the experiences of those who possess a devalued, or *discredited*,
social identity. Since Goffman’s influential sociological work, a number of social psychologists have refined the concept of social stigma (e.g., Crocker, Major, & Steele, 1998; Jones, Farina, Hastorf, & Markus, 1984; Major & O’Brien, 2005). Although some definitions of social stigma have sought to narrow its scope or demarcate rigid boundaries, Phelan, Link and Dovidio (2008) argue that social stigma is conceptually overlapping with the experience of prejudice and discrimination. Phrased differently, being the target of prejudice and discrimination results in the experiential phenomenon of social stigma. The union of social stigma and prejudice and discrimination parallels inherent similarities in social stress models of stigma (Meyer, 2003b; Miller & Kaiser, 2001) and perceived discrimination (Clark et al., 1999; Pascoe & Richman, 2009). The crux of each of these models is the proposition that individuals who possess a devalued social identity experience unique stress related to prejudice and discrimination. Furthermore, past work has shown that the stress of prejudice and discrimination is associated with impaired psychological and physical health outcomes across devalued social groups (Paradies, 2006; Pascoe & Richman, 2009; Williams & Mohammed, 2009), including sexual minorities (Hatzenbuehler, 2009; Lick et al., 2013; Meyer, 2003b).

For example, data from a large probabilistic national sample involved in the Midlife in the United States Study (MIDUS) revealed associations between perceived discrimination and psychiatric morbidity, including depression and anxiety, among sexual minorities (Mays & Cochran, 2001). Furthermore, disparities in psychiatric morbidity between sexual minority and heterosexual participants in this study were
attenuated after accounting for perceived discrimination. Discriminatory events were also found to be associated with physical health problems, including flu, hypertension and cancer, in a probabilistic sample of sexual minority men and women living in New York City (Frost, Lehavot, & Meyer, in press). Explanations for such findings have often centered on the stress engendered by prejudice and discrimination (Meyer, 2003b; Miller & Kaiser, 2001). Because stressors has also been shown to negatively affect social relationship outcomes (McCubbin & Patterson, 1983; Randall & Bodenmann, 2009), it does not seem a far leap to propose that prejudice and discrimination may lead to impaired social relationship outcomes. Just as with mental and physical health disparities, disparities in social relationship outcomes between members of dominant and devalued groups, including sexual minorities, may arise due to the stress of social stigma.

Some recent work conducted with samples of racial minorities and women suggests that this may be the case (e.g., Doyle & Molix, 2014a, in press-a, in press-b; Lincoln & Chae, 2010; Murry, Brown, Brody, Cutrona, & Simons, 2001; Murry et al., 2008; Trail et al., 2012). Murry and colleagues (2001, 2008) have investigated the association between perceived discrimination and familial relationship quality in a probabilistic sample of rural African American women participating in the Family and Community Health Study (FACHS). Analyses have shown that perceived discrimination is associated with impaired relationship quality with both romantic partners and children (Murry et al., 2001). However, analyses of longitudinal data from three waves in 1997, 1999 and 2001 suggest that the deleterious effects of perceived discrimination on
relationship quality may shift over time, with perceived discrimination eventually exacerbating the effects of impaired maternal psychological functioning on familial relationship quality (Murry et al., 2008). While the majority of the extant research on discrimination and social relationships has been cross-sectional, Doyle and Molix (2014) found that a manipulation of social stigma salience led to impaired self-reported romantic relationship quality for individuals whose relationships were relatively vulnerable, supporting the proposition of a causal role for social stigma in producing relationship disparities.

Perhaps because negative attitudes and behaviors directed toward sexual minorities often stem from or include reference to their sexual and romantic partners (i.e., members of the same sex) there has been a somewhat greater interest in the effects of prejudice and discrimination on romantic relationship functioning among sexual minorities compared to members of other devalued groups (e.g., Doyle & Molix, in press-a; Kamen, Burns, & Beach, 2011; Otis, Rostosky, Riggle, & Hamrin, 2006). In a quantitative review of this literature, Doyle and Molix (in preparation) found that across 35 studies there was evidence of a statistically significant inverse association between social stigma and romantic relationship functioning ($r = -.17$), meaning that sexual minorities who report greater levels of social stigma tend to experience impaired romantic relationship functioning. A far smaller number of studies have focused on the effects of prejudice and discrimination on other types of social relationships among sexual minorities. For sexual minority older adults in the Netherlands, perceived
discrimination was found to be associated with greater loneliness (Kuyper & Fokkema, 2010). Although greater numbers of interpersonal connections were found to be protective in this study, perceived discrimination had an effect on loneliness above and beyond the objective presence of greater social relationships. Perceived discrimination, or victimization, has also been shown to be inversely associated with social support from family and friends among sexual minority youths in the United States (Mustanski, Newcomb, & Garofalo, 2011).

**Minority Stress Framework**

As reviewed here, much previous work has shown that prejudice and discrimination negatively affect health outcomes, including potentially social relationships. However, in order to understand potential gaps in social relationship outcomes between sexual minorities and heterosexuals, researchers must also investigate factors involved in their production. When exploring etiologic factors, it is useful to employ a theoretical framework that is capable of organizing causal pathways. Among researchers interested in sexual minority populations, the minority stress framework, as initially proposed by Meyer (2003b), has had considerable traction in the fields of social psychology and public health. In a quantitative review of the literature Meyer showed that sexual minorities suffered from increased rates of psychopathology, including depressive and anxious disorders, relative to heterosexuals. He argued that stressors unique to sexual minorities caused these differences; therefore in the minority stress framework social stigma stands as a fundamental cause of population health outcomes
Much previous research has provided evidence for the deleterious effects of minority stressors, as proposed by Meyer, on various health and well-being outcomes (e.g., Kuyper & Fokkema, 2010; Lehavot & Simoni, 2011; Lewis, Derlega, Griffin, & Krowinski, 2003; Meyer, 1995; Wong, Schrager, Holloway, Meyer, & Kipke, 2014). Yet an important limitation of the minority stress framework was the lack of specified mechanisms through which social stigma affects health.

Hatzenbuehler (2009) developed the psychological mediation framework in order to address this limitation and prompt further research on the effects of minority stressors. In many ways, the psychological mediation framework is an extension of the minority stress framework with the inclusion of mediating processes. Specifically, Hatzenbuehler proposed that minority stressors lead to psychopathology by way of emotional, interpersonal and cognitive mechanisms. Within this model, social relationships are positioned as mediators in the association between social stigma and mental health, but not as outcomes. As discussed previously, because of the intimate associations between social relationships and psychological and physical health, we view social relationships as one component of overall health and well-being. An important limitation of the psychological mediation framework was that while it provided plausible mechanisms to explain impaired mental health outcomes among sexual minorities, it was agnostic to both physiological mechanisms and physical health outcomes.

A recent review of minority stress and physical health outcomes among sexual minorities included an updated version of the minority stress framework (Lick, Durso, &
Johnson, 2013). A major contribution of this updated framework was the explication of pathways from minority stress to impaired physical health through both emotional and physiological stress responses. These pathways had previously been discussed in research conceptualizing discrimination as social stress (e.g., Clark, Anderson, Clark, & Williams, 1999), but had not been previously incorporated into the minority stress framework. The addition of these two pathways as the primary conduits for the deleterious effects of social stigma on health outcomes opened new avenues for researchers interested in explaining health disparities between sexual minorities and heterosexuals. However, these pathways may not be unique to physical health outcomes, but instead apply to other health outcomes (i.e., psychological and social) as well.

**Suppression as a Psychological Stress Response**

Understanding the mechanisms by which social stigma affects health (Pascoe & Richman, 2009), and particularly social relationships (Doyle & Molix, in press-a), is essential to developing programs and interventions to disrupt adverse effects. Although many mechanisms likely operate in concert (Pascoe & Richman, 2009), conceptualizing prejudice and discrimination as social stressors facilitates a focus on stress responses (Clark et al., 1999; Lick et al., 2013). Both psychological and physiological stress responses act in concert when an individual encounters an experience that is taxing beyond available resources (Ganzel, Morris, & Wethington, 2010), such as an encounter with prejudice and discrimination (Miller & Kaiser, 2001). When activated continuously
over time, these stress responses can damage health and well-being (Ganzel et al., 2010; McEwen, 2004).

Psychological stress responses can take many forms. For example, within the general domain of emotion dysregulation, different manifestations might include venting and rumination (Gross, 1998). Among sexual minorities, suppression of negative emotions may be a particularly relevant form of emotion dysregulation. Because sexual minorities possess a concealable stigmatized identity (Pachankis, 2007; Quinn, 2006), that is an identity that is not necessarily evident without disclosure, suppression as a cognitive-emotional strategy may be relatively common (Smart & Wegner, 1999, 2000). Many sexual minorities have years of practice concealing their stigmatized identities (D’Augelli, 1992; Martin, 1982) and such practice may make suppression a more likely response when faced with future stressors. Suppression may also be especially likely in the wake of prejudice and discrimination because of heightened concern over one’s stigmatized identity during the event (D’Augelli, 1992; Smart & Wegner, 1999).

Although an appealing coping strategy in the moment, suppression can be costly for sexual minorities’ health and well-being (e.g., Hatzenbuehler, Nolen-Hoeksema, & Dovidio, 2009).

The concept of suppression as a stress response, or defense mechanism, was introduced in Freud’s theorizing and has found empirical support in the social psychological literature (Baumeister, Dale, & Sommer, 1998). Although potentially broad in scope (Baumeister et al., 1998), the term suppression can be used to refer to the
denial of negative emotions or cognitions. Suppression, sometimes perceived as an adaptive coping strategy, has actually been shown to extend negative moods and increase arousal (Mauss, Bunge, & Gross, 2007). Furthermore, research on the ironic effects of suppression shows that attempting to inhibit emotions results in those same emotions becoming even more cognitively accessible (Wegner, 1994). In fact, research suggests that suppression of negative emotions may negatively affect health and well-being, even to the point of predicting increased mortality risk (Chapman, Fiscella, Kawachi, Duberstein, & Muennig, 2013).

Suppression may be a relatively normative response to the experience of being the target of prejudice and discrimination (Miller & Kaiser, 2001). Acknowledging others’ negative attitudes and behaviors based upon one’s devalued identity can be an overwhelming prospect, potentially harming one’s global sense of self. Therefore, members of devalued groups may become adept at denying or minimizing these negative experiences (Major & Sawyer, 2009). Past work has found that members of devalued groups do suppress negative thoughts and emotions, especially related to their stigmatized identities. For example, women who feel stigmatized because of having had an abortion are more likely to conceal their abortions and suppress negative abortion-related thoughts and emotions (Major & Gramzow, 1999). In a separate daily diary study (Hatzenbuehler et al., 2009), sexual minority and African American participants reported greater emotional suppression on days when they encountered greater stigma-related stress. Furthermore, in both of these studies suppression was associated with increased
psychological distress, suggesting that suppression, as a coping response, can be harmful for the well-being of members of devalued groups.

