An Examination of the Direct and Indirect Effects of Minority Stress on Mental and Physical Health in Sexual Minorities

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This thesis titled
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Abstract

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An Examination of the Direct and Indirect Effects of Minority Stress on Mental and Physical Health in Sexual Minorities

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Health disparities between sexual minorities and their heterosexual counterparts in regards to morbidity and mortality are well documented and persist in the present. Researchers have suggested that these health disparities may be due to stressful social situations and environments that are created by stigma, prejudice, and discrimination (i.e., minority stress). Minority stress is categorized into distal social stressors (i.e., events that occur outside of the individual) such as overt discriminatory acts and proximal social stressors (i.e., process that occur within the individual) such as stigma consciousness (e.g., the internalization of prejudice).

The current study recruited 277 LGB individuals to complete an online survey at one time point. Using structural equation modeling, the direct and indirect effects of minority stress (i.e., discrimination and stigma consciousness) on poor mental and physical health were examined. Discrimination from family and friends was found to be directly and indirectly, via perceived stress reactivity, associated with poorer mental and physical health. Two moderators, social identity and hardiness, were also examined. Hardiness moderated the direct association between stigma consciousness and poor mental and physical health. Discussion, implications, and future directions are provided.
I would like to dedicate this thesis to my mother, Olga Figueroa, who taught me the value of education and hard work. I would also like to dedicate this thesis to my partner, Mark Clark, for his support and encouragement throughout this process.
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Introduction

Health disparities between mainstream and minority populations in regards to morbidity and mortality are well documented and persist in the present day (Brennan, Ramirez, Baker, Metzler, 2008; Paradies, 2006; United States Department of Health and Human Services, 2000; 2011). Specifically lesbian, gay, and bisexual individuals (LGB) are at an increased risk for mental (e.g., DiPlacido, 1998; Hatzenbuehler, 2009; Meyer, 2003) and physical (e.g., Cochran & Mays, 2007; Huebner & Davis, 2007) health problems compared to their heterosexual counterparts. Examining why these differences exist between majority and minority groups is essential to understanding and possibly reducing health disparities between majority and minority groups.

Researchers have suggested that these health disparities may be due to stressful social situations and environments that are created by stigma, prejudice, and discrimination (i.e., minority stress; Meyers, 2003). Minority stress is conceptualized as stressors that are distinct from the general stressors experienced by the mainstream. Minority stress is further categorized into distal social stressors (i.e., events that occur outside of the individual) such as overt discriminatory acts and proximal social stressors (i.e., process that occur within the individual) such as stigma consciousness (e.g., the internalization of prejudice).

Discrimination is a fairly common experience in the lives of LGB individuals (Mays & Cochran, 2001). Given the prevalence of discrimination among gay and lesbian individuals, it is especially important to understand its potential impact on mental and physical health. Although the negative consequences of sexual orientation discrimination
have been established in regards to mental health (e.g., Hatzenbuehler et al., 2008; Herek & Garnets, 2007; Lewis, Derlega, Griffin, Krowinski, 2003; Mays & Cochran, 2001; Meyer, 2003), only a 3 studies have looked at physical health outcomes (e.g., Huebner & Davis, 2007; Zamboni & Crawford, 2007). Furthermore, little is known about the factors that may influence the association between discrimination and mental and physical health in the LGB population.

One factor that may influence the association between minority stress and health is social identity. The influence of social identity (i.e., the portion of an individual self-concept or self-perception that is derived from membership in a relevant social group) only recently has been examined in regards to sexual orientation discrimination and stigma consciousness (Fingerhut, Peplau & Ghavami, 2005; Fingerhut, Peplau & Gable, 2010). The few studies that exist in regards to sexual orientation discrimination and stigma consciousness suggest social identity may have a buffering effect on the negative consequences of stigma consciousness and mental health (Fingerhut et al., 2005; Fingerhut et al., 2010). However, the different aspects of social identity (i.e., psychological and behavioral) and their role in the association between discrimination and health needs to be further examined in the LGB population. The current study extends previous findings by examining the effects of social identity on the negative consequences of discrimination and stigma consciousness on both mental and physical health.

The pathway(s) by which minority stress may affect health also needs to be further examined in the LGB population. Recently, Pascoe and Smart Richman (2009)
conducted a review of discrimination literature across various groups (e.g., race, gender, sexual orientation etc.) and suggested not only direct pathways but also possible indirect pathways by which discrimination may influence health. Specifically, they found that health behaviors and heightened stress responses as a consequence of discrimination may mediate the association between discrimination and health outcomes. In regards to the LGB population, studies have focused on the direct effects of discrimination and health (primarily mental health) or have looked at health behaviors (e.g., alcohol use, drug use, and risky sexual behavior) independent of discrimination. Also, studies examining heightened stress responses in the LGB population have not been in healthy participants but in individuals with HIV/AIDS (e.g., Taylor & Cole, 1997). It is crucial examine the possible mechanisms by which discrimination may influence health to better understand how discrimination may lead to negative health and perhaps how to reduce those effects.

The current study examined the association between minority stress and mental and physical health in an LGB sample in a cross-sectional study. Specifically the direct effects of minority stress, via proximal and distal conceptualizations (Meyer, 2003), on mental and physical health were examined. The indirect effects of minority stress via health behavior and perceived stress reactivity on mental and physical health were examined. The moderating role of social identity as well as hardiness on the association between minority stress, health behavior and perceived stress reactivity was also examined. Finally, a modified version of Pascoe and Smart Richman’s (2009) discrimination and health model was empirically tested in an LGB population.
Health Disparities in the LGB Population

Mental Health

Data consistently show that lesbian gay and bisexual individuals report mental health problems at a greater rate than their heterosexual counterparts (e.g., Cochran, Sullivan & Mays, 2003; D’Augelli & Grossman, 2001; Hatzenbuehler, 2009; Hatzenbuehler, McLaughlin & Nolen-Hoeksema, 2008; Herek & Garnets, 2007; Lewis et al., 2003; Meyer, 2003). Large national studies have found consistent patterns of mental health disparities in sexual minorities. For example, Mays and colleagues (2001), as part of the MacArthur Foundation National Survey on Midlife Development in the United States (MIDUS), found that in comparison to heterosexual men, gay men were 3.6 times more likely to suffer from major depression, 5 times more likely to suffer from panic disorders, and 3.9 times more likely to experience comorbid mental disorders. In comparison to heterosexual women, lesbians were 3.9 times more likely to suffer from generalized anxiety disorder and 2.9 times more likely to experience comorbid mental disorders. Similarly, in a national study, Meyer (2003) found that in comparison to heterosexual men, gay men were 2.7 times more likely to suffer from a mood disorder and 2.4 times more likely from an anxiety disorder. Lesbian women, in comparison to heterosexual women, were 2.5 times more likely to suffer from a mood disorder and 1.6 times more likely to suffer from an anxiety disorder. Overall, Meyer found that homosexual men and women were 2.4 times more likely to suffer from mental disorders over the course of their lifetime compared to heterosexual men and women. Given the well-documented mental health disparity between sexual minorities and their
heterosexual counterparts, it is important to examine possible causes that may be leading to poorer mental health.

Although the evidence of mental health disparities in sexual minorities has been well documented, it is only recently that physical health has been examined. The following section reviews evidence for physical health disparities in the LGB community.

**Physical Health**

Physical health disparities in sexual minorities have also garnered national attention. As noted in Healthy People 2020, a national public health initiative whose aim is to set national objectives and monitor progress towards promoting health (Department of Health and Human Services, 2011), physical health disparities include risky health behavior (e.g., higher rates of tobacco, alcohol and other drug use), higher rates of suicide (particularly among LGB youth), lack of preventive cancer services (in gay women), higher prevalence of obesity, higher rates of cancer and higher prevalence of violence and homicide towards LGB individuals.

In a large epidemiological study, Cochran and Mays (2007) analyzed data from 2,272 non-heterosexual participants. The relationship between sexual orientation and measures of general physical health and disability were examined. Findings indicated that gay men reported more migraines or headaches than heterosexual men. Homosexually experienced heterosexual men (i.e., men who have sex with men but do not identify as homosexual) reported more liver disease, digestive problems, heart disease, asthma, and chronic fatigue syndrome than heterosexual men. Among women, bisexual women were more likely than exclusively heterosexual women to report digestive complaints, back
problems, and chronic fatigue syndrome. Homosexually experienced heterosexual women (i.e., women who have sex with women but do not identify as homosexual) were more likely than exclusively heterosexual women to report asthma and back problems. In sum, both bisexual women and homosexually experienced heterosexual men reported poorer physical health.