**Inflammation as a Physiological Stress Response**

The physiological component of the stress response, which acts in concert with the psychological component following stigma-related stress (Mays, Cochran, & Barnes, 2007), can also damage health and well-being. Chronic activation of physiological stress responses leads to wear and tear on various bodily systems, referred to as allostatic load (Ganzel et al., 2010; McEwen, 2004). Just as with psychological dysregulation, physiological dysregulation can take many forms. Potentially of particular relevance to sexual minorities is chronic inflammation (Everett, Rosario, McLaughlin, & Austin, 2014; Hatzenbuehler, McLaughlin, & Slopen, 2013). Explanations for disparities in chronic inflammation between sexual minorities and heterosexuals have included increased health risk behaviors, such as smoking and drinking, as well as additional chronic stress in the form of prejudice and discrimination (Hatzenbuehler et al., 2013b).

The immune system is vulnerable to allostatic load and can become dysregulated over time for those who experience chronic stress (Segerstrom & Miller, 2004). One potential result of immune dysregulation is a shift toward chronic non-specific inflammation. Interluekin-6 (IL-6), a pro-inflammatory cytokine secreted by leukocytes in order to stimulate the immune response, is elevated in individuals suffering from chronic inflammation. Therefore, IL-6 is a useful biomarker for researchers interested in gauging chronic inflammation (Naugler & Karin, 2008). IL-6 may also be of particular
relevance due to the potential role of pro-inflammatory cytokines in initiating depressive-like symptoms, notably social withdrawal (Slavich & Irwin, in press).

Previous research with samples of other devalued groups (e.g., racial minorities) has shown that prejudice and discrimination are associated with increased levels of various inflammatory biomarkers (Friedman, Williams, Singer, & Ryff, 2009; Lewis, Aiello, Leurgans, Kelly, & Barnes, 2010), including IL-6 (Ratner, Halim, & Amodio, 2013). Previous work has also unveiled an association between chronic inflammation and social isolation (e.g., Cole et al., 2007; Ford, Loucks, & Berkman, 2006; Friedman et al., 2005). For example, Ford and colleagues (2006) examined data from the third wave of the National Health and Nutrition Examination Survey (NHANES), a representative sample of the United States population. They found that social isolation was related to elevated levels of C-reactive protein, a biomarker of chronic inflammation, among older adult men (i.e., over 60 years of age) and adult women (i.e., 20 to 59 years of age). After adjustment for a host of covariates, ranging from body mass index and smoking to diabetes and cholesterol levels, only the association among older adult men remained statistically significant. Clearly, there are many nuances in the association between social relationships and inflammation that have yet to be teased apart. Furthermore, because this research has primarily been cross-sectional, researchers tend to posit that greater levels of loneliness and social isolation lead to chronic inflammation.

Yet other work with non-human animals (see Dantzer et al., 2008, for a review) as well as humans (Eisenberger, Inagaki, Mashal, & Irwin, 2010; Inagaki et al., 2012) has
demonstrated that inflammation, and particularly pro-inflammatory cytokines, are associated with a constellation of sickness-related behaviors, including social withdrawal.

In one recent study (Eisenberger et al., 2010), participants were randomly assigned to receive either an endotoxin (i.e., inflammatory challenge) or placebo injection. Researchers measured levels of plasma IL-6 as well as social disconnection at baseline and every hour for six hours. Participants assigned to the endotoxin condition, compared to the placebo condition, showed significant increases in social disconnection up to four hours post-injection. Furthermore, the researchers also found that greater increases in IL-6 were associated with greater social disconnection among participants.

Although this study focused on temporary or acute inflammation, the cross-sectional research mentioned previously (e.g., Cole et al., 2007; Ford et al., 2006; Friedman et al., 2005) indicates that it is possible for these effects to extend over time with chronic inflammation. However, it should be noted that causal relations between chronic inflammation and social relationship outcomes, including the depressive-like symptoms of social withdrawal, remain speculative at this point. Some research has in fact shown support for prospective effects of depression on inflammation (i.e., the opposite pattern of causation as proposed here; Duivis et al., 2011; Stewart, Rand, Muldoon, & Kamarck, 2009). It is likely that the association between social isolation and chronic inflammation is considerably more complex than most studies have been able to test, with reciprocal influence and bidirectional effects (Jaremka, Lindgren, & Kiecolt-Glaser, 2013; Slavich & Irwin, in press).
Group Identification as a Protective Factor

Social stigma can engender deleterious stress responses, both psychological and physiological, leading to risk for impaired health outcomes, but social stigma may also drive increases in some protective factors that have salubrious effects on health and well-being. One such protective factor that may be important for sexual minorities is group identification (Doyle & Molix, 2014b; Meyer, 2003b). Past research has shown that members of devalued groups may find strength in their devalued identities (e.g., Branscombe, Schmitt, & Harvey, 1999; Molix & Bettencourt, 2010; Phinney, 1990; Romero & Roberts, 2003; Sellers & Shelton, 2003). According to social identity theory (Tajfel & Turner, 1979), individuals are motivated to maintain a positive self-image and may do so via identification with relevant social groups. Because members of devalued groups are often excluded from membership in dominant groups, they must look to their devalued identities for fulfillment of group memberships. Indeed, some research with samples of sexual minorities has found positive associations between minority group identification and overall health and well-being (Doyle & Molix, 2014b; Frable, Wortman, & Joseph, 1997; Ghavami, Fingerhut, Peplau, Grant, & Wittig, 2011).

The rejection-identification model (Branscombe et al., 1999) posits that social stigma can actually lead to greater levels of devalued group identification. When members of devalued groups experience pervasive prejudice and discrimination, they may bolster their self-image by distancing themselves from the dominant groups (i.e., the perpetrators of prejudice and discrimination) and drawing closer to their devalued groups.
This model has previously been supported in research with members of many devalued groups, including African Americans (Branscombe et al., 1999) and African immigrants in Belgium (Bourguignon, Seron, Yzerbyt, & Herman, 2006). Recently, Doyle and Molix (2014b) also found support for this model among sexual minority men. Specifically, in a convenience sample of gay men perceived discrimination had a bolstering indirect effect on well-being (i.e., self-esteem and positive affect) through minority group identification.

Group identification can be achieved in many ways, including affective, cognitive and behavioral (Ashmore, Deaux, & McLaughlin-Volpe, 2004). While many researchers have focused on the former two components of group identification (e.g., McCoy & Major, 2003; Sellers & Shelton, 2003), behavioral identification may be especially important for sexual minorities (cf. Doyle & Molix, in press-b). Related to issues of concealment, behavioral identification is likely to induce overt displays of one’s devalued group identity. These overt displays could help counter the deleterious effects of concealment and also lead to interactions with other sexual minority individuals, both of which could be protective of health outcomes.

**Perceived and Structural Discrimination**

In addition to effects of individual discrimination, a growing body of research has begun to uncover the deleterious health effects of structural discrimination, here defined as “societal-level conditions, cultural norms, and institutional policies that constrain the opportunities, resources, and wellbeing of the stigmatized” (p. 2, Hatzenbuehler & Link,
While much of this work has focused on racial and ethnic minorities, researchers are beginning to consider the effects of structural discrimination on sexual minorities’ health and well-being (Hatzenbuehler, 2010; Hatzenbuehler & Link, 2014). An important finding that has emerged in research on structural discrimination is that, in addition to direct effects (e.g., Hatzenbuehler, 2011; Hatzenbuehler, Keyes, & Hasin, 2009; Kosciw, Greytak, & Diaz, 2009), structural discrimination moderates the association between social stressors, including individual discrimination, and various health and well-being outcomes (e.g., Bauermeister, in press; Goldberg & Smith, 2011; Hatzenbuehler & McLaughlin, 2014). For example, Goldberg and Smith (2011) recruited gay and lesbian couples that were in the process of adopting a child. Participants, who resided throughout the United States, self-reported information about minority stressors and mental health at three time points including after the transition to parenthood. The researchers also coded state legal climates, a form of structural discrimination, according to laws either supporting or prohibiting gay adoption. Results from multilevel models revealed that internalized homophobia predicted an increasing trajectory of anxiety, but only for participants residing in states with greater levels of structural discrimination.

Another advantage of including measures of structural discrimination is that these tend to be relatively objective in nature, as compared to measures of individual discrimination, which are likely to be subjective in nature (Krieger, 2012). In the literature on social stigma an important distinction has been made between objective and subjective assessments of prejudice and discrimination (Meyer, 2003a; Williams &
Mohammed, 2009). Subjective assessments, often referred to as perceived discrimination, capture experiences of which individuals are cognizant and attribute to their devalued identities (Meyer, 2003a), and are also willing to self-report (Krieger, 2012; Krieger et al., 2011). As mentioned previously, members of devalued groups may be motivated to deny or minimize experiences of prejudice and discrimination for a number of reasons (Feldman Barrett & Swim, 1998; Major & Sawyer, 2009).

Furthermore, different individual characteristics, such as group identification (e.g., Operario & Fiske, 2001) and prejudice expectations (Pinel, 1999), have been shown to influence perceptions of discrimination (Major & Sawyer, 2009). Because of these complications, assessing the stress of discrimination via only subjective responses may uncover a limited picture (Meyer, 2003a).

This discrepancy between subjective and objective measurements on the part of the targets of prejudice and discrimination also parallels discrepancies on the part of the perpetrators. For example, the shifting standards model (Biernat, 2012; Biernat & Manis, 1994; Biernat, Manis, & Nelson, 1991) posits that social group membership can be used as a referent when making judgments about individual targets. Therefore, when asked to describe how tall a 5’8” woman is, one might say that she is tall—but implicit in that judgment is that she is tall relative to other women. Relative to men, tall would not seem an appropriate descriptor for her. Similar judgments could be made for other subjective characteristics. For example, a manager may judge an African American job applicant as extremely industrious, and this judgment would seem counter-stereotypical or non-
prejudiced. Yet if his referent was informed by the stereotype that African Americans are lazy, he could still judge the extremely industrious African American applicant as less industrious than an ordinarily industrious White applicant. Similar issues may arise when asking sexual minorities how much discrimination they have experienced in their lives. If their referent is informed by the expectation that sexual minorities all experience frequent discrimination, they may report that they have experienced relatively little by comparison (i.e., the personal/group discrimination discrepancy; Taylor, Wright, Moghaddam, & Lalonde, 1990; Taylor, Wright, & Porter, 1994) and the shifting standards model may account for this discrepancy (Fuegen & Biernat, 2000).

**Research Overview**

The overarching goal of the current research was to examine how sexual orientation may influence social relationship outcomes. The present research included two studies addressing this topic, with complementary aims. The primary aim of Study 1 was to quantify disparities in social relationship outcomes between sexual minority and heterosexual adults (i.e., 18-50 years of age) in the United States. Furthermore, Study 1 also examined the influence of perceived discrimination and structural discrimination on social relationship outcomes. No a priori differences were hypothesized in the pattern of results across different forms of social relationship outcomes. The primary aim of Study 2 was to home in on the pathways linking social stigma to social relationship outcomes, including both protective (i.e., group identification) and risk factors (i.e., emotional suppression, chronic inflammation) that may be especially relevant to sexual minority
populations (see Figure 1). The proposed research was designed to contribute to a
growing body of literature uncovering the social determinants of relationship outcomes,
including stigmatized social identities (Bryant et al., 2010; Doyle & Molix, in
preparation; Hatzenbuehler et al., 2013a; McCubbin & Patterson, 1983; Rith & Diamond,
2013; Umberson & Montez, 2010).

**Study 1**

The major aim of Study 1 was to explore disparities in social relationship
outcomes between sexual minority and heterosexual adults in the United States. As
described previously, social relationships can include interpersonal connections on a
number of different levels. In Study 1, measures assessed both the objective presence of
social relationships (i.e., social network size) and the subjective experience of lacking
social ties (i.e., loneliness). Additionally, as relationship quality has also been shown to
be important for health and well-being (Brooks & Dunkel Schetter, 2011; Kiecolt-Glaser
& Newton, 2001), measures were selected to address potential differences in relationship
quality between sexual minorities and heterosexuals. Based upon previous research from
European countries (e.g., Andersson et al., 2006; Bos et al., 2008; Fokkema & Kuyper,
2009) as well as studies focusing on sexual minority older adults (e.g., Fokkema &
Kuyper, 2009; Valanis et al., 2000) and sexual minority youths (e.g., Bos et al., 2008;
Diamond & Lucas, 2004), it was hypothesized that sexual minority adults would
evidence fewer social relationships, greater levels of loneliness, greater social
relationship strain and lesser social capital relative to heterosexual adults.
Another aim of Study 1 was to examine the effects of both perceived discrimination and structural discrimination on social relationship outcomes. It was posited that mean differences in social relationship outcomes between sexual minorities and heterosexuals would be attenuated when accounting for the effects of perceived discrimination. Perceived discrimination was thus posited to be a confounding variable (MacKinnon, Krull, & Lockwood, 2000), that is, “a variable related to two factors of interest that falsely obscures or accentuates the relationship between them” (Meinert, 1986, p. 285). Furthermore, based upon previous research among sexual minorities (e.g., Bauermeister, in press; Goldberg & Smith, 2011; Hatzenbuehler et al., 2011; Hatzenbuehler & McLaughlin, 2014), it was hypothesized that the deleterious effects of perceived discrimination on relationship outcomes would be exacerbated for sexual minorities exposed to greater structural discrimination and attenuated for those exposed to lesser structural discrimination.

**Method**

In order to determine the recruitment goal for Study 1, power analyses were conducted a priori using G*Power (Version 3.1). An estimate of the effect size for sexual orientation differences in loneliness was obtained (Fokkema & Kuyper, 2009) and converted to Cohen’s d ($d = .26$). To achieve .80 power with $\alpha$ set at .05, a total of 468 participants would be required (234 heterosexual and 234 sexual minority). For Study 1, a total of 579 participants were recruited (365 heterosexual and 214 sexual minority), approximating recruitment goals. Approximately two thirds of the sample identified as
male (63.6%) and about one third identified as female (35.9%). The mean age of the sample was 29.92 ($SD = 9.17$). The majority of participants identified as Caucasian/White (80.1%), but the sample also included individuals identified as Asian/Asian Indian (7.1%), African American/Black (6.0%), Hispanic/Latino (4.0%), multiracial (1.9%), Native American (.5%) and Middle Eastern/North African (.2%). The mean household income of the sample was $47,097 per year ($SD = 47,531$) and, on average, participants had completed some years of college education.

All participants were sampled from Amazon’s Mechanical Turk (MTurk), a crowdsourcing platform gaining popular use in the social and behavioral sciences (Buhrmester, Kwang, & Gosling, 2011; Goodman, Cryder, & Cheema, 2013; Shapiro, Chandler, & Mueller, 2013). Crowdsourcing is a term that refers to the practice of obtaining work or data from large groups of people, generally via online communities. A number of different websites have been developed to capture the power of crowdsourcing and MTurk is among the most popular for researchers involved in the social and behavioral sciences (Goodman et al., 2013). The only requirements for workers to be eligible to join MTurk are that they must be over 18 years of age and possess a valid social security or individual tax identification number. In line with the current research questions, a restriction was also placed limiting participation to those residing within the United States. Researchers are then able to post tasks (referred to as human intelligence tasks; HITs) for a pool of over 200,000 eligible workers. Importantly for the current
study, past research has successfully employed MTurk in order to recruit sexual minority participants (e.g., Zou et al., 2013).

For the current study, one HIT was posted including a link to a separate survey hosted on Qualtrics, an online survey-hosting website. The survey instrument included measures of sexual orientation, social relationship outcomes and social stigma as described in the following section. Participants were compensated $.50 for their time and effort, which is on par with payments for tasks of comparable length (approximately 10 minutes) and has been shown to be sufficient to motivate participation in a timely manner (Buhrmester et al., 2011). All workers residing in the United States were eligible to participate regardless of other demographic characteristics, such as age, gender or race. However, prior to participating in the study, everyone was required to respond to a sexual orientation item (described in the following section). Based upon these responses, participants were either classified as heterosexual or sexual minority. The survey instrument was programmed such that each separate group had a fixed quota set at 365 participants. Once this quota was reached for either group, further individuals selecting that group membership were told that the study was full and thanked for their interest. Settings were also programmed to avoid “ballot-stuffing,” meaning that Qualtrics tracked IP addresses and disallowed returning individuals who had previously responded to the first item from starting the survey over. This prevented potential participants from changing their sexual orientation identification in order to get around the fixed quotas. All other components of the survey instrument were identical between groups.
Measures

All measures for this study are included in Appendix B.

*Sexual orientation.* Based upon previous research recommending a five-category self-identification measure of sexual orientation (Vrangalova & Savin-Williams, 2012; Savin-Williams & Vrangalova, 2013), participants were asked to select from the following points on a five-point Kinsey-type scale: *heterosexual, mostly heterosexual, bisexual, mostly gay/lesbian, gay/lesbian.* For the purposes of the survey quotas, as described previously, participants selecting *heterosexual* were grouped as heterosexual while participants selecting all other labels were grouped as sexual minority. Sexual orientation was also assessed near the end of the survey via a free-response item asking participants, “What term best describes your sexual orientation?”

*Perceived discrimination.* Items for this measure were adapted from the Everyday Discrimination Scale (Williams, Jackson, & Anderson, 1997), designed to gauge perceived discrimination among ethnic minorities, but were reworded to reflect experiences likely to affect sexual minorities. The two items that were chosen were, “You are called names or insulted because of your sexual orientation,” and, “You are threatened or harassed because of your sexual orientation.” Participants indicated how often they experienced each of these events on a scale ranging from 1 (*never*) to 6 (*almost everyday*). These two items were highly correlated, \( r(569) = .86, p < .001, \) and were thus combined by taking the mean score in order to gauge perceived discrimination.
**Structural discrimination.** Structural discrimination was gauged by asking participants in which state they currently reside. States were then coded according to how discriminatory extant public policy was toward sexual minorities. Specifically, a variety of public policies within each state that were relevant to sexual minority rights were coded (Hatzenbuehler, 2010), including hospital visitation rights, housing non-discrimination, second parent adoption rights, joint adoption rights, employment non-discrimination, marital equality, marital prohibition, hate crime laws, school-anti bullying policy and school non-discrimination. Lists of relevant public policy were downloaded from the Human Rights Campaign (HRC) website (http://www.hrc.org/resources/entry/maps-of-state-laws-policies). Per policy domain, states were coded from 0 (*most protective*) to 4 (*most discriminatory*). These codes correspond to hierarchical ordering of policy per domain provided by the HRC website (e.g., for hate crimes, polices are divided into those lacking protection for sexual minorities, those offering protection based upon sexual orientation only and those offering protection based upon sexual orientation *and* gender identity). Sums across policy domains were tallied by state, such that higher numbers indicated greater levels of overall structural discrimination.

**Social network size.** Participants’ social networks, or the number of social relationships, were assessed with the abbreviated version of the Lubben Social Network Scale (Lubben et al., 2006). This scale includes two subscales composed of three items each (total of six items), with one subscale referring to family (including romantic partners) and one subscale referring to friends. Participants indicated the number of
people in each category whom they see and hear from at least once a month, feel close enough to call for help and feel at ease to talk with about private matters. Mean scores on all six items were calculated for an overall network size score. The total scale evidenced adequate internal consistency in past research, \( \alpha = .83 \) (Lubben et al., 2006), as well as in the current study, \( \alpha = .83 \).

**Loneliness.** The previous measure of social relationships refers to the objective component, but also of interest was the subjective component. Therefore, a measure of loneliness was included in order to assess participants’ general feelings of social integration. The three-item loneliness scale (Hughes, Waite, Hawkley, & Cacioppo, 2004) is an abbreviated version of the Revised UCLA Loneliness Scale (Russell, Peplau, & Cutrona, 1980). Participants were asked to respond to items such as, “How often do you feel that you lack companionship?” on a scale from 1 (hardly ever) to 3 (often), and mean scores across the three items were computed. The three-item version has been shown to have adequate internal consistency, \( \alpha = .72 \), and correlates highly with the longer Revised UCLA Loneliness Scale, \( r = .82 \) (Hughes et al., 2004). This scale evidenced good internal consistency in the current study, \( \alpha = .86 \).

**Social relationship strain.** In addition to the social network scale, which gauges the size of participants’ social networks, a measure of relationship quality with friends (Walen & Lachman, 2000) was included to assess social relationship functioning. This scale consisted of four statements related to social relationship strain with friends. Participants rated their level of agreement with each statement on a scale ranging from 1
(not at all) to 4 (a lot). Example statements include, “How often do they criticize you?” and, “How often do they let you down when you are counting on them?” Mean scores across all four items were calculated to assess friendship strain. In past research (Walens & Lachman, 2000), internal consistency has been shown to be adequate, $\alpha = .79$, and was also adequate in the current research, $\alpha = .79$.

**Social capital.** Within public health, social capital is posited as an important indicator of social well-being and a determinant of health outcomes. In line with past research (Fujiwara, Kubzansky, Matsumoto, & Kawachi, 2012), the cognitive domain of social capital was assessed via two items addressing social trust, “In general, would you say that your neighbors can be trusted?” and mutual aid, “Do you think that people in your neighborhood aid each other?” Responses were made on a scale ranging from 1 (not at all) to 4 (a lot). These two items were strongly correlated in the current study, $r(571) = .66$, $p < .001$, and were therefore combined via mean score on both items to indicate social capital. Social capital is thus operationally defined here as social trust and mutual aid in one’s neighborhood.

**Results**

**Data Screening**

First, missing data were evaluated. Overall, very few participants had missing data on any of the measures, with the most on the measure of perceived discrimination ($n = 10$). Due to these low levels of missing data and a lack of systematic associations of
missing data with any other characteristics, pairwise deletion was employed in the following analyses.

**Sexual Orientation and Participant Grouping**

Participants’ responses to the initial sexual orientation item were compared with their free responses on the sexual orientation self-identification item near the end of the survey. Table 1 displays frequencies of each self-identification label, coded into six separate categories, by selections on the initial sexual orientation item. Participants who selected *heterosexual* on the initial item were overwhelmingly likely to self-identify as heterosexual. The majority of those selecting *mostly heterosexual* on the initial item also identified as heterosexual, but this group included a significant number of participants self-identifying with a variety of other sexual minority labels. This finding is consistent with past work demonstrating that individuals who select *mostly heterosexual* represent a unique sexual minority group (Vrangalova & Savin-Williams, 2012; Savin-Williams & Vrangalova, 2013). Participants who selected *bisexual* on the initial item predominantly self-identified as bisexual, but a fair number also used labels such as queer, fluid or pansexual. Mirroring the *mostly heterosexual* group, the majority of those who selected *mostly gay/lesbian* on the initial item also self-identified as gay or lesbian, but included a significant number who chose other sexual minority labels. All participants who selected *gay/lesbian* on the initial item also self-identified as gay or lesbian. Chi-square analyses confirmed that self-identification labels differed significantly between participants based upon responses to the initial sexual orientation item, $\chi^2(20) = 1020.27, p < .001$. 
For the purposes of the current study, participants were next divided into two groups based upon sexual orientation: heterosexual and sexual minority. As described in the measures section, participants who selected *heterosexual* on the initial sexual orientation item were categorized as heterosexual while participants who selected any other response were categorized as sexual minority. These two categories were utilized in all of the following analyses, but similar results were obtained when substituting self-identification as the criterion for determining heterosexual and sexual minority group categorization (the correlation between sexual orientation coded from the initial item and self-identification responses was quite large, \( r(553) = .74, p < .001 \)). In order to explore systematic variation in demographic characteristics between the two groups, zero-order correlations between sexual orientation and demographic variables were examined (see Table 2). Sexual orientation was significantly associated with sex and age, such that sexual minorities tended to be older and were more likely to be female. Because these variables were potential confounds, sex and age were included as covariates when comparing outcomes between groups.