In a similar study of Swiss gay men, Wang, Hausermann, Vonunatsu, Aggleton, and Weiss (2007) found that gay men were 1.85 times more likely to report higher cholesterol, 2.15 times more likely to report higher blood pressure and 2.40 times more likely to report higher glucose levels compared to heterosexual Swiss men. Swiss gay men were also more likely to report greater physical symptoms (e.g., 4 times more likely to report moderate/severe back pain, 14 times more likely to report general fatigue, 4.87 times more likely to report insomnia, and 6.95 times more likely to report headaches).

In a national study of 90,823 women in the United States, gay women (n=694) were found to have greater risk factors for breast cancer and cardiovascular disease compared to their heterosexual counterparts. Specifically, gay women were more likely to report nulliparity (i.e., lack of child birth) as well as a higher Body Mass Index than heterosexual women (Nurses Health Study II; Case, Austin, Hunter, Manson, Malspeis, Willett & Spiegelman, 2004).

Lastly, in a large national Dutch study (n = 9,511), among gay men and women (n = 233, M age = 49, SD =18.17) sexual orientation was related to greater acute physical symptoms within the last two weeks ($\beta =.175, p <.05$) as well as greater chronic physical conditions ($\beta = .181, p < .05$) compared to heterosexual men and women. Specifically,
gay men and women were 1.87 times more likely to report respiratory problems and 1.51 times more likely to report back and neck pain within the last two weeks compared to heterosexual men and women. Gay men and women were also 2.27 times more likely to report serious intestinal problems as well as 2.26 times more likely to report severe headaches or migraines and 8.6 times more likely to report urinary incontinence (i.e., loss of bladder control) compared to heterosexual men and women (Sandfort, Bakker, Schellevis, & Vanwessenbeek, 2006).

Although the literature on physical health disparities in the LGB population is not as developed as the mental health disparities literature (i.e., examination of the physical health disparities in sexual minorities has not been as extensively examined as mental health disparities), the evidence presented highlights the need for further investigation into possible causes that may be leading to poorer physical health. Researchers have suggested the possible causes of health disparities in sexual minorities may not be biological but social in nature (Meyer, 2003). Specifically, the minority status, a socially derived categorization, may be influencing mental and physical health in sexual minorities. These social stressors, unique to minorities, are referred to as minority stress (Meyer, 1995; 2003).
**Minority Stress**

Minority stress, a term used to refer to the social stressors experienced by individuals of minority status (Meyer, 1995; 2003), are stressors different from general stressors experienced in everyday life. Minority stress can be categorized in terms of distal and proximal social stressors. Distal social stressors refer to events that take place independent of or outside the individual. In other words, there is no cognitive or affective process on the part of the individual that causes the event. An example of a distal social stressor would be an overt act of discrimination. Proximal stressors refer to a process within the individual (i.e., processes that involve some cognitive or affective component). An example of a proximal social stressor would be stigma consciousness. Stigma consciousness refers to the consciousness awareness of stereotypical characteristics of a stigmatized identity and the consequent expectation of negative evaluation or rejection due to these characteristics (Pinel, 1999). In other words, these individuals are vigilant for cues signaling that they are being viewed stereotypically and are, therefore, more likely to appraise situations as threatening. The following sections discuss the prevalence of discrimination and stigma consciousness in sexual minorities and their connection to health outcomes.

**Discrimination**

According to Meyer (2003), discrimination is considered a distal social process because it does not necessarily depend on an individual’s perception or appraisal of the situation. For example, a woman who has sex with other women but does not identify as homosexual can be the target of anti-gay discrimination. Research has shown
discrimination is a common experience of LGB individuals (e.g., Herek, Gillis, & Cogan, 1999; Kertzner, 1999; Mays & Cochran, 2001; Meyer, 2003). Discrimination is measured via self-report checklists of discriminatory events both everyday and lifetime (e.g., Heterosexist, Harassment, Rejection, and Discrimination Scale; Syzmanski, 2006). For example, Mays and Cochran (2001) found that LGB individuals were two times more likely to be fired from their job because of discrimination compared to their heterosexual counterparts. In a report by the Kaiser Family Foundation (2001), 55% of LGB participants reported that they or someone they knew had experienced sexual orientation discrimination when applying or keeping a job. Herek and colleagues (1999) found that 1/5 of female participants and 1/4 of male participants in their LGB sample self-reported victimization including sexual assault, physical assault, robbery, and property crime due to their sexual orientation. In a report by the Kaiser Family Foundation (2001), 74% of the LGB participants reported personally experiencing verbal abuse or name calling at some point of in their lives due to their sexual orientation, and 32% reported experiencing physical violence against themselves or their property. Given the prevalence of discrimination among gay and lesbian individuals, it is especially important to understand its potential impact on mental and physical health.

Sources of discrimination (e.g., family and friends versus strangers) have been examined to a lesser extent compared to type of discrimination (e.g., name calling, physical violence). In fact, with regards to sexual minorities, studies that have examined the influence of family and friends have primarily focused on the potential source of resiliency that family and friends may provide. For example, in a study of Asian
American gay men, researchers found that men who had open conversations about anti-gay discrimination with their family and gay friends were less likely to engage in risky sexual behavior compared to men who did not have open conversations about anti-gay discrimination with family and friends (Yoshikawa, Wilson, Chae, & Chen, 2004). Studies that have examined discrimination from family members have focused on its effects on homelessness (Milburn, Ayala, Rice, Batterham, & Rotheram-Borus, 2006) and risky health behavior (Ryan, Huebner, Diaz, & Sanchez, 2009) in LGB adolescents, rather than poor health outcomes. One study that examined rejection sensitivity (i.e., similar to stigma consciousness, individuals who are high in rejection sensitivity anticipate rejection from others in various different domains; Downey & Feldman, 1996) in gay men with HIV found rejection sensitivity to family and friends elicited different mental health outcomes compared to gay men who were more sensitive to rejection from strangers (Taylor, et al., 1997). For example, gay men who were more sensitive to rejection from family members reported more anxiety, whereas men who were more sensitive to rejection from strangers reported more depression. Further research is needed in order to examine the differential effects that different sources of discrimination may have on health outcomes in sexual minorities.

Stigma Consciousness

The proximal minority stressor of interest in the current study is stigma consciousness. Stigma consciousness is the conscious awareness of stereotypical characteristics of a stigmatized identity and the consequent expectation of negative evaluation or rejection due to these characteristics (Meyer, 2003; Pinel, 1999). For
example, a gay man may worry that his gay identity may lead to people to immediately assume that he is effeminate or sexually promiscuous. Meyer (2003) explains that stigmatized minority individuals learn to expect negative appraisal from members of the dominant culture, and in turn, are chronically vigilant for this reaction. That is, individuals high in stigma consciousness are hyper vigilant for information related to negative appraisal, prejudice, or discrimination related to their sexual orientation.

Pinel (1999) conducted a series of six studies examining stigma consciousness among heterosexual men and women as well as sexual and ethnic minorities. Stigma consciousness was operationalized as the expectation of rejection due to stigmatized identity and assessed using the Stigma Consciousness Questionnaire (SCQ; Pinel, 1999). Across groups, the studies found that people high in stigma consciousness were more likely to report discrimination directed both at their group in general, and toward them specifically compared to those low in stigma consciousness. They were also more likely to provide reasonable evidence for these reports. Also, those high in stigma consciousness were more likely to decline opportunities to contradict stereotypes about their group. The findings suggest that individuals high in stigma consciousness see discrimination as pervasive and therefore expect discrimination from social interactions with the mainstream. This may lead to behavioral inhibition in social interactions in general and to less disclosure of sexual orientation for LGB people. Pinel (1999) concludes that there could be adverse effects related to excessive attention to stigmatized status, such as attributing evaluation to the stigmatized characteristic and not to other attributes, or deleterious effects on self-esteem and mental health.
Minority Stress and Mental Health

The recurrent experience of social stressors, or chronic social stress, can lead to a depletion of resources, which in turn can influence mental and physical health outcomes. The concept of allostasis, a term coined by McEwen (1998), suggests that an individual has a limited amount of cognitive resources, as well as biological resources, which allow an individual to cope with general stressors. When the stressors become chronic, resources can become depleted and lead to strain also known as allostatic load. Minority stress, a chronic stressor, may lead to the depletion of resources to cope which in turn can lead to negative (mental and physical) health outcomes. The following sections examine the direct effect minority stress may have on mental health.

Discrimination and Mental Health

Discrimination researchers have focused largely on race and gender and only recently have examined the effects of sexual minority discrimination on health. Strong evidence exists for the association between discrimination and negative mental health outcomes in regards to race and gender (e.g., Brondolo, Brady, Thompson, Tobin, Cassells, & Sweeney, 2008; Kessler, Mickelson, & Williams, 1999; Paradies, 2006; Williams, Neighbors, & Jackson, 2003). For example, results have shown that discrimination (i.e., self-report lifetime and everyday discrimination) in racial and ethnic minorities is related to higher levels of depression, anxiety, psychological distress, lower ratings of subjective well being, and increased risk for substance abuse (Paradies, 2006; Pascoe & Smart Richman, 2009; Williams et al., 2003; Williams & Mohammed, 2009).
Meyer (2003) asserts that researchers most commonly attribute the higher prevalence of mental disorders among LGB individuals to stressful social situations and environments that are created by stigma, prejudice, and discrimination and not to some inherent flaw of LGB individuals (e.g., DiPlacido, 1998). This view was not always held in the scientific community. For example, until 1973, homosexuality was listed in the Diagnostic and Statistical Manual of Mental Disorders. Meyer makes clear that while all people experience some degree of stress, the social stress of belonging to a minority population such as the LGB community, may have additive effects over and above the everyday stressors common to the general population. In other words, the unique stressors encountered by sexual minorities may cause depletion of cognitive resources, in addition to depletion caused by general stressors that may contribute to the higher prevalence of mental disorders in LGB individuals.

In one of the first studies to examine the effects of sexual orientation discrimination on mental health, Meyer (1995) found that anti-gay discrimination experienced by gay men within the past year was significantly positively correlated with psychological distress. In a study examining victimization among LGB older adults, D’Augelli and Grossman (2001) found that participants who had been physically attacked reported lower self-esteem, more loneliness, poorer mental health, and more suicide attempts than other LGB older adults. In a study examining stress and depressive symptoms in gay men, discrimination (i.e., self-reported lifetime discrimination) independently predicted depressive symptoms over and above general stressors (Lewis et al., 2003). In LGB youth, discrimination based on sexual orientation was significantly
related to higher scores on a scale of depressive symptomology (Almeida, Johnson, Corliss, Molnar & Azreal, 2009). Hatzenbuehler, Nolen-Hoeksema, and Erickson (2008) found discrimination (i.e., self-reported lifetime discrimination) was correlated with depressive symptoms in bereaved gay men. Another study on LGB individuals who survived hate crimes found that these individuals showed significantly more symptoms of anxiety, depression, anger and post-traumatic stress than LGB individuals who had not experienced hate crime (Herek, Gillis & Cogan, 1999). A similar study, Szymanski (2005) found that recent hate crime victimization was significantly positively correlated with psychological distress in a sample of gay women. In summary, there appears to be evidence for a direct association between discrimination and negative mental health in sexual minorities.

**Stigma Consciousness and Mental Health**

Research indicates that there is a strong negative relationship between stigma consciousness and mental health (e.g., Lewis, Derlega, Clarke, & Kuang, 2006). Hatzenbuehler and colleagues (2008) found that expectations of rejection among recently bereaved gay men were correlated with depressive symptomology. Lewis and colleagues (2003) examined the effect of stigma consciousness on depressive symptoms in a sample of predominantly self-disclosed gay men and women. Participants who reported higher stigma consciousness experienced greater depressive symptoms (Lewis et al., 2003). Stigma consciousness was also shown to have a negative relationship to openness about sexual orientation (i.e., being less likely to disclose sexual orientation). In order to expand on their findings, Lewis and colleagues (2006) examined how social constraints
(i.e., perceived barriers in talking with others about ones experiences) moderated the relationship between stigma consciousness and mental distress. In this study, the authors assessed mental distress by examining intrusive thoughts in a sample of lesbian women. Zero order correlations showed a positive relationship between stigma consciousness and social constraints as well intrusive thoughts; specifically, higher scores on a stigma consciousness associated with more social constraints and greater intrusive thoughts.

In a review of social processes and health disparities in ethnic/racial minorities, Schnittiker and Mcleod (2005) found that stigma consciousness was negatively associated with mental health, and this association was mediated by heightened vigilance. Heightened vigilance refers to the chronic psychological attentiveness and chronic physiological arousal resulting from the threat of exposure to violence and discrimination (Williams, Lavizzo-Moury & Warren, 1994). Heightened vigilance may affect mental health by depleting cognitive resources due to the psychological costs associated with persistently monitoring out-group members’ actions (Frable, Blackstone & Sherbaum, 1990; Saenz, 1994).

In summary, although the majority of discrimination literature has focused on race and gender, the association between discrimination (and stigma consciousness) and mental health is similarly negative in regards to sexual minorities. Discrimination and stigma consciousness have been linked to poor mental health outcomes (e.g., anxiety, depressive symptomology, poor life satisfaction) in both gay men and women in 15 studies. Only three studies have examined the effects of discrimination and stigma consciousness on physical health among LGB individuals.
Minority Stress and Physical Health

Discrimination and Physical Health

The effects of discrimination on physical health have not been as extensively studied as the effects of discrimination on mental health in sexual minorities. The majority of the studies looking at physical health outcomes of discrimination have focused on ethnic discrimination, particularly in African Americans (e.g., Williams et al., 2003). In general, these studies have relied on global self-reported health measures as the outcome variable as well as other self-report indicators of health status, including chronic conditions, indicators of disability, and other global ratings of health. Overall, there is a trend for a negative association between discrimination and physical health, but the findings are somewhat mixed in regards to ethnic minorities (e.g., Jackson et al., 1996; Williams et al., 1997). Williams and colleagues (2003) reviewed 11 studies examining discrimination and chronic illness (e.g., development of atherosclerotic disease) and global self-reports of health (these were generally created for the study and were meant to assess health status in general) in ethnic minorities. Out of the 11 studies, 6 indicated a negative relationship between discrimination and physical health (i.e., more discrimination predicted worse physical health) and 5 indicated no relationship. More recently Fuller-Rowell and colleagues (2012) found that discrimination (i.e., self-reported lifetime discrimination) was related to potentially healthier (i.e., steeper) diurnal cortisol
slopes in a sample of African Americans. These surprising findings may indicate that the effects of discrimination may not be universally negative.

In regards to sexual minorities, thus far only two published studies have examined the effects of discrimination and physical health. In one study, Huebner and Davis (2007) examined the direct effects of discrimination on physical health in a cross-sectional study. Physical health was operationalized as frequency of nonprescription medication use, number of physician visits, and number of sick days from work in the past year in a sample of gay and bisexual men. Discrimination was operationalized by assessing frequency of experienced discriminatory events such as name calling over the lifetime. In the study, the relationship between discrimination and sick days was linear in nature for all men in the study. The more discrimination, the more sick days were reported. This study is the first to suggest that discrimination may be correlated with physical health in a healthy LGB sample.

Zamboni and Crawford (2007) investigated the relationship between discrimination due to racial or sexual orientation status and sexual dysfunction among gay and bisexual African-American men. They found that minority stress predicted more concurrent sexual dysfunction. This effect was fully mediated by psychiatric symptoms (e.g., depression), such that minority stress predicted psychiatric symptoms, which in turn predicted sexual dysfunction. This study highlights the indirect effect minority stress may

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1 In general, cortisol typically rises sharply in the morning then steadily declines throughout the day (Wust et al., 2000). Cortisol that does not decline or stays relatively flat throughout the day may be indicative dysregulation due to long-term response to chronic stress. Therefore, steeper cortisol slopes may be indicative of “healthier” cortisol profiles.
have on physical health. Specifically, minority stress may negatively influence physical health (e.g., sexual dysfunction) via psychiatric symptoms.

**Stigma Consciousness and Physical Health**

Similar to the literature on stigma consciousness and mental health, the empirical literature on the effect of stigma consciousness on physical health among sexual minorities is rare. To date, there has been only one study that has examined the direct association between stigma consciousness and physical health in sexual minorities (Frost, Lehavot, & Meyer, 2011). In this study, stigma consciousness was assessed by measuring self-reported expectation of rejection due to the stigmatized identity and physical health was assessed via self-report of general physical health (e.g., SF-12; Ware, Kosinski & Keller, 1996). The study found that although there was a negative association between stigma consciousness and mental health, this association was not statistically significant.

Empirical studies have suggested that stigma consciousness can have a negative indirect effect on physical health by influencing self-control (Inzlicht, McKay & Aronson, 2006; Pascoe & Smart Richman, 2009). Inzlicht and colleagues (2006) hypothesized that due to the limited capacity and the increased use of self-regulation in those high in stigma consciousness (via hyper vigilant behaviors), those who were high in stigma consciousness would report having less self-control. Self-control is depleted due to the over use of cognitive resources stigma consciousness requires. Empirical studies have confirmed that self-control is a limited, easily exhausted resource, with prior acts of self-control depleting the self-control available for subsequent tasks (Baumeister & Heatherton, 1996; Muraven & Baumeister, 2000; Muraven, Tice, & Baumeister, 1998;
Richards & Gross, 2000). Therefore, if self-control reserves become compromised, little mental energy will be available to overcome environmental temptations and override urges, emotions, and automatic response tendencies thus may lead to poor health behaviors and negative physical health outcomes.