**Disparities in Social Relationship Outcomes by Sexual Orientation**

In order to examine the first hypothesis of Study 1, that sexual minorities would experience impaired relationship outcomes relative to heterosexuals, multivariate analysis of variance (MANOVA) was conducted with SPSS software (Version 21). In this analysis, sexual orientation was entered as the independent variable (IV) and social network size, social relationship strain, loneliness and social capital were entered as the
dependent variables (DV$s$). Screening of these variables showed that all approximated normal distributions. Results from these analyses revealed that, overall, sexual orientation had a significant multivariate association with social relationship outcomes, Wilk’s $\lambda = .95$, $F(4, 561) = 6.81$, $p < .001$, $\eta^2 = .05$. Next, mean differences in each of the social relationship outcomes between sexual minorities and heterosexuals were tested with follow-up ANOVAs (see Figure 2). Each of these tests revealed a significant effect of sexual orientation and all effects showed the same general pattern, with poorer relationship outcomes among sexual minorities relative to heterosexuals. Specifically, compared to heterosexuals, sexual minorities reported smaller social networks ($M = 3.38$, $SD = .07$ vs. $M = 3.56$, $SD = .05$), $F(1, 564) = 4.40$, $p = .04$, $\eta^2 = .01$, less social capital ($M = 2.23$, $SD = .05$ vs. $M = 2.39$, $SD = .04$), $F(1, 564) = 5.23$, $p = .02$, $\eta^2 = .01$, more social relationship strain ($M = 1.85$, $SD = .04$ vs. $M = 1.67$, $SD = .03$), $F(1, 564) = 11.79$, $p = .001$, $\eta^2 = .02$, and more loneliness ($M = 1.82$, $SD = .04$ vs. $M = 1.60$, $SD = .03$), $F(1, 564) = 16.45$, $p < .001$, $\eta^2 = .03$.

**Perceived Discrimination as an Etiologic Factor**

The second hypothesis for Study 1 concerned the ability of perceived discrimination to account for the sexual orientation gap in social relationship outcomes. Zero-order correlations between both perceived and structural discrimination and all social relationship outcomes among sexual minorities and heterosexuals are presented in Table 3. The distribution of perceived discrimination was positively skewed among sexual minorities, indicating that participants generally reported relatively low levels of
perceived discrimination on the current measure. However, transformation of this variable in order to achieve normality did not significantly affect the pattern of results, therefore the untransformed distribution was retained in the following analyses. Before testing the second hypothesis, we also explored mean differences in perceived discrimination between sexual minorities and heterosexuals. As expected, sexual minorities reported significantly greater levels of sexual orientation-based perceived discrimination ($M = 1.60$, $SD = .05$) compared to heterosexuals ($M = 1.10$, $SD = .04$), $F(1, 562) = 68.96$, $p < .001$.

In order to address the second hypothesis, perceived discrimination was entered as a covariate in the previously run ANOVAs. As mentioned previously, perceived discrimination was posited as a confounding variable. Perceived discrimination was not tested as a mediating variable because social stigma is not caused by sexual orientation per se (MacKinnon et al., 2000). Both sexual minorities and heterosexuals may report experiencing “discrimination” based upon sexual orientation, but the phenomenological meaning of said “discrimination” is different (Schmitt et al., 2002). Rather than acting as a causal factor, the relationship between perceived discrimination and sexual orientation obscures the true association between sexual orientation and social relationship outcomes. The approach of treating perceived discrimination as a confounding variable is consistent with past research aimed at uncovering the disparities in mental health outcomes based upon sexual orientation (Mays & Cochran, 2001). Indeed, after controlling for perceived discrimination associations between sexual orientation and
social networks, $F(1, 560) = 3.50, p = .06, \eta^2 = .006$, social capital, $F(1, 560) = 3.22, p = .07, \eta^2 = .006$, and social relationship strain, $F(1, 560) = 3.80, p > .05, \eta^2 = .007$, all became non-significant, confirming hypotheses. However, the association between sexual orientation and loneliness, although reduced in magnitude, remained statistically significant after controlling for perceived discrimination, $F(1, 560) = 11.08, p = .001, \eta^2 = .019$.

**Moderation by Structural Discrimination**

Next, structural discrimination was examined among sexual minorities. Levels of structural discrimination ranged from 0 to 30, with a mean of 14.98 ($SD = 1.39$). Examination of a histogram plotting structural discrimination revealed a bimodal distribution (see Figure 3). This distribution reflects the fact that, across policy domains, states tended to have either many policies that protect sexual minorities or many policies that discriminate against them. Fewer states fell in between, with heterogeneous public policy regarding sexual minority rights. Potential interactive effects of perceived and structural discrimination on social relationships among sexual minorities were tested via multilevel models using Hierarchical Linear Modeling software (Version 6.0; Raudenbush, Bryk, Cheong, & Congdon, 2000). Because in this study participants were nested within states, Level 1 equations referred to individual characteristics (i.e., perceived discrimination, grand mean-centered) while Level 2 referred to state characteristics (i.e., structural discrimination, grand mean-centered). Utilizing multilevel models, we were able to account for shared variance due to participants residing within
the same state. The DV in these analyses was each of the four measures of social relationship outcomes in turn.

Level 1

\[
\text{Social Relationship Outcome}_{ij} = \beta_{0j} + \beta_{1j} \times (\text{Perceived Discrimination}) + e_{ij}
\]

Level 2

\[
\beta_{0j} = Y_{00} + Y_{0i} \times (\text{Structural Discrimination}) + r_{0i}
\]

\[
\beta_{1j} = Y_{10} + Y_{1i} \times (\text{Structural Discrimination}) + r_{1i}
\]

Addressing the study hypotheses, the interaction between perceived discrimination and structural discrimination was tested by evaluating the slope of structural discrimination at Level 2 predicting the slope of perceived discrimination at Level 1 \((Y_{1i})\). Results from multilevel models confirmed significant interactions when predicting social relationship strain, \(Y_{1i} = .009, SE = .004, t(40) = 2.68, p = .01\), and loneliness, \(Y_{1i} = .010, SE = .004, t(40) = 2.67, p = .01\). Complete multilevel models are presented in Tables 4 and 5 for social relationship strain and loneliness, respectively (multilevel models for social capital and social network size are also presented in Tables 6 and 7, although these analyses did not confirm study hypotheses). For ease of interpretation, these significant interactions are depicted in Figures 4 and 5, with the associations between perceived discrimination and social relationship outcomes plotted separately for individuals residing in states with relatively greater (+1 SD) and relatively lesser (-1 SD) levels of structural discrimination. Consistent with hypotheses, across both relationship strain and loneliness, the association between perceived discrimination and
relationship outcomes was exaggerated for sexual minorities living in states with relatively greater levels of structural discrimination and attenuated for those living in states with relatively lesser levels of structural discrimination.

**Discussion**

For the most part, results provided support for the major hypotheses of Study 1. Confirming and extending past research (e.g., Andersson et al., 2006; Bos et al., 2008; Fokkema & Kuyper, 2009; Valanis et al., 2000), evidence was found for disparities in social relationship outcomes between sexual minority and heterosexual adults in the United States, such that sexual minorities reported significantly smaller social networks, less social capital, more social relationship strain and more loneliness on average. The consistency of this pattern across social relationship outcomes suggests that sexual minorities do in fact face unique obstacles to forming and maintaining strong, healthy social relationships.

A second finding from Study 1 provides insight into an important candidate mechanism—social stigma. Results from multivariate analyses revealed that mean differences in three of the four social relationship outcomes became statistically non-significant after controlling for perceived discrimination. In contrast, only the association of sexual orientation with loneliness remained statistically significant after controlling for perceived discrimination. It is worth noting, however, that the association of sexual orientation with each of the other three social relationship outcomes could be said to be marginally significant. Taken together, this suggests that perceived discrimination is not
the only factor differentially influencing social relationship outcomes among sexual minorities, although the current results confirm that it is certainly a very important factor. In addition to perceived discrimination, Study 1 confirmed the importance of structural discrimination in shaping social relationship outcomes for sexual minorities. Across social relationship strain and loneliness, structural discrimination magnified the deleterious association with perceived discrimination.

It is important to consider the composition of the sample in Study 1, as it is both a limitation and strength of the current study. Ideally, one would utilize a probabilistic, nationally representative sample in order to answer questions regarding disparities in social relationship outcomes between sexual minorities and heterosexual adults in the United States (Meyer & Wilson, 2009), and this lofty goal should certainly be pursued in future research. However, the sample recruited for the current study was a relatively probabilistic subset of the population of MTurk workers. While this population is certainly not fully representative of the population of the United States as a whole (see Paolacci, Changler, & Ipeirotis, 2010, for a description of average MTurk demographics), it is an informative starting point for tackling these research questions. Another strength of the current study is that the recruitment materials made no mention of the fact that the study concerned sexual orientation; therefore selection issues related to minority group identification were greatly attenuated. For example, in response to the self-identification item, one participant responded that he identified as “closeted gay.” Individuals who are not out regarding their sexual orientation are often excluded from research on sexual
minority issues (whether intentionally or unintentionally), but the current design may have enabled a fair number of such individuals to participate.

Also related to sampling, it can be difficult to find a legitimate control group of heterosexuals when studying sexual minority populations (Rothblum, 2007). Although in the current study heterosexuals and sexual minorities were found to differ across certain demographic characteristics (e.g., sex, age), these differences may be attributed more to sexual orientation differences than sampling biases (Rothblum, 2007). The heterosexual sample in the current study represents a valid comparison group for the sexual minorities, as there is no reason to suspect systematic differences in the propensity to participate in MTurk based upon sexual orientation. Finally, because of the sampling method employed in the current study, sexual minorities from across most of the United States were recruited (sexual minorities reported residing in 42 different states). This diversity of residence was critical for testing the effects of structural discrimination.

**Study 2**

The primary aim of Study 2 was to narrow the research focus onto the associations between social stigma and social relationship outcomes among sexual minorities. Specifically, both protective (i.e., group identification) and risk factors (i.e., emotional suppression, chronic inflammation) that may be especially relevant to sexual minority populations were examined (see Figure 1). It was predicted that perceived discrimination would be positively associated with social relationship strain, but that perceived discrimination would have indirect effects through group identification,
emotional suppression and chronic inflammation. Furthermore, it was predicted that the indirect path through group identification would be in the opposite direction (inverse) as the indirect paths through emotional suppression and chronic inflammation (positive; see Figure 1).

Method

Participants for Study 2 were recruited from gay and lesbian community events in the New Orleans area (Southern Decadence and Tulane University Pride Week). In order to control for the diurnal rhythm of IL-6, which appears to be elevated at awakening and bedtime with a trough from about 10:00 to 20:00 (Izawa, Miki, Liu, & Ogawa, 2013), participants at each event were sampled within an approximately three-hour block. Participants recruited from Southern Decadence were sampled between approximately 10:00 and 13:00, while participants recruited from Tulane University Pride Week were sampled between approximately 17:00 and 20:00. Because of the difference in time of day, event was coded and explored as a covariate in all analyses involving IL-6. In order to determine the recruitment goal, power was calculated a priori based upon estimates for detecting indirect effects via bias-corrected bootstrap tests (Fritz & MacKinnon, 2007). Past research with a similar model among African Americans (Doyle & Molix, in press-b) was used to determine approximate values of α and β paths (.26 and .41, respectively). Based upon these values, approximately 115 participants would be necessary in order to achieve .80 power (Fritz & MacKinnon, 2007). Because of the relatively smaller sample size, limiting fine-grained between-groups analyses, only self-identified gay men and
lesbian women were recruited for Study 2. Participants were asked to self-identify as members of one of these groups prior to participation.

In total, ninety-nine sexual minority participants were recruited for this study. Of these participants, 74 identified as gay men (74.7%) and 21 identified as lesbian women (21.2%). The mean age of the sample was 34.60 (SD = 13.01). The majority of participants identified as White (79.8%), but the sample also included individuals identified as multiracial (6.1%), African American (4.0%), Asian (3.0%), and Hispanic (2%). The mean household income of the sample was $101,421 per year (SD = 117,809) and, on average, participants had completed a college degree.

At each of these events, the researchers were positioned near the main route but slightly away from the bulk of the crowd in order to maximize opportunities to approach potential participants. Research assistants, who were supervised by at least one member of the research team who identified as gay or lesbian, approached all individuals attending these events, including those who were solo as well as those in groups. All potential participants were approached by trained research assistants and offered $10.00 compensation for their time and effort. No specific criteria were used when determining which potential participants to approach, but prior to participating interested individuals needed to be over 18 years of age, self-identify as gay or lesbian and have consumed one alcoholic beverage or fewer since the beginning of the day (Wawrzyniak & Whiteman, 2011). All alcohol consumption was recorded so that it could be modeled in statistical analyses. Eligible participants were given a small cup of water in order to rinse their
mouth, clearing any debris. Next, they completed the survey instrument, containing the measures described in the following section. Upon completion of the survey instrument, participants were asked to expectorate 1mL of saliva via the passive drool method into a 2 mL IBL collection device. All saliva samples were stored in a portable cooler until transported to a -80°C freezer at Tulane University for storage.

**Measures**

All measures for this study are included in Appendix D.

*Perceived discrimination.* Perceived discrimination was assessed via the same measure used in Study 1. Additionally, two items were created to parallel perceived discrimination against the self, but worded to reflect perceived discrimination that does not necessarily target the self. These new items were, “You see other people get harassed because of their sexual orientation,” and, “You hear people use gay/lesbian slurs (e.g., fag, dyke).” Participants again indicated how often they had experienced each of these four events on a scale ranging from 1 (*never*) to 6 (*almost everyday*). The two items measuring perceived discrimination targeting the self were highly correlated, *r*(97) = .72, *p* < .001. The two items measuring perceived discrimination not necessarily targeting the self were also significantly correlated, albeit not as strongly, *r*(97) = .44, *p* < .001. The two subscales were also correlated with one another, *r*(97) = .56, *p* < .001, and were retained separately to be used as indicators of perceived discrimination in the following analyses. Additionally, the loading for perceived discrimination targeting the self was fixed at one in order to set the metric for the perceived discrimination factor.
**Group identification.** The behavioral identification scale (Doyle & Molix, 2014b), composed of four items, was included to gauge group identification. Sample items from this scale include, “I read magazines or newspapers geared toward the gay community,” and, “I make a point to vote for political candidates based on their stances on gay rights issues.” Participants indicate how often they engage in each behavior on a scale ranging from 1 (never) to 5 (very often) and mean scores are calculated across all four items. This scale has evidenced acceptable internal consistency in past research, $\alpha = .79$ (Doyle & Molix, 2014b), and also in the present study, $\alpha = .73$.

**Emotional suppression.** Suppression was assessed by the 4-item subscale of the COPE Inventory (Carver, Scheier, & Weintraub, 1989). An example item from this scale, which asks participants to indicate their reactions to difficult or stressful events in their lives, is, “I refuse to believe that it has happened.” Responses to each item are made on a scale ranging from 1 (not at all) to 4 (a lot) and mean scores are calculated across all four items. The denial subscale has evidenced acceptable internal consistency in past work, $\alpha = .71$ (Carver et al., 1989), but demonstrated slightly lesser internal consistency in the present study, $\alpha = .63$.

**IL-6.** As described previously, participants provided 1 mL saliva samples which were temporarily stored in a -80°C freezer at Tulane University (one participant was unable to produce adequate saliva for assay procedures). Samples were then shipped in single-batch overnight on dry ice to a lab at Brandeis University for IL-6 assay. Assays were initially conducted via commercially available enzyme-linked immunosorbent assay
(ELISA) following manufacturer’s instructions, utilizing a 1:5 dilution rate (Salimetrics, State College, PA). These procedures only returned detectable values for 48 out of 98 participants. Dilution rates and other specifics related to assay procedures for salivary IL-6 have often been unreported in the literature, especially in the field of social psychology (e.g., Ratner et al., 2013). Because of the number of non-detectable values, the assay procedure was adjusted to utilize a 1:2 dilution rate and all non-detectable samples were rerun along with 3 previously detected samples to establish consistency. The 3 rerun samples produced nearly identical values. Furthermore, the new dilution rate returned 31 previously undetected values. Between the two procedures, IL-6 levels were detected for a total of 79 participants (79.80%). For the adjusted procedure, the intra-assay coefficient of variability was acceptable, CV = 10.22.

**Social relationship strain.** The same measure of social relationship strain from Study 1 was utilized in Study 2. However, a parallel scale was added to gauge relationship quality with romantic partners. For this scale, participants rated their level of agreement with 4 statements identical to those referring to friendship strain on a scale ranging from 1 (not at all) to 4 (a lot) and mean scores were calculated across all four items for each scale separately. Internal consistency was shown to be adequate for items addressing romantic partner strain, $\alpha = .81$, in past work (Walen & Lachman, 2000). Both of these scales demonstrated adequate, though lesser internal consistency in the current study (friendship strain, $\alpha = .61$, and romantic partner strain, $\alpha = .67$). These two scales were significantly correlated with one another, $r(50) = .46, p = .001$, and were used
as indicators of overall social relationship strain. In the following analyses, the loading for friendship strain was fixed at one in order to set the metric for the social relationship strain factor.

**Results**

**Data Screening**

In Study 2, primary hypotheses were tested with structural equation modeling analyses via AMOS software (Arbuckle, 1997). As in Study 1, missing data were first evaluated. Once again, very few participants had missing data on any of the measures, with the most on the measure of friendship strain \( n = 3 \). However, many participants did not have scores for romantic partner strain, because many participants did not report having a romantic partner, or IL-6, because of issues related to null values discussed previously. In the current study, missing values were handled in analyses via full-information maximum likelihood (FIML) methods when estimating model parameters (Arbuckle, 1996). Two participants also had extreme values on IL-6 (i.e., greater than two standard deviations from the mean), so these extreme outliers were replaced with scores exactly two standard deviations above the mean.

Descriptive statistics and zero-order correlations between all variables to be analyzed in the proposed model, including latent variable indicators, are presented in Table 8. As mentioned previously, indicators for both latent variables (perceived discrimination and social relationship strain) were significantly correlated with one another, supporting the investigation of latent factors. The distribution of each of the
variables in the proposed model was also explored. Perceived discrimination against the self, suppression and IL-6 were each somewhat positively skewed, with IL-6 displaying the greatest skew. However, maximum likelihood estimation has been shown to be robust to the level of skew evidenced by these variables (Finney & DiStefano, 2006), therefore no further transformations or alternative analysis techniques related to non-normal distributions were employed in the current study.

Another note on distribution regards group identification. Because participants were recruited from gay and lesbian community events, there was a chance that they may have been more likely to be highly group-identified in general. This issue was resolved by examination of the distribution of group identification, which had a mean squarely in the middle of the scale and displayed a virtually normal curve (see Figure 6). Therefore, it was determined that these events drew a diverse crowd of sexual minority individuals, not necessarily just those who were highly group-identified. Sampling issues related to group identification were not further pursued in the current study. Before running the primary analyses, associations between IL-6 and potential confounds were examined. IL-6 was not found to be significantly associated with a host of characteristics commonly examined in research with salivary analytes (Schultheiss, Schiepe, & Rawolle, 2012), including smoking, medication, alcohol consumption, caffeine consumption, tooth brushing, sex, age and race. Therefore, none of these variables were included in the following models.

The Proposed Model
To test the proposed model, path coefficients as well as fit indices were examined in structural equation models. In addition to examining chi-squares for model fit, consistent with recommendations (Hooper, Coughlan, & Mullen, 2008) one absolute fit index, the root mean square error of approximation (RMSEA), and one incremental fit index, the comparative fit index (CFI), were reported for each model. The CFI was chosen in particular due to the fact that it performs well with relatively smaller samples (Tabachnick & Fidell, 2007), as in the current study. RMSEA values below .05 and CFI values above .95 are generally accepted as indicative of good model fit. Additionally, non-significant chi-square values indicate that the reproduced covariance matrix does not significantly differ from the observed covariance matrix, suggesting a well fitting model.

The complete proposed model was examined first, with all paths included (see Figure 7). Although this model fit the data well, \( \chi^2(15) = 11.08, p = .75, \) RMSEA < .001 (90% CI: .00, .07), CFI = 1.00, there were a number of non-significant paths. Notably, although the direction of effects was consistent with hypotheses, perceived discrimination did not significantly predict group identification, \( \beta = .11, p = .38, \) nor did group identification significantly predict social relationship strain, \( \beta = -.07, p = .53. \) Because neither of these paths was statistically significant, they were both trimmed in the final model. As hypothesized, the direct path from perceived discrimination to relationship strain was also non-significant, \( \beta = .18, p = .26. \) This indicates that the association between perceived discrimination and social relationship strain was driven by the proposed mechanisms, and therefore this path was also dropped from the final model.
The final model was run with the aforementioned paths excluded (see Figure 8). This model fit the data quite well, $\chi^2(11) = 11.02, p = .44$, RMSEA = .005 (90% CI: .00, .11), CFI = 1.00. In the final model, perceived discrimination significantly predicted increased emotional suppression, $\beta = .30, p = .02$, which in turn significantly predicted increased social relationship strain, $\beta = .36, p = .03$. Perceived discrimination also significantly predicted increased IL-6, $\beta = .18, p = .03$. The only remaining non-significant path was from IL-6 to social relationship strain, $\beta = .20, p = .21$. For theoretical purposes, however, this path was retained. In addition, analyses of chi-square change indicated that fixing this path at 0 (the equivalent of removing it from the model) did not improve model fit, $\Delta\chi^2(1) = 1.36, p = .24$.