Recently Inzlicht and Kang (2010) empirically tested the role of self-control in the association between stigma consciousness and health behavior (e.g., compulsive eating). Female participants who scored high in stigma consciousness (e.g., internalized negative stereotypes, expectation/anticipation of discrimination) were given a difficult math test. Half of the participants were told to reappraise the situation and math test neutrally and objectively, as if they were professional test evaluators. The other half were not given any reappraisal instructions. It was thought that reappraisal would eliminate the need to cope with stigma consciousness and therefore save the participants self-control resources. To examine self-control, the participants then completed a “taste test” of three flavors of ice cream and were told they could have as much as they wanted. Participants that did not receive instructions to reappraise, the threat group, ate significantly more ice cream that those who were instructed to reappraise the situation. The authors suggested that the reappraisal group conserved self-control resources and were able to resist over indulgence. This finding provides evidence for role of stigma consciousness in risky health behaviors such as over eating among women.

The few studies that have assessed the role of stigma consciousness in sexual minorities and physical health have focused on HIV/AIDS. For example, In a sample of HIV positive gay men, Taylor & Cole (1997) found that those who were high in stigma
consciousness, compared to those low in stigma consciousness (assessed by measuring expectations of rejection), had lower rates of CD4 cells (a marker of HIV progression; lower CD4 cell counts indicate greater progression) and accelerated times to AIDS diagnoses and consequent mortality when their gay identity was disclosed. In other words, HIV positive gay men who scored high on expectations of rejection were more likely to have accelerated times to mortality.

Recently Frost, Lehavot and Meyer (2011) examined the health effects of discrimination and stigma consciousness prospectively in an LGB sample. The study consisted of two time points, an initial baseline and a second time point one year later. The results suggested that discrimination, assessed by a self-report of discriminatory events, at baseline was able to significantly predict serious physical health problems one year later (e.g., serious physical illness within the past year), controlling for general stressors, age, gender and social economic status. Further, sexual minorities who reported experiencing discriminatory acts within the last year were three times more likely to report serious physical illness compared to sexual minorities who did not experience discriminatory acts within the last year (self-reports of physical illness were collected at the second time point). Although the proximal aspects of minority stress (e.g., stigma consciousness) did not significantly predict serious physical illness within the past year, they did predict poorer self-reported general health (assessed by the SF-12; Ware, Kosinski & Keller, 1996). This finding indicates that minority stress (discrimination and stigma consciousness) is capable of predicting future physical health outcomes in sexual minorities.
In summary, although the association between poor mental health and discrimination for LGB individuals has been largely demonstrated, evidence has been somewhat mixed in regards to physical health. In addition, only two studies have been published thus far. Furthermore, little is known about the factors that may influence the relationship between mental and physical health and discrimination in the LGB population. The current study adds to literature by further exploring the associations between discrimination, stigma consciousness and both mental and physical health in sexual minorities.
Moderators

Although the direct association between minority stress and health in sexual minorities has been primarily negative, recent studies have begun to examine possible moderators that may alleviate the negative consequence of minority stress on health. Specifically, the literature on various forms of discrimination (e.g., ethnic, gender, sexual orientation) has found that social identity may moderate the association between minority stress and health. However, this small area of research has yielded mixed results with some studies suggesting a buffering role (i.e., social identity may alleviate the negative consequences of minority stress) and others suggest an exacerbating role. With regards to sexual minorities, the results have been more consistent with studies suggesting an ameliorative effect of social identity; however, these studies have focused solely on mental health. Another factor that may influence the association between minority stress and health in sexual minorities is hardiness. Although not directly examined in the context of minority stress, hardiness has been linked to positive mental and physical health (e.g., Kobasa, Maddi, & Kahn, 1982) as well as academic success (e.g., Sheard, 2009). The following sections discuss social identity and hardiness and their potential moderating role in the association between minority stress and health.

Social Identity

Social identity is defined as the portion of an individual self-concept or self-perception that is derived from membership in a relevant social group (Tajfel & Turner, 1979; 1986). Social identity can be further divided into both psychological and behavioral components (Phinney, 1990; Cameron, 2004). The psychological component
refers to the social identity’s centrality, salience and individuals affect towards the social identity. Centrality refers to the extent to which an individual defines himself with regard to the social identity (e.g., an individual may be male, gay and African American, but views his gay social identity as most central to his self-definition; Meyer, 2003). Saliency refers to how relevant the social identity is to the individual’s self-concept at a particular moment in time. Affect refers to how the individual feels about belonging to a particular social identity as well as other group members. The behavioral component consists of assessing the extent to which an individual participates in activities/events relevant to the social identity (e.g., an LGB individual may attend rallies, demonstrations or support politicians that support LGB issues/interests).

Social identity, both behaviorally and psychologically, is measured using self-report questionnaires that assess the extent to which the social identity is central and salient as well as general sense of belonging (e.g. MEIMR; Phinney, 1990). In general unlike the psychological component of the gay social identity, very few scales exist to measure the behavioral component (e.g., Frost & Meyer, 2012; Proescholdbell et al., 2006). Furthermore, the scales that do exist tend to focus on the psychological assessment of being connected to the minority community. For example, although the Psychological Sense of Community scale (PSOC; Proescholdbell et al., 2006) assesses community connection in the LGB population, it does not assess the extent of actual involvement or participation in LGB activities. Instead, it measures how being connected to the LGB community makes the individual feel (e.g., How much do you feel that your opinions matter to other gay men?). For the current study, the Involvement in Feminists Activity
Scale (IFAS; Szymanski, 2004) was adapted to assess the level of behavioral involvement in the gay social identity in sexual minorities. This measure is broad enough to be generalizable to other identities (e.g., “I am involved in research, writing and/or speaking about LGB issues”) and provides a more nuanced measurement of the behavioral component of social identity. A pilot study (n=140) was conducted in order to determine the reliability and validity of the adapted IFAS (ILGBAS) in sexual minorities. The ILGBAS showed excellent internal consistency, α = .94 and was negatively correlated with measures of depression (r = -.290) and anxiety (r = -.169), as expected.

Social identity may be beneficial to mental and physical health by providing a person with stability (i.e., purpose and direction; Haslam, Jetten, Postmes & Haslam, 2009). For example, Ghavami and colleagues (2011) found in a sample of gay men and women that having strong sense of belonging to the gay community and feeling good about their gay identity predicted greater life satisfaction, fewer depressive symptoms, less anxiety and higher self-esteem compared to those who did not have a strong sense of belonging to the gay community or did not feel good about their gay identity. Social identity may also provide other resources, such as social support and a sense of belonging, which may counteract or buffer social stressors (e.g., minority stress; Meyer, 2003; Phinney, 2003; Tajfel & Forgas, 2000). However, studies have also shown that when social identity centrality and salience are great, they may also exacerbate social stressors (e.g., Sellers, Rowley, Chavous, Shelton, & Smith, 1997). The following section reviews evidence for both the buffering and exacerbating roles social identity may have on the association between minority stress and health.
Buffering Hypothesis. Recently, researchers have begun to examine the possible moderating role of social identity on the association between minority stress and health (e.g., Branscombe, Schmitt, & Harvey, 1999; Pascoe & Smart Richman, 2009; Fingerhut, Peplau & Ghavami, 2005; Fingerhut, Peplau & Gable, 2010). It should be noted that, like most of the minority stress literature, the majority of these studies have focused on the influence of ethnic identity on racial discrimination (i.e., distal minority stress). Social identity theory suggests that the social identity may ameliorate the negative effects of minority stress by providing a positive self-concept and sense of belonging (Tajfel & Turner, 2001). For example, if minority stress induces distress via an attack on an individual’s self-concept, then the social identity may counteract the distress by providing the individual with a strong sense of belonging to the social group and guarding against negative stereotypes. Mossakowski (2003) found that having a strong sense of ethnic social identity buffered the negative impact of racial and ethnic discrimination on depressive symptoms among Filipino Americans 18 to 65 years of age. Studies examining ethnic social identity centrality have also found that those who hold the ethnic identity as more central experience a buffering effect on the association between racial discrimination and mental health (e.g., depression, anxiety; Neblett, Shelton, & Sellers, 2004; Sellers, Caldwell, Schmeelk-Cone, & Zimmerman, 2003).

Studies examining sense of belonging and centrality of the gay social identity have found similar results. Gay men and women who hold the gay identity as more central to their self-concept, who have a positive view of the gay identity and who have a strong sense of belonging to the gay community experience a buffering effect on the
association between minority stress and mental health (depressive symptomatology; Fingerhut, Peplau & Ghavami, 2005; Fingerhut, Peplau, Gable, 2010). These studies provide evidence that the psychological component of social identity may provide a buffering effect on the direct association between minority stress and mental health. To date, no studies have examined the buffering role on the direct association between minority stress and physical health.