**Discussion**

Overall, Study 2 provided mixed support for the proposed model of the effects of perceived discrimination on social relationship strain among sexual minorities. The most consistent evidence was found for the path through emotional suppression. As discussed previously, emotional suppression may be an especially relevant coping strategy or psychological stress response among sexual minorities (D’Augelli, 1992; Martin, 1982). However, the current study unveils a deleterious association between emotional suppression and social relationship functioning. So, although experiences of prejudice and discrimination may instigate such responses (Miller & Kaiser, 2001), expanding upon past work (e.g., Hatzenbuehler et al., 2009; Major & Gramzow, 1999), there may be downstream consequences in domains not previously examined (e.g., social relationship
In the current study, evidence for chronic inflammation as a mechanism linking perceived discrimination to social relationship strain was somewhat more ambiguous. In the final model, the path from perceived discrimination to IL-6 was significant, but the path from IL-6 to relationship strain was not. Yet this non-significant path had a relatively large standardized coefficient, suggesting that power may have been one issue. Indeed, the total sample was not especially large and somewhat fewer participants had detectable levels of IL-6, weakening power to detect a significant association here. Consideration of the correlation matrix (Table 5) is also somewhat informative regarding this point. Although IL-6 was positively associated with greater friendship strain and greater partner strain, only the association with partner strain was significant. This correlation was also of a considerably greater magnitude. Perhaps IL-6 is more closely tied to certain types of relationships, such as the intimate bonds with one’s romantic partner, and somewhat less tied to one’s friendships. Again, greater statistical power may have uncovered significant associations with both types of strain, but future work might also consider differences between the types of social relationships examined.

The least support was found for the predicted protective factor, group identification. Although the initial model including the path through group identification fit the model well and the effects were both in the directions consistent with hypotheses (i.e., perceived discrimination was related to greater group identification and group identification was related to lesser social relationship strain), neither effect was
statistically significant. It is possible that this was also a result of limited statistical power, however unlike IL-6, nearly all participants had scores on the measure of group identification. Furthermore, group identification was not significantly correlated with any other study variable in zero-order correlations. One reason that group identification may not have acted as a protective factor in the proposed model is that it may be protective of individual level outcomes (e.g., self-esteem) as demonstrated in past research (e.g., Doyle & Molix, 2014b) but not protective of interpersonal outcomes.

While being highly identified with and involved in one’s minority group may lead to more friendships with other group members, it could actually lead to distancing from individuals outside of one’s social group, such as dominant group members (e.g., heterosexuals). In terms of sexual minorities’ romantic relationships, group identification, especially behavioral identification, may also provide more romantic alternatives that could potentially strain current relationships. Past research has in fact found evidence of a curvilinear association between sexual minority group involvement and romantic relationship quality, such that both low and high levels of involvement were related to poorer relationship quality on average (Beals & Peplau, 2001). Future research should aim to further clarify the potentially complicated associations between discrimination, group identification and social relationship outcomes.

**General Discussion**

Two complementary studies built upon one another in order to elucidate disparities in social relationship outcomes between sexual minorities and heterosexuals,
as well as examine etiologic factors that may be responsible for producing these disparities. In Study 1, evidence was found for mean differences in a host of social relationship outcomes, including social networks, social capital, social relationship strain and loneliness. These outcomes run the gamut from relatively objective (social networks) to relatively subjective (loneliness), and from micro-level (loneliness) to meso-level (social relationship strain) to macro-level (social capital). The consistent pattern of results across dependent variables also suggests that these effects are relatively broad and reliable. Although all sexual minorities may not experience all forms of social relationship impairments, at the aggregate and mean levels, these disparities in social relationship outcomes based upon sexual orientation are both stark and staggering.

Rather than viewing these differences as innate and determined by social categories (Dar-Nimrod & Heine, 2011; Krieger, 2005), it is vital to recognize unique social factors that may be responsible for producing disparities. In the current work, consistent with past research on psychological and physical health disparities based upon sexual orientation (Hatzenbuehler, 2009; Lick et al., 2013; Meyer, 2003b), social stigma was posited as a key etiologic factor. Confirming the importance of social stigma, perceived discrimination was shown to influence social relationship outcomes among sexual minorities in Studies 1 and 2. In fact, controlling for levels of perceived discrimination significantly attenuated mean differences in three of the four social relationship outcomes in Study 1, suggesting that group differences may indeed be a product of unique contributions of social stigma to impairments in relationship
functioning. Study 1 also provided support for the importance of considering structural discrimination in addition to perceived discrimination. Structural discrimination is beginning to gain greater attention amongst researchers interested in the effects of social stigma on health (Hatzenbuehler et al., 2014). The present work points toward this topic, especially the interactive effects of perceived and structural discrimination (e.g., Bauermeister, in press; Goldberg & Smith, 2011; Hatzenbuehler & McLaughlin, 2014) as an important area for further research.

Further scrutinizing the direct effects of stigma on social relationship outcomes, Study 2 explored risk and protective factors that may represent pathways from discrimination to relationship strain. Although the evidence for mechanisms ranged from strongest to weakest for emotional suppression, chronic inflammation and behavioral identification, the overall model, both as initially proposed (Figure 7) and with final trimmed paths (Figure 8), fit the data well. This work on the biopsychosocial correlates of stigma built upon other research utilizing secondary data with an African American sample (Doyle & Molix, in press-b). Consistent results across these two studies point toward potentially fruitful avenues for further research with members of other stigmatized groups. However, there were nuances between these two studies, including the importance and significance of emotional suppression as a coping response among sexual minorities (D’Augelli, 1992; Martin, 1982) and the relatively more mixed results for the effects of chronic inflammation in the current research. Future research should continue to examine factors that are both common across stigmatized identities as well as
potentially unique to specific minority groups. Emotion dysregulation may represent a common pathway from social stigma to impaired relationship outcomes, but emotion dysregulation may manifest differently between groups, for example as venting or aggression among racial minority men (e.g., Doyle & Molix, in press-b; Trail et al., 2012) and as suppression among sexual minorities, as demonstrated in Study 2.

**Implications and Conclusion**

Past research has shown that sexual minorities are burdened with higher rates of psychological and physical health problems, including but not limited to depression and anxiety (Cochran & Mays, 2009; King et al., 2008; Meyer, 2003b) as well as cardiovascular disease and cancer (Dibble, Roberts & Nussey, 2004; Lick et al., 2013; Wang, Hausermann, Counatsou, Aggleton, & Weiss, 2007). The remediation of these burdens is slowly becoming a priority among some researchers and practitioners within the United States (HHS, 2014; IOM, 2011). However, as of yet, these health disparities have proven to be relatively intractable and it may be that current policies and interventions are too narrow in scope (Hong, Espelage, & Kral, 2011). The current work should be of particular interest to those concerned with the remediation of health disparities as impaired social relationships are a known risk factor for many of the most serious diseases iniquitably burdening sexual minority men and women today (Berkman, 1995; Hawkley & Cacioppo, 2010). By neglecting the importance of social relationships for sexual minority health, researchers and policy makers may be overlooking one of the most critical avenues for intervention.
At the structural level, advocates and policy makers might use the results of the current research to argue for protective policy and against discriminatory policy targeting sexual minorities (Hatzenbuehler, 2010; Herek, 2010; Matthews & Adams, 2009; Rostosky & Riggle, 2011). For example, the recent repeal of the Defense of Marriage Act may have positive effects on sexual minorities’ romantic relationships (Doyle & Molix, in preparation) and in turn improve psychological and physical health outcomes in the long run. Other discriminatory public policy, including same-sex marriage prohibitions at the state level, must also be repealed and protective policies, such as the Employment Non-Discrimination Act, must be passed. These changes to the structure of the society of the United States could have very real and lasting effects on sexual minority health (Hatzenbuehler, 2010).

While public policy, as a form of structural discrimination, is surely important in determining health outcomes for sexual minorities, daily hassles related to prejudice and discrimination are insidious and tend to accumulate over time (Silverschanz et al., 2008; Swim et al., 2008). By their very nature, these manifestations of social stigma may be capable of contaminating social relationships and yet remain relatively unobserved and not closely scrutinized by sexual minorities or those attempting to improve health outcomes among this population. There is some hope that changing public policy can affect change at the individual level, but other programs within communities and networks that are aimed at eradicating prejudice and discrimination, perhaps through
teaching diversity or building intergroup communities and spaces, are necessary (Matthews & Adams, 2009; Rostosky & Riggle, 2011).

Finally, although public policy and attitude change are the ultimate goals in eradicating prejudice and discrimination, something must be done in the short-term to help empower and build resilience among sexual minorities who are struggling with minority stressors on a daily basis. According to Kwon’s (2013) review of resilience factors, three important predictors of resilience among sexual minorities are social support, emotional openness and optimism. According to Kwon’s framework, these resilience factors reduce reactivity to prejudice and discrimination, thus protecting sexual minorities from negative health outcomes. Clinicians and practitioners working with sexual minority individuals and couples should focus on building these resilience factors with their clients. Clinicians and practitioners can also help sexual minority individuals and couples recognize the influence that minority stressors have on their social relationships, with awareness potentially disrupting negative effects. Interventions targeted toward reducing loneliness may also be effective among sexual minorities, as they have been shown to be among heterosexuals (Masi, Chen, Hawkley, & Cacioppo, 2011). However, primary prevention is also critical (Matthews & Adams, 2009); friends and allies of sexual minority individuals can play their part in supporting positive outcomes before the negative effects of minority stress lead sexual minorities to seek professional help.
Researchers have been remiss in neglecting to recognize the influence of social relationship disparities on other intractable health disparities inequitably affecting sexual minorities. The present work reveals consistent evidence of a divide in social relationship outcomes between sexual minority and heterosexual adults in the United States. Moreover, these studies shed light on the critical role of social stigma as an etiologic factor. By its very nature, the term ‘social stigma’ is interpersonal, but the majority of past research on social stigma has focused on intrapersonal outcomes (Major & Sawyer, 2009). A paradigmatic shift in the way researchers think about and conceptualize stigma will be necessary to advance study on the intersection of stigma and social relationships. Potential avenues for attenuating social stigma’s deleterious effects have been reviewed here but more applied work must also be done to examine the efficacy of potential interventions. Disrupting the negative effects of social stigma on relationship outcomes will certainly not be an easy endeavor, but it is a necessary one in order to achieve health equity across all social groups.
Table 1

*Frequency of Self-Identification Labels by Sexual Orientation Response on Kinsey-Type Scale*

<table>
<thead>
<tr>
<th>Orientation</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heterosexual</td>
<td>345</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>(94.5%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mostly heterosexual</td>
<td>65</td>
<td>12</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>20</td>
</tr>
<tr>
<td>(60.7%)</td>
<td>(11.2%)</td>
<td>(1.9%)</td>
<td>(2.8%)</td>
<td>(18.7%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bisexual</td>
<td>1</td>
<td>39</td>
<td>0</td>
<td>10</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>(2.0%)</td>
<td>(76.5%)</td>
<td>(19.6%)</td>
<td>(2.0%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mostly gay/lesbian</td>
<td>0</td>
<td>2</td>
<td>10</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>(12.5%)</td>
<td>(62.5%)</td>
<td>(18.8%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gay/lesbian</td>
<td>0</td>
<td>0</td>
<td>37</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>(92.5%)</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

*Note.* This table displays cross-tabulated values for participants responses to the initial sexual orientation item and the sexual orientation self-identification item near the end of the survey. Self-identification labels were coded as, 1 = Completely heterosexual/straight, 2 = Bisexual, bicurious, 3 = Completely homosexual/gay/lesbian, 4 = Queer, fluid, pansexual, 5 = Asexual, 6 = Unsure/questioning. Counts are displayed for each cell outside of parentheses and percentages, also cross-tabulated, are displayed in parentheses. Frequencies within each group based upon responses to the initial sexual
orientation item do not necessarily total to %100 because some participants did not provide a response to the self-identification label item ($n = 26, 4.5\%$). $N = 579$. 