Although the behavioral component of social identity is hypothesized to provide similar beneficial effects (i.e., by providing opportunities to increase social ties and increase sense of belonging), very few studies have explicitly examined its effects on health or its buffering role on the association between minority stress and health. Studies examining the role of the feminist identity in gay women have found that those who are actively engaged in the feminist social identity experience a buffering effect on the association between sexism and mental health (depressive symptomatology; Syzmanski, 2004, 2006). Although the gay identity was not assessed in these studies, the author hypothesized that the behavioral component of the gay social identity may have a similar effect on heterosexist events in gay women. In gay men, studies examining risky health behavior in sexual minorities have found that those who frequently used gay-related media (e.g., literature, film), were highly integrated as well as active in the gay community were less likely to engage in risky health behavior (e.g., unprotected sex) than those who were less integrated or less active in the gay community (Joseph, Adib, Joseph & Tal, 1991; Morton & Duck, 2000; Ridge, Plummer, & Minichiello, 1994). As with the psychological component of social identity, no studies to date have examined the
buffering role of the behavioral component of social identity on the direct association between minority stress and physical health.

**Exacerbating Hypothesis.** If being gay is central to an individual’s self-concept, it is plausible that having a strong sense of belonging to the gay community may result in a strong negative reaction when experiencing minority stress. Self-categorization theory (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987) suggests that people should be more aware of environmental cues that are relevant to an important aspect of their identity. In other words, minority stress experienced as a result of being an LGB individual should be more relevant for those who hold the gay social identity and central to their self-concept. Some researchers have suggested that those who hold the social identity as central to the self-concept are more likely to be more responsive (physiologically and psychologically) to subtle forms of minority stress (Operario & Fiske, 2001). Studies examining the effects of social identity on the association between racial discrimination and mental health have supported this hypothesis (e.g., increase depressive symptomology and anxiety; McCoy and Major, 2003; Operario & Fiske, 2001; Noh, 1999). To date, no study examining the effects social identity on the association of minority stress in sexual minorities have reported an exacerbating effect.

In summary, it is unclear whether social identity exacerbates or buffers the association between minority stress and health. Although studies examining the role of social identity on the association between minority stress and mental health in sexual minorities have not found an exacerbating effect, there have been only two published studies that have examined this relationship and further examination is needed (Fingerhut
et al., 2005; Fingerhut et al., 2010). Furthermore, the effects of social identity on the association between minority stress and *physical* health have not been considered. The current study further examined the role of social identity, both psychological and behavioral, on the association between minority stress and mental and physical health.

**Hardiness**

Kobasa and her colleagues coined the term hardiness, a personality trait consisting of a sense of control, commitment, and challenge, as a potential moderator in the relationship between stressful events and health outcomes (e.g., Kobasa, Maddi & Courington, 1981). Hardiness shares similarities with several other psychological constructs such as locus of control, sense of coherence, self-efficacy, and dispositional optimism.

As a coping mechanism in response to stressors, hardiness has been examined in various populations such as business executives (Kobasa, 1979) and military personnel (Bartone, 1995). In a study examining business executives, a position filled with stressful events, Kobasa (1979) used retrospective data to examine the association between hardiness and physical illness. In this study, those who reported high physical illness scored lower on hardiness compared to those who reported low physical illness. Longitudinal studies have also been able to use hardiness to predict physical illness. In two studies, greater hardiness predicted a decrease in physical illness in response to stressful events over a 6 month period (Kobasa et al., 1981 and Kobasa et al., 1982).

Hardiness has also been shown to moderate the association between psychosocial stressors physiological reactivity. For example, Wiebe (1991) found that men who were
higher in hardiness had lower heart rate in response to a lab stressor (i.e., a speech task) compared to men who were lower on hardiness. Further, hardiness has also been shown to moderate the association between discrimination and health. One study examining racial discrimination and psychological outcomes found that hardiness played a moderating role in the association between self-reported discrimination and psychosomatic symptoms (Dion, Dion, & Pak, 1992). In this study psychological health was assessed via a composite that examined nervousness, sleep problems, headaches, inability to cope, typical mood, and degree of worrying. More specifically, this study found that in Asian Americans who were low in hardiness, the association between self-reported discrimination and poor psychological health was moderate and significant. On the other hand, in participants who were high in hardiness, the association between discrimination and poor psychological health was not significant. In other words, hardiness weakened the association between self-reported discrimination and psychosomatic symptoms.

Together, these studies suggest that hardiness may play a buffering role in the association between stressful events (i.e., discrimination) and health outcomes. It is unclear whether hardiness would similarly buffer the association between minority stress and poor health in LGB. The current study furthered tested the moderating role of hardiness on the association between minority stress and health in an LGB sample.
Models of Minority Stress and Health

In order to further illustrate the complex connections between discrimination, stigma consciousness and health, the Minority Stress Model (MSM; Meyer, 2003) and Pascoe and Smart Richman’s (2009) discrimination and health model is reviewed. The models provide both direct and indirect pathways by which discrimination may influence health outcomes as well as moderating variables (e.g., identity, hardiness) that may influence these associations.

Minority Stress Model

The first model that has been developed to explain the relationship between discrimination, stigma consciousness and mental health outcomes is the Minority Stress Model (MSM; Meyer, 1995; 2003). This model illustrates the potential pathways to mental health outcomes in minority individuals. The model highlights the experience of minority stress as unique and independent of general stressors experienced in everyday life as well as possible moderators that may influence the association between minority stress and mental health. Minority stress in its entirety, according to the MSM, is comprised of distal social processes (i.e., discrimination and violent acts) as well as proximal social processes (i.e., expectations of rejection or stigma consciousness, concealment and internalized homonegativity). In the interest of clarity and relevance, only the roles of discrimination and stigma consciousness in the MSM are discussed, as these are the variables of interest in the present study.
As discussed previously, discrimination is considered a distal social stressor because it is an event that occurs outside of the individual. As seen in Figure 1 (path a), the MSM suggests that discrimination may directly influence mental health independent of general stressors. Several studies measuring discrimination as suggested in the MSM (i.e., as a distal social stressor independent of affective or cognitive responses on the part of the individual) have supported the direct negative association between discrimination and mental health as well as its ability to predict negative mental health independent of general stressors (e.g., Fingerhut, 2005; 2010; Frost et al., 2011). Meyer (2003) suggested that discrimination encountered by sexual minorities may cause depletion of cognitive resources, in addition to depletion caused by general stressors that may contribute to the higher prevalence of mental disorders in LGB individuals.
Figure 1. The above model is a modified version of the Minority Stress Model (MSM; Meyers, 2003) that illustrates the direct effects of discrimination and stigma consciousness on mental health as well as possible moderators of these associations.

The MSM suggests that the association between discrimination and mental health may possibly be attenuated by connections to the minority community (see path e, Figure 1). Meyer based this assumption on research that has demonstrated the ability of group identification to buffer the association between racial discrimination and mental health (i.e., Rejection Identification Model; Branscombe et al., 1999). Connections to the community may provide the minority individual with support and resources to cope with minority stress. For example, Frable, Wortman, and Joseph (1997) demonstrated gay and bisexual individuals who had strong connections the LGB community felt more positive about themselves and scored higher in a measure of life satisfaction. As discussed
previously, social identity can be categorized into behavioral and psychological components. Connections to the minority community (e.g., involvement in social identity relevant activities) fall under the behavioral component of social identity. Therefore, according to the MSM, the behavioral component of the social identity may moderate the association between discrimination and mental health among LGB. The MSM does not hypothesize that the psychological component, which is discussed later with regards stigma consciousness, moderates the association between discrimination and mental health.