Table 2

Zero-Order Correlations between Sexual Orientation and Other Demographic Characteristics

<table>
<thead>
<tr>
<th>Measure</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sexual orientation</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Age</td>
<td>-.17***</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Income</td>
<td>-.02</td>
<td>-.04</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Sex</td>
<td>.20***</td>
<td>.08</td>
<td>.01</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Education level</td>
<td>-.02</td>
<td>.07</td>
<td>.11*</td>
<td>.07</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>6. Race</td>
<td>.03</td>
<td>-.17***</td>
<td>.03</td>
<td>.03</td>
<td>-.02</td>
<td>--</td>
</tr>
</tbody>
</table>

*Note.* Sexual orientation (0 = Heterosexual, 1 = Sexual minority), sex (0 = Male, 1 = Female) and race (0 = White, 1 = Racial minority) were dummy coded. N = 579. *p < .05, ***p < .001.
Table 3

Zero-Order Correlations between Social Relationship Outcomes and Social Stigma for Heterosexuals and Sexual Minorities

<table>
<thead>
<tr>
<th>Measure</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Perceived discrimination</td>
<td>--</td>
<td>.06</td>
<td>.04</td>
<td>-.01</td>
<td>.20***</td>
<td>.07</td>
</tr>
<tr>
<td>2. Structural discrimination</td>
<td>.08</td>
<td>--</td>
<td>.03</td>
<td>.08</td>
<td>.04</td>
<td>-.06</td>
</tr>
<tr>
<td>3. Social network size</td>
<td>-.03</td>
<td>-.04</td>
<td>--</td>
<td>.24***</td>
<td>.10†</td>
<td>-.31***</td>
</tr>
<tr>
<td>4. Social capital</td>
<td>-.07</td>
<td>-.06</td>
<td>.30***</td>
<td>--</td>
<td>-.05</td>
<td>-.19***</td>
</tr>
<tr>
<td>5. Social relationship strain</td>
<td>.18**</td>
<td>.09</td>
<td>.06</td>
<td>-.12†</td>
<td>--</td>
<td>.18**</td>
</tr>
<tr>
<td>6. Loneliness</td>
<td>.07</td>
<td>-.08</td>
<td>-.27***</td>
<td>-.17*</td>
<td>.21**</td>
<td>--</td>
</tr>
</tbody>
</table>

Note. Coefficients above the diagonal represent values for heterosexuals (n = 365) and coefficients below the diagonal represent values for sexual minorities (n = 214). †p < .10, *p < .05, **p < .01, ***p < .001.
Table 4

Multilevel Model Predicting Social Relationship Strain from Perceived Discrimination at Level 1 and Structural Discrimination at Level 2

<table>
<thead>
<tr>
<th>Level 1</th>
<th>b</th>
<th>SE</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta_{0i}$</td>
<td>1.848</td>
<td>.038</td>
<td>49.11</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>$\beta_{1i}$</td>
<td>.112</td>
<td>.035</td>
<td>3.24</td>
<td>&lt; .01</td>
</tr>
</tbody>
</table>

Level 2

<table>
<thead>
<tr>
<th></th>
<th>$Y_{0i}$</th>
<th>SE</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.004</td>
<td>.004</td>
<td>1.15</td>
<td>.26</td>
</tr>
<tr>
<td></td>
<td>.009</td>
<td>.004</td>
<td>2.68</td>
<td>.01</td>
</tr>
</tbody>
</table>

Note. Level 1 $n = 213$, Level 2 $k = 42$. Perceived discrimination and structural discrimination were both grand mean-centered. $\beta_{0i}$ represents the level of relationship strain for those with mean levels of both perceived and structural discrimination, $\beta_{1i}$ represents the main effect of perceived discrimination on relationship strain, $Y_{0i}$ represents the main effect of structural discrimination on relationship strain and $Y_{1i}$ represents the interaction between structural and perceived discrimination.
Table 5

*Multilevel Model Predicting Loneliness from Perceived Discrimination at Level 1 and Structural Discrimination at Level 2*

<table>
<thead>
<tr>
<th></th>
<th>$b$</th>
<th>$SE$</th>
<th>$t$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\beta_{0j}$</td>
<td>1.814</td>
<td>.045</td>
<td>40.47</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>$\beta_{1j}$</td>
<td>.054</td>
<td>.037</td>
<td>1.46</td>
<td>.15</td>
</tr>
<tr>
<td><strong>Level 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$Y_{0i}$</td>
<td>-.006</td>
<td>.005</td>
<td>-1.23</td>
<td>.23</td>
</tr>
<tr>
<td>$Y_{1i}$</td>
<td>.010</td>
<td>.004</td>
<td>2.67</td>
<td>.01</td>
</tr>
</tbody>
</table>

*Note.* Level 1 $n = 213$, Level 2 $k = 42$. Perceived discrimination and structural discrimination were both grand mean-centered. $\beta_{0j}$ represents the level of loneliness for those with mean levels of both perceived and structural discrimination, $\beta_{1j}$ represents the main effect of perceived discrimination on loneliness, $Y_{0i}$ represents the main effect of structural discrimination on loneliness and $Y_{1i}$ represents the interaction between structural and perceived discrimination.
Table 6

Multilevel Model Predicting Social Capital from Perceived Discrimination at Level 1 and Structural Discrimination at Level 2

<table>
<thead>
<tr>
<th></th>
<th>b</th>
<th>SE</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\beta_{0j}$</td>
<td>2.211</td>
<td>.049</td>
<td>45.45</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>$\beta_{1j}$</td>
<td>-.004</td>
<td>.005</td>
<td>-.75</td>
<td>.46</td>
</tr>
<tr>
<td>Level 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$Y_{0i}$</td>
<td>-.053</td>
<td>.043</td>
<td>-1.25</td>
<td>.22</td>
</tr>
<tr>
<td>$Y_{1i}$</td>
<td>.007</td>
<td>.005</td>
<td>1.42</td>
<td>.16</td>
</tr>
</tbody>
</table>

Note. Level 1 $n = 213$, Level 2 $k = 42$. Perceived discrimination and structural discrimination were both grand mean-centered. $\beta_{0j}$ represents the level of social capital for those with mean levels of both perceived and structural discrimination, $\beta_{1j}$ represents the main effect of perceived discrimination on social capital, $Y_{0i}$ represents the main effect of structural discrimination on social capital and $Y_{1i}$ represents the interaction between structural and perceived discrimination.
Table 7

*Multilevel Model Predicting Social Network Size from Perceived Discrimination at Level 1 and Structural Discrimination at Level 2*

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\beta_{0j}$</td>
<td>3.442</td>
<td>.072</td>
<td>48.08</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>$\beta_{ij}$</td>
<td>-.003</td>
<td>.007</td>
<td>-.50</td>
<td>.62</td>
</tr>
<tr>
<td>Level 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$Y_{01}$</td>
<td>-.032</td>
<td>.049</td>
<td>-.65</td>
<td>.52</td>
</tr>
<tr>
<td>$Y_{11}$</td>
<td>.005</td>
<td>.006</td>
<td>.90</td>
<td>.38</td>
</tr>
</tbody>
</table>

*Note.* Level 1 $n = 213$, Level 2 $k = 42$. Perceived discrimination and structural discrimination were both grand mean-centered. $\beta_{0j}$ represents the social network size for those with mean levels of both perceived and structural discrimination, $\beta_{ij}$ represents the main effect of perceived discrimination on network size, $Y_{01}$ represents the main effect of structural discrimination on network size and $Y_{11}$ represents the interaction between structural and perceived discrimination.
Table 8

Zero-Order Correlations between Variables in the Proposed Model

<table>
<thead>
<tr>
<th>Measure</th>
<th>M (SD)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Disc.-self</td>
<td>1.89 (.86)</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Disc.-other</td>
<td>3.38 (1.13)</td>
<td>.56**</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Suppression</td>
<td>1.66 (.62)</td>
<td>.21*</td>
<td>.22*</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. IL-6</td>
<td>5.67 (8.46)</td>
<td>.17</td>
<td>.25*</td>
<td>.22*</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Identification</td>
<td>3.62 (.88)</td>
<td>.06</td>
<td>.09</td>
<td>.01</td>
<td>.07</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Friend. strain</td>
<td>1.98 (.59)</td>
<td>.21*</td>
<td>.17†</td>
<td>.27**</td>
<td>.11</td>
<td>-.05</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>7. Partner strain</td>
<td>1.66 (.64)</td>
<td>-.03</td>
<td>-.02</td>
<td>.31*</td>
<td>.35*</td>
<td>.01</td>
<td>.46**</td>
<td>--</td>
</tr>
</tbody>
</table>

Figure 1. Proposed Structural Model of Pathways from Perceived Discrimination to Social Relationship Strain
Figure 2. Mean Differences in Social Relationship Outcomes between Sexual Minority and Heterosexual Participants Note. Sex and age were entered as covariates in these analyses. Scores for network size ranged from 0 to 5, scores for loneliness ranged from 1 to 3, scores for relationship strain and social capital each ranged from 1 to 4. *p < .05, ** p < .01, ***p < .001.
Figure 3. Distribution of Scores on Structural Discrimination Variable Note. Structural discrimination was coded from data available at the HRC website (http://www.hrc.org/resources/entry/maps-of-state-laws-policies). Scores on structural discrimination ranged from 0 to 30. The bimodal distribution indicates that states tended to have relatively homogenous public policy regarding sexual minority rights (i.e., relatively protective versus relatively discriminatory public policy).
Figure 4. The Association between Perceived Discrimination and Social Relationship Strain Moderated by Structural Discrimination
Figure 5. The Association between Perceived Discrimination and Loneliness Moderated by Structural Discrimination
Figure 6. Distribution of Scores on Group Identification Variable Note. Scores on group identification ranged from 1 to 6. A normal curve is plotted over the frequency distribution for descriptive purposes. Because the observed distribution approximates this curve, the distribution of group identification can be said to be relatively normal.
Figure 7. Initial Model with all Proposed Pathways Note. All coefficients presented are standardized. Time of day for data collection (i.e., morning or evening) was included in the model as a predictor of IL-6 and was allowed to covary with perceived discrimination but is not depicted. Fit statistics for the model are as follows: $\chi^2(15) = 11.08, p = .75$, RMSEA < .001 (90% CI: .00, .07), CFI = 1.00. *$p < .05$, **$p < .001$. 
Figure 8. Final Model with Paths Trimmed Note. All coefficients presented are standardized. Time of day for data collection (i.e., morning or evening) was included in the model as a predictor of IL-6 and was allowed to covary with perceived discrimination but is not depicted. Fit statistics for the model are as follows: $\chi^2(11) = 11.02, p = .44$, RMSEA = .005 (90% CI: .00, .11), CFI = 1.00. *$p < .05$, ***$p < .001$. 
Principal Investigator: David Matthew Doyle, M.A.
Faculty Advisor: Lisa Molix, Ph.D.
Study Title: Social Relationships and Social Identities

Introduction
You are invited to participate in a research study to better understand the personal and social experiences of members of various communities. No research activity is to be conducted until you have had an opportunity to review this consent form, ask any questions you may have, and provide consent below. We are conducting this research study to better understand how members of various communities experience their social relations and how this is linked to their well-being.