According to the MSM (Meyer, 2003) stigma consciousness, or the conscious awareness of stereotypical characteristics of a stigmatized identity and the consequent expectation of negative evaluation or rejection due to these characteristics, is a proximal social stressor because it is a process that occurs within the individual and is dependent on the social identity. As seen Figure 1 (path b), like discrimination, stigma consciousness has the ability to directly influence mental health independent of general stressors. The negative association between stigma consciousness and mental health among LGB samples has been demonstrated in several studies (e.g., Lewis et al., 2003; Lewis et al, 2006). Stigma consciousness is thought to negatively affect mental health via heightened vigilance (i.e., chronic psychological attentiveness and chronic physiological arousal resulting from the threat of exposure to violence and discrimination; Williams et al., 1994). Like discrimination, heightened vigilance depletes cognitive resources which in turn influences other cognitive processes such as self-control and subsequently influences mental health (Frable et al., 1990; Saenz, 1994).
In a study of activity in the anterior cingulate cortex (ACC), a part of the brain that is essential for self-control, Inzlicht and Kang (2010) demonstrated that stigma consciousness has the ability to induce heightened vigilance. The authors hypothesized that stereotypes about women and math performance (i.e., women perform worse on math tasks than men) would cause women to naturally feel threatened by the task. Vigilance was assessed by measuring event related potentials (ERP) which are a product of affective responses and act as neural signals sent by the ACC when vigilance is needed. In this study, male (control group) and female participants completed a diagnostic math test and then were asked to cope naturally (threat condition) or reappraise the situation objectively (non-threat condition). The participants then completed a Stroop color naming task, which consisted of trials that required inhibition and others that did not, while their ACC activity was measured via electroencephalography (EEG). Women in the threat condition performed worse on the Stroop task than women in the non-threat condition and men. Also, women in the non-threat condition and men showed normal ACC activity (i.e., high ERP amplitude when inhibition or vigilance are needed and low ERP amplitudes when vigilance is not needed). Women in the threat condition, however, had high ERP amplitudes regardless if inhibition was required. In fact, women in the threat condition had especially high amplitudes when inhibition was not needed. Therefore, it appears that women in the threat condition were more vigilant and anxious after all trial types and wasted their efforts in situations that did not require vigilance. This study provides preliminary evidence for the effect of stigma consciousness on mental health via hypervigilance.
According to the MSM, the association between stigma consciousness and mental health may be moderated by the salience and valence of the social identity (Figure 1, path d). Salience and valence of the social identity fall under the psychological component of the social identity, and refers to the extent to which the social identity is a relevant part of an individual’s self-concept at a particular moment in time as well as feelings towards the social identity. In the racial discrimination literature, the psychological component of social identity has yielded mixed results as a potential moderator of the association between stigma consciousness and mental health outcomes (i.e., attenuating, exacerbating, and no effect on the association between stigma consciousness and mental health; Pascoe & Smart Richman, 2009). However, the few studies that have examined the moderating role of the psychological component of social identity in sexual minorities have found an ameliorative effect on the association between stigma consciousness and mental health (Fingerhut et al., 2005; Fingerhut et al., 2010). For example, Fingerhut and colleagues (2010) found that gay men and women who were higher on the psychological component of the gay social identity (e.g., held the gay identity as more central to their self-concept and also held a positive affect towards the gay identity) reported less depressive symptomatology when reporting stigma consciousness than those who were lower in the psychological component of the gay social identity. Meyers suggests the psychological component of the social identity may impede the depletion of cognitive resources that influence other cognitive processes such as self-control. Dysregulation of cognitive processes such as self-control have been implicated in engagement of risky health behavior (e.g., over eating; Inzlicht & Kang, 2010). The possible mediating role of
health behavior in the association between minority stress and health is discussed in a later section.

The behavioral component of social identity may also moderate the association between stigma consciousness and mental health (Figure 1, path e). Although the behavioral component of social identity has not been examined as a moderator in the stigma consciousness and mental health association in sexual minorities, empirical studies by Branscombe and colleagues (1999, 2002) have found that greater participation in activities relevant to the ethnic identity (e.g., social clubs) weaken the effects of stigma consciousness (e.g. expectations of rejection) and mental health (e.g., self-esteem).

In summary, although the MSM has provided solid theoretical foundation to examine the effects of minority stress (i.e., discrimination and stigma consciousness) on mental health, it is lacking in several aspects. First, the model only outlines pathways from minority stress to mental and not physical health. Although it is important to understand the effects of minority stress on mental health, there is a critical need for empirical studies examining the role of minority stress in physical health outcomes. The current study adds to the MSM by also exploring the effects of minority stress on physical health. Second, the MSM only suggests direct pathways to mental health outcomes. Although studies have found a direct negative association between minority stress and mental health, it would be informative to tease apart this association in order to understand potential indirect effects, or mechanisms through which minority stress may impact mental and physical health. The current study examined two potential indirect pathways (i.e., heightened stress reactivity and health behaviors) that are discussed in the
following section. Specifically, following a recent review of the discrimination literature, Pascoe and Smart Richman (2009) developed a model examining discrimination and health across various social identities (e.g., race, gender, and sexual orientation). This model examines both mental and physical health outcomes as well as potential indirect pathways by which discrimination may influence mental and physical health.

**Pascoe and Smart Richman’s (2009) Discrimination and Health Model**

Pascoe and Smart Richman’s (2009) discrimination and health model is a theoretical model created from their review of 134 studies in the discrimination and health literature. Although the model was intended to explain the effects of discrimination on health across various groups, the literature reviewed focused primarily on racial discrimination. The model takes into account both direct and indirect pathways by which discrimination may influence mental and physical health outcomes. Moderating variables of the direct and indirect pathways are also examined (e.g., social support, coping style and group identification), however only group identification is discussed, as this is the variable of interest in the present study.

**Direct effects.** This general model of discrimination and health (Pascoe & Smart Richman, 2009) shows three possible pathways by which discrimination, regardless of type, may impact health. As illustrated in Figure 2, the first pathway (a) suggests a direct link between discrimination and health. Out of 134 studies Pascoe and Smart Richman reviewed, 90% indicated a negative association between reports of discrimination and *mental* health outcomes (e.g., depressive symptomology, anxiety) with 69% of them reaching statistical significance. This direct path is consistent with the previously
discussed Minority Stress Model (MSM; Meyer, 2003). Pascoe and Smart Richman suggest a direct pathway to physical health as well as mental health. Out of the 134 studies, only 36 studies looked at physical health outcomes (e.g., self-report of physical health, checklist of acute and chronic conditions). Of those, only 42% showed a negative association between discrimination and physical health outcomes. It is important to note, however, that only one study included in this review looked at the relationship between perceived sexual orientation discrimination and physical health (self-report of physical health, doctor visits, sick days from work; Huebner & Davis, 2007). As previously stated, there is paucity in empirical research examining the role of discrimination and physical health, particularly in sexual minorities. It is the aim of the current study to add to the literature by examining the direct effect of discrimination and stigma consciousness on physical health in sexual minorities.
Figure 2. This model, developed by Pascoe and Smart Richman (2009), attempts to explain the effects of discrimination across various forms of discrimination. The model suggests three pathways: (a) direct, (b/c) through heightened stress reactivity, and (d/e) health behaviors that may influence the relationship between perceived discrimination and health outcomes. The model also suggests a possible moderator (group identification; paths f, g and h) that may influence the pathways. The above model is a modified reproduction of the Pascoe and Smart Richman (2009) model.

Indirect effects. The Pascoe and Smart Richman (2009) model also considers the indirect pathways by which discrimination may influence mental and physical health outcomes. Paths b and c illustrate how discrimination may indirectly affect mental and physical health via heightened stress reactivity. Repeated exposure to discrimination has
been suggested to lead to heightened stress reactivity through dysregulation of physiological systems. Although reactivity to stress, or the physiological and psychological response to stressors, is part of a healthy and adaptive response, exaggerated or sustained reactivity is not. Repeated exaggerated stress reactivity may ultimately lead to dysregulation of physiological systems (McEwen, 2004) as well as interfere with the body’s restorative processes (e.g., by interfering with sleep and relaxation; Beatty, Hall, Kamarck, Buysee, Owens, Reis & Matthews, 2011). Failure to return baseline levels after experiencing a stressor, or sustained reactivity, may indicate an impairment of restorative processes which has also been linked to disease risk and mortality (e.g., cardiovascular disease; Gerin & Pickering, 1995).

Studies that have manipulated racial discrimination in the laboratory setting have shown that discrimination is capable of eliciting robust physiological reactivity from different systems (e.g., cardiovascular, endocrine; McClure, Snodgrass, Martinez, Eddy, Jimenez & Isiordia, 2010; Merritt, Bennett, Williams, Edwards & Sollers, 2006; Ratner, Halim & Amodio, 2013; Sawyer, Major, Cassad, Townsend & Mendes, 2012; Smart Richman, Bennett, Pek, Sigler & Williams, 2007, Smart Richman, Pek, Pascoe & Bauer, 2010). For example, with regard to discrimination and blood pressure, researchers have consistently found that higher racial discrimination is related to greater blood pressure at rest (McClure et al., 2010; Sawyer et al., 2012), after a stressor (Smart Richman et al., 2007, 2010; Merritt et al., 2006; Sawyer et al., 2012) as well after the stressor is over (Merritt et al., 2006). Recently, in a sample of Black and Latina Women (Ratner et al., 2013), discrimination was associated with immune markers. For example, levels of IL-6
(an inflammatory marker) at rest were higher when women reported higher discrimination compared to those who did not report discrimination. IL-6 is essential in the inflammatory process, and although increases in IL-6 might be adaptive in the short term, sustained elevation of IL-6 is a risk factor for cardiovascular disease and cancer (Danesh, Kaptoge, Mann, Sarwar, Wood, Angleman, & Gudnason, 2008; Hodge, Hurt, & Farrar, 1998). Given the strong evidence in the racial discrimination literature, it is logical to assume the same association may exist between sexual orientation discrimination and heightened stress reactivity in sexual minorities. However, there have been no empirical studies to date that have examined this association in sexual minorities.