What are the study procedures? What will I be asked to do?
If you agree to take part in this study, you will then be asked to complete a brief online survey (approximately 10 minutes) containing items related to your personal and relational well-being and your perceptions of your social identities. We are seeking to recruit about 1000 participants for this study.

What are the risks or inconveniences of the study? What are the benefits of the study?
We believe there are no known risks associated with this research study; however, a possible inconvenience may be the time it takes to complete the study. You may not directly benefit from this research; however, we hope that your participation in the study may aid in our understanding of the factors involved in well-being among various groups.

Will I receive payment for participation? Are there costs to participate?
If you agree to participate in this study, you will be paid $.50 as compensation for your time and effort. There are no costs to you to participate in this study.

How will my personal information be protected?
All data provided during the course of this study will be kept completely confidential and anonymous. A random participant code will be generated for your survey but this code will not be linked to any of your personal information at any point during this study. You should also know that the Tulane University Human Research Protection Office, Social/Behavioral Institutional Review Board (IRB) and/or the Office of Research Compliance may inspect study records as part of its auditing program, but these reviews will only focus on the researchers and not on your responses or involvement. The IRB is a group of people who review research studies to protect the rights and welfare of research participants.

Can I stop being in the study and what are my rights?
You do not have to be in this study if you do not want to. If you agree to be in the study, but later change your mind, you may drop out at any time. There are no penalties or
consequences of any kind if you decide that you do not want to participate. Furthermore, you may choose not to answer any questions that you do not want to answer without penalty.

**Whom do I contact if I have questions about the study?**
Take as much time as you like before you make a decision to participate in this study. We will be happy to answer any question you have about this study. If you have further questions about this study, want to voice concerns or complaints about the research or if you have a research-related problem, you may contact the faculty advisor, Lisa Molix, at 504-314-7549 or lmolix@tulane.edu. If you would like to discuss your rights as a research participant, discuss problems, concerns, and questions; obtain information; or offer input with an informed individual who is unaffiliated with the specific research, you may contact the Tulane University Human Research Protection Office at 504-988-2665 or email at irbmain@tulane.edu.

**Documentation of Consent:**
I have read this form and decided that I will participate in the research project described above. Its general purposes, the particulars of involvement and possible risks and inconveniences have been explained to my satisfaction. I understand that I can withdraw at any time. My signature also indicates that I have received a copy of this consent form.

- I have read this form and consent to participate in the current study.
- I have read this form and decline to consent to participate in the current study.
Appendix B: Survey Instrument, Study 1

1. How do you identify your sexual orientation?
   - Heterosexual
   - Mostly Heterosexual
   - Bisexual
   - Mostly Bisexual
   - Gay/Lesbian
   - Mostly Gay/Lesbian

What is your age? ___________  
What is your gender? ___________  
What is your race? _________________  
Please estimate your average yearly household income. _________________  
In what state do you reside? ___________  
What is the highest level of education you have completed? _________________  
Are you currently involved in a romantic relationship?  Y  N  
If so, for how long? _________________

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>One</td>
<td>Two</td>
<td>Three or Four</td>
<td>Five thru Eight</td>
<td>Nine or More</td>
<td></td>
</tr>
</tbody>
</table>

FAMILY: Considering the people to whom you are related either by birth or marriage . . .  
1. _____ How many relatives do you see or hear from at least once a month?  
2. _____ How many relatives do you feel close to such that you could call on them for help?  
3. _____ How many relatives do you feel at ease with that you can talk about private matters?  

FRIENDSHIPS: Considering all of your friends including those who live in your neighborhood . . .  
4. _____ How many of your friends do you see or hear from at least once a month?  
5. _____ How many friends do you feel close to such that you could call on them for help?  
6. _____ How many friends do you feel at ease with that you can talk about private matters?  

Please consider your friends when answering the following questions. Mark a response for each of different type of person in the space provided.  

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>Often</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. ______ How often do they criticize you?
2. ______ How often do they make too many demands on you?
3. ______ How often do they let you down when you are counting on them?
4. ______ How often do they get on your nerves?

The next questions are about how you feel about different aspects of your life. For each one, indicate how often you feel that way.

1. Hardly Ever 2. Some of the Time 3. Often

1. ______ How often do you feel that you lack companionship?
2. ______ How often do you feel left out?
3. ______ How often do you feel isolated from others?

What term best describes your sexual orientation? ____________

1. Not At All 2. A Lot

1. _____ In general, would you say that your neighbors can be trusted?
2. _____ Do you think that people in your neighborhood aid each other?

Please consider how often each of the following events occurs because of your sexual orientation.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>Less Than A Few</td>
<td>A Few</td>
<td>At Least Once A</td>
<td>Almost Once A</td>
<td>Everyday</td>
</tr>
<tr>
<td>Year</td>
<td>Times A</td>
<td>Times A</td>
<td>Month</td>
<td>Week</td>
<td></td>
</tr>
</tbody>
</table>

1. _____ You are called names or insulted because of your sexual orientation.
2. _____ You are threatened or harassed because of your sexual orientation.
Appendix C: Informed Consent Form, Study 2

Principal Investigator: David Matthew Doyle, M.A.
Faculty Advisor: Lisa Molix, Ph.D.
Study Title: Gay Community Well-Being Study

Introduction
You are invited to participate in a research study to better understand the personal and social experiences of members of the gay/lesbian community. No research activity is to be conducted until you have had an opportunity to review this consent form, ask any questions you may have, and sign this document if applicable. We are conducting this research study to better understand how members of the gay community experience their social relations and how this is linked to their health.

What are the study procedures? What will I be asked to do?
If you agree to take part in this study, you will then be asked to complete a brief survey (approximately 10 minutes) related to your personal and relational well-being and social identity followed by collection of 1ml of saliva which will be used to assess markers of inflammation, such as c-reactive protein and interleukin-6, indicating systemic levels of inflammation in the body. Only these markers of inflammation will be assayed, we will not use these samples for other purposes such as DNA analysis. Saliva samples may be stored for up to six months, at which point they will be shipped to an independent lab for assay and then subsequently discarded. We are seeking to recruit about 300 participants for this study.

What are the risks or inconveniences of the study? What are the benefits of the study?
We believe there are no known risks associated with this research study; however, a possible inconvenience may be the time it takes to complete the study. You may not directly benefit from this research; however, we hope that your participation in the study may aid in our understanding of the factors involved in well-being among sexual minorities.

Will I receive payment for participation? Are there costs to participate?
If you participate, you will be paid $10.00 compensation for time/effort. There are no costs to participate in this study.

How will my personal information be protected?
All data provided during the course of this study (including your saliva samples) will be kept completely confidential and anonymous. A random participant code will be generated for your survey and saliva sample but this code will not be linked to any of your personal information at any point. You should also know that the Tulane University Human Research Protection Office, Social/Behavioral Institutional Review Board (IRB) and/or the Office of Research Compliance may inspect study records as part of its auditing program,
but these reviews will only focus on the researchers and not on your responses. The IRB is a group of people who review research studies to protect the rights and welfare of research participants.

**Can I stop being in the study and what are my rights?**

You do not have to be in this study if you do not want to. If you agree to be in the study, but later change your mind, you may drop out at any time. There are no penalties or consequences of any kind if you decide that you do not want to participate.

**Whom do I contact if I have questions about the study?**

Take as much time as you like before you make a decision to participate in this study. We will be happy to answer any question you have about this study. If you have further questions about this study, want to voice concerns or complaints about the research or if you have a research-related problem, you may contact the principal investigator, Lisa Molix at 504-314-7549 or lmolix@tulane.edu. If you would like to discuss your rights as a research participant, discuss problems, concerns, and questions; obtain information; or offer input with an informed individual who is unaffiliated with the specific research, you may contact the Tulane University Human Research Protection Office at 504-988-2665 or email at irbmain@tulane.edu.

**Documentation of Consent:**

I have read this form and decided that I will participate in the research project described above. Its general purposes, the particulars of involvement and possible risks and inconveniences have been explained to my satisfaction. I understand that I can withdraw at any time. My signature also indicates that I have received a copy of this consent form.

____________________________________________      __________________________
Subject                        Date

____________________________________________      __________________________
Person Obtaining Consent        Date
Appendix D: Survey Instrument, Study 2

What is your age? ___________
What is your gender? ___________
What is your race? _________________
Please estimate your average yearly household income. ___________
In what state do you reside? ________
What is the highest level of education you have completed? _________________
Are you currently involved in a romantic relationship? Y   N
If so, for how long? _________________
What is your height? ___________
What is your weight? ___________
Do you smoke? Y   N
How many hours has it been since you brushed your teeth? ___________
How many hours ago has it been since you consumed caffeine (coffee, tea, soda, chocolate)? ___________
How many hours ago has it been since you consumed an alcoholic beverage? ___________
Are you currently taking any hormone-altering medications (including oral contraceptives)? Y   N
Please indicate any drugs/medications you are currently taking.
_____________________________________

Please rate how often you engage in each of the following activities.

1   2   3   4   5
Never  Almost Never  Sometimes  Fairly Often  Very Often

1. _____ I watch television programs geared toward the gay community.
2. _____ I read magazines or newspapers geared toward the gay community.
3. _____ I keep up with news about what’s going on in the gay community.
4. _____ I make a point to vote for political candidates based on their stances on gay rights issues.

Please consider your friends and spouse/partner when answering the following questions. Mark a response for each of different type of person in the space provided.

1         2         3         4
Never     Often
Friends  Spouse/Partner
1. ______  2. ______ How often do they criticize you?
3. ______  4. ______ How often do they make too many demands on you?
5. ______  6. ______ How often do they let you down when you are counting on them?
7. ______  8. ______ How often do they get on your nerves?

We are interested in how people respond when they confront difficult or stressful events in their lives. These statements ask you to indicate what you generally do and feel when you experience stressful events.

1. _____ I say to myself "this isn't real."
2. _____ I act as though it hasn't even happened.
3. _____ I refuse to believe that it has happened.
4. _____ I pretend that it hasn't really happened.

Please consider how often each of the following events occurs because of your sexual orientation.

1. _____ You are called names or insulted because of your sexual orientation.
2. _____ You are threatened or harassed because of your sexual orientation.
3. _____ You hear people use gay/lesbian slurs (e.g., fag, dyke).
4. _____ You see other people get harassed because of their sexual orientation.
References


BIOGRAPHY

David Matthew Doyle, originally from Brookfield, Illinois, received his undergraduate degree in psychology from the University of Illinois at Urbana-Champaign in 2005. Subsequently, he worked as a research assistant in the Department of Psychology at Northwestern University. In 2010, Mr. Doyle completed his Master’s in Social Psychology at Loyola University Chicago and entered the doctoral program at Tulane University. Mr. Doyle’s research broadly focuses on how social identities, especially devalued identities, affect health outcomes, including psychological, physical and social. Mr. Doyle’s work is interdisciplinary in nature, integrating theories and methods from social psychology, public health and neuroendocrinology. The overarching goal of his research is to reduce and prevent social disparities in health.