The association between heightened stress responses and mental health was not tested for the Pascoe and Smart Richman (2009) model (Figure 2), however past research has shown that repeated heightened stress responses may lead to negative mental health. For example, sustained negative emotional states have been linked to the development of depression (e.g., Hammen, 2005; National Institutes of Health, 2002). Sustained physiological reactivity (e.g., cortisol) has also been linked to the development of depression (e.g., Nemeroff, 1996). Therefore, it is plausible that heightened stress responses, over time, may lead to poorer mental health.

Although Pascoe and Smart Richman (2009) only reviewed the association between discrimination and objective heightened stress reactivity, it is possible that discrimination may influence subjective, or perceived, stress reactivity as well. To the author’s knowledge, no studies to date have examined the effect of discrimination on subjective perceptions of stress reactivity. Since the current study was administered via
online survey, it is not feasible for heightened physiological stress reactivity to be assessed. Therefore, this study examined the effect of discrimination on perceived stress reactivity in sexual minorities.

A second indirect pathway from discrimination to health the Pascoe and Smart Richman (2009) model suggests is via health behaviors (paths d and e). In this review, the health behaviors that were examined were alcohol and tobacco use, substance abuse, positive health habits (e.g., good sleep behavior, exercise), medication adherence and eating habits. A total of 13 studies looked at the relationship between discrimination and health behaviors cross-sectionally. It should be noted that none of the studies in the review examined association between discrimination and health behaviors in sexual minorities. Eighty nine percent of the studies found a negative relationship between discrimination and health behaviors (i.e., more discrimination predicted increased risky health behavior) with 72% reaching statistical significance. Findings indicate a consistent negative association between discrimination and health behavior and provide evidence for path d. It is important to note that Pascoe and Richman could not establish a causal link between discrimination and health behaviors because none of the studies reviewed experimentally manipulated discrimination.

Consistent with this indirect pathway studies of both adolescents and adults show that substance use is more prevalent in sexual minority populations than among heterosexuals. For example, in a review of eight population-based studies involving 83,402 adolescents, Reis and Saewyc (1999) found that 23% of heterosexual youth versus 36% of LGB youth had engaged in drug use. Compared to a heterosexual comparison
group, LGB youth were six times more likely to have used cocaine, three times more likely to have used hallucinogens, and twice as likely to have smoked marijuana at least 40 times in the past 30 days (Reis & Saewyc, 1999). Therefore, as Meyer (2003) suggests, because minority stress is above and beyond general daily stressors, this may lead minority individuals to use negative health behaviors at higher rates than those in the majority. Research has also indicated that the increase in negative health behaviors seen in sexual minorities may be due to discrimination (e.g., Cochran, 2001; Hughes & Eliason, 2002; Meyer, 2003). More recently, a large population study examined the association between three types of discrimination (race, gender, and sexual orientation) and substance abuse (alcohol) and found that sexual minorities who experienced sexual orientation discrimination were nearly 4 times more likely to have abused alcohol compared those who had not experienced discrimination within the past year (McCabe, Bostwick, Hughes, West & Boyd, 2010). This suggests that the increase negative health behaviors in sexual minorities, such as increased alcohol use, may be due to the discrimination sexual minorities’ experience.

Pascoe and Smart Richman (2009) also hypothesized that health behaviors may lead to mental and physical health outcomes (path e). Although studies examining the association between health behavior and physical health were not tested for Pascoe and Smart Richman’s model (Figure 2), past research has demonstrated that certain health behaviors (e.g., smoking, drugs use, alcohol use) can lead to negative physical health outcomes. For example, excessive alcohol use has been linked to long term liver diseases such as hepatitis and cirrhosis (Kochanek, Murphy, Anderson, & Scott, 2004). Belloc and
Breslow’s (1972) seminal study on preventive and risky health behavior and physical health found in a sample of 6,928 adults that those who reported better sleeping habits (e.g., sleeping 7-8 hours a night), better eating habits (e.g., eating breakfast, not skipping meals), being physical active (e.g., taking walks) moderate alcohol consumption (i.e., 3 drinks or less at a time) and those who had never smoked (compared to past and present smokers) also reported the most favorable physical health (assessed by a physical health spectrum created from answers to questions about disability, chronic conditions, impairments physical symptoms and energy level). Past research has also found that health behaviors may influence mental health. As discussed previously, minority stress may lead to heightened vigilance and depletion of cognitive resources needed for self-control thus influencing health behavior (e.g., over eating; Inzlicht & Kang, 2010). Past studies have shown that excessive self-regulatory failure may lead to feelings of dejection and may lead to severe psychological consequences (e.g., depression; Higgins, Shah, & Friedman, 1997; Strauman, 2002).

**Moderated/conditional effects.** Thus far, the direct and indirect effects of discrimination on mental and physical health have been discussed as suggested by Pascoe and Smart Richman’s model (2009). However, the model also suggests variables that may moderate the association between discrimination, stress reactivity and health behaviors. Although the model includes three moderators, only group identification is discussed, as this is the variable of interest in the present study.

Similar to the MSM (Meyer, 2003), Pascoe and Smart Richman (2009) also suggest that group identification, or social identity, may moderate the direct associations
between discrimination and health (see Figure 2, path f). In addition, Pascoe and Richman’s model also suggests group identification may moderate the indirect (i.e., stress reactivity and health behavior) associations between discrimination and health (see Figure 2, paths g and h). It is important to note that no studies in Pascoe and Smart Richman’s (2009) review examined the potential effects of social identity on the association between discrimination and health in sexual minorities. Unlike the MSM, however, Pascoe and Smart Richman (2009) do not make a distinction between the psychological and behavioral components of social identity. Instead, studies in the review focused primarily in assessing the *centrality* of the social identity to the self-concept. In other words, the studies focused on the extent to which an individual defined themselves on the basis of the social identity. This distinction is important because, as discussed previously, the psychological component of social identity can be assessed in several different ways including affect towards the social identity as well as sense of belonging. Therefore when considering the findings in this review, with the exception of Sabik & Tylka’s (2006) study, which assessed actual participation in the feminist identity, it should be kept in mind that the results may not necessarily be extended to other assessments of social identity.

In total, fifteen studies examined the moderating effects of social identity on direct and indirect associations between discrimination and health (Pascoe & Smart Richman, 2009). Overall, the findings regarding the moderating effects of social identity on the association between discrimination and health were mixed. Unlike the previously discussed MSM (Meyer, 2003), Pascoe and Smart Richman (2009) highlight the fact that
social identity may be just as likely to buffer as it is to exacerbate the association between discrimination and health. The authors cite the social categorization theory (Turner et al., 1987) which states that an individual should experience greater losses or damages when their social identity is threatened (e.g., discrimination) if they are highly identified with that social identity compared to those not highly identified with the social identity. However Pascoe and Richman (2009) also cite social identity theory (Tajfel & Turner, 2001), which suggests that the social identity may ameliorate the negative effects of minority stress by providing a positive self-concept and sense of belonging. Twelve studies examined the direct association between discrimination and mental health (path f); one study examined the direct association between discrimination and physical health (path f, no association; Williams et al., 1999); one examined the indirect association between discrimination and health behaviors (path h; attenuation of disordered eating in response to sexism; Sabik & Tylka, 2006) and one study examined the association between discrimination and stress reactivity (path g, no association; Major, Quinton & Schmader, 2003).

Out of the 12 studies that examined the role of social identity on the direct association between distal minority stress and mental health, 5 found a buffering effect (depressive symptomatology; Jones, Cross, & DeFour, 2007; Lee, 2005; Mossakowksi, 2003; self-esteem; Bourguignon, Seron, Yzerbyt, & Herman, 2006; Romero & Roberts, 2003), 5 found a exacerbating effect (self-esteem; McCoy & Major, 2003; general well-being; Sellers et al., 2006; Yoo & Lee, 2008; depressive symptomatology; McCoy &
Major, 2003; Noh et al., 1999; Sellers et al., 2006), and 2 found no effect (well-being; Lee, 2003; psychological stress response; Major et al., 2003).

The moderating role of social identity on the indirect pathways (b and d) was also mixed. Williams and colleagues (1999) examined the direct association between racial discrimination and self-reported general physical health and chronic physical health symptoms and found that ethnic social identity did not moderate this association. Sabik and Tylka (2006) examined the moderating role of feminist identity (i.e., how active an individual is with feminist activities as well as how central the feminist identity is to the individual self-definition) on the direct association between sexism and disordered eating in women. The authors found that women who were higher in the feminist identity experienced attenuation in the association between sexism and disordered eating (a negative health behavior). Although only one study in the review examined the role of social identity in the discrimination and health behavior association, studies examining risky health behavior in sexual minorities have found that those found that those who frequently used gay-related media (e.g., literature, film), were highly integrated as well as active in the gay community were less likely to engage in risky health behavior (e.g., unprotected sex) than those who were less integrated or less active in the gay community (Joseph, Adib, Joseph & Tal, 1991; Morton & Duck, 2000; Ridge, Plummer, & Minichiello, 1994). Major and colleagues (2003) found that the role of gender identity on the association between sexism and psychological stress reactivity in women neither exacerbated nor buffered psychological responses.
In summary, Pascoe and Smart Richman’s (2009) model provides researchers with testable direct and indirect pathways by which minority stress may influence mental and physical health outcomes. However, this model was primarily constructed based on studies examining racial discrimination. Although it can be argued that discriminatory experiences may be similar across minority groups, psychological and physiological reactions to these experiences may highly differ within the same group as well as across groups; it is therefore crucial to test this model in other populations. Also, although Pascoe and Richman’s (2009) model adds to the MSM (Meyer, 2003) by including physical health outcomes as well as indirect pathways by which discrimination may influence health, it does not have the nuanced conceptualization of social identity discussed in the MSM.
Specific Aims

It was the aim of the current study to further examine the effects of minority stress on health in the LGB population. First, there is paucity in the literature regarding the potential effects of discrimination on physical health in the LGB community. Therefore, the current study tested the direct associations between minority stress (both proximally and distally) and mental health as well as physical health. Second, only the direct effects of minority stress have been examined in the LGB population. The present study examined indirect pathways (e.g., health behavior and perceived stress reactivity) to further delineate how discrimination may predict health outcomes in a LGB sample. Third, the present study tested the moderating role of social identity and its potentially ameliorative or exacerbating effect on the association between minority stress and health. The potential moderating (i.e., buffering) role of hardiness on the association between minority stress and health was also examined.
Hypotheses

The present study tested a modified version of the Pascoe and Smart Richman (2009) discrimination and health model both individual pathways and the model as a whole, as shown in Figure 3 and 4. The hypothesized model was modified from the Pascoe and Smart Richman (2009) model in the following ways: (1) substituting minority stress (i.e., stigma consciousness and discrimination) as the main predictor in place of discrimination, (2) by refining the conceptualization of social identity to include both psychological and behavioral components; and (3) examining the role of hardiness as a potential moderator. The current study tested the direct (path e) and indirect (paths g-h and f-i) effects of minority stress on mental and physical health outcomes. In addition, the moderating effects of social identity and hardiness on the direct (path e) and indirect (paths g-h and f-i) effects of minority stress via perceived stress reactivity and health behaviors were also examined. In addition, the overall model fit was examined.

The proposed model is shown in Figures 3 and 4 below. The model contains four latent variables: Minority stress, health behaviors, perceived stress reactivity and health (there were two proposed models, one for mental health and one for physical health). Minority stress is an exogenous variable with two indicator variables: Discrimination ($\alpha = .90$) and stigma consciousness ($\alpha = .86$). Health behaviors, perceived stress reactivity and health (mental and physical) are endogenous variables. The health behaviors variable has two indicator variables: Preventive ($\alpha = .77$) and risky ($\alpha = .70$) health. Perceived stress reactivity has five indicator variables: Prolonged reactivity ($\alpha = .62$), reactivity to work overload ($\alpha = .77$), reactivity to social conflict ($\alpha = .71$), reactivity to failure ($\alpha = .65$),
and reactivity to social evaluation (α = .63). Two different models were used to examine the direct and indirect, via health behaviors and perceived stress reactivity, on mental and physical health. Mental health has three indicator variables: Depressive symptomatology (α = .92), anxiety (α = .91), and somatization (α = .86). Physical health also has three indicator variables: Sleep quality (α = .83), physical health symptoms (α = .95), and general physical health (α = .80). Social identity, psychological (α = .82) and behavioral (α = .94), were examined separately as a possible moderator of the direct and indirect effects of minority stress on mental and physical health. Hardiness (α = .86) was also examined as a possible moderator of the direct and indirect effects of minority stress on mental and physical health.
Figure 3. Hypothesized model of the direct and indirect effects of minority stress on mental health.
Figure 4. Hypothesized model of the direct and indirect effects of minority stress on physical health.
Direct Effects

Aim 1. Examined the direct effects of minority stress on mental and physical health in sexual minorities.

Hypothesis 1a. Greater minority stress (i.e., discrimination and stigma consciousness) would be associated with poorer mental health (e.g., greater anxiety, somatization and depressive symptomatology). This would be indicated with a positive coefficient (e), which is significantly different from zero (Figure 3).

Hypothesis 1b. Greater minority stress (i.e., discrimination and stigma consciousness) would be associated with poorer physical health (e.g., poorer sleep quality, greater negative physical symptoms and poorer overall physical health). This would be indicated with a positive coefficient (e) which is significantly different from zero (Figure 4).

Conditional/Moderated Direct Effects

Aim 2. Examined the moderating role of the gay social identity on the direct association between minority stress and health.

Research question for Aim 2. The moderating role of social identity on the direct association between minority stress and mental and physical health was explored as a research question.

Indirect Effects

Aim 3. Examined the role of health behaviors in the indirect association between minority stress and health in sexual minorities.
**Hypothesis 3a.** Increased minority stress would predict health behaviors (i.e., increased risky health behavior and decreased preventive health behavior). This would be indicated by a coefficient ($f$) which should be positive and significantly different from zero (Figure 3 and 4). Health behaviors would mediate the association between minority stress and negative mental health outcomes (e.g., greater anxiety, somatization and depressive symptomatology). This would be indicated by path $f^*i$, which should be significantly different from zero (Figure 3).

**Hypothesis 3b.** Increased minority stress would predict health behaviors (i.e., increased risky health behavior and decreased preventive health behavior). This would be indicated by coefficient ($f$), which should be positive and significantly different from zero. Health behaviors would mediate the association between minority stress and negative physical health outcomes (e.g., poorer sleep quality, greater negative physical symptoms and poorer overall physical health). This would be indicated by path $f^*i$, which should be significantly different from zero (Figure 4).

**Aim 4.** Examined the role of perceived stress reactivity in the association between minority stress and health in sexual minorities.

**Research question for Aim 4.** The mediating role of perceived stress reactivity in the association between minority stress and negative mental and physical health was examined.

**Conditional/Moderated Indirect Effects**

**Aim 5.** Examined the moderating role of gay social identity on the association between minority stress, perceived stress reactivity and health.
**Research question for Aim 5.** The potential moderating role of gay social identity in the association between minority stress, perceived stress reactivity, and subsequent mental and physical health was explored.

**Aim 6.** Examined the moderating role of gay social identity on the association between minority stress, health behaviors, and subsequent health outcomes.

**Research question for Aim 6.** The potential moderating role of gay social identity in the association between minority stress, health behaviors, and subsequent mental and physical health was explored.

**Aim 7.** Examined the moderating role of hardiness on the direct and indirect effects of minority stress on health outcomes.

**Hypothesis 4:** Hardiness will buffer (i.e., weaken) the direct association between minority stress and poorer health outcomes.

**Hypothesis 5:** Hardiness will buffer (i.e., weaken) the indirect association between minority stress and poorer health outcomes.
Method

Participants

Participants included 277 LGB men and women (55% male, \(N = 155\)). Participation was restricted to individuals who self-identified as lesbian, gay, or bisexual. In addition, participants were required to be at least 18 years of age, speak and read English fluently, and live in the United States. As shown in Table 1, the sample was predominately young (68% were 18-33 years of age), well educated (70% had some college or were college graduates) and of low income (64% reported annual incomes of $40,000 or less). The sample was also predominately Caucasian (72%).
Table 1.

Participants Characteristics ($N = 277$)

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<tr>
<td>Age</td>
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<td></td>
<td>26-33</td>
<td>34%</td>
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<td></td>
<td>34+</td>
<td>32%</td>
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<tr>
<td>Income</td>
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<td></td>
<td>$15,000-40,000</td>
<td>36%</td>
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<tr>
<td></td>
<td>$40,000 or more</td>
<td>36%</td>
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<tr>
<td>Education</td>
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<tr>
<td></td>
<td>Some college</td>
<td>36%</td>
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<td></td>
<td>College degree</td>
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<td>Ethnicity</td>
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<td>9%</td>
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<td>Other</td>
<td>19%</td>
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Recruitment

Recruitment took place online via the Amazon Company, Mechanical Turk (mturk.com). Mechanical Turk is an online labor market in which requestors post jobs or “HITs” and workers choose which jobs (e.g., surveys) to do for compensation. A requestor is any person who uploads a job and a worker is any person who completes a job. Mechanical Turk offers the advantage of a diverse population that may otherwise not be available to the researcher at Ohio University. Participants were compensated $0.50 for their participation, which was paid directly to their Amazon accounts. The use of a Mechanical Turk worker ID ensured anonymity of the worker (participant).
**Procedure**

The study took place entirely on the Internet. Potential participants entered the mturk.com site and found the study listed under available jobs. If the participant met the eligibility requirements, they were directed to a page that contains the link for the actual study. The study was hosted on Qualtrics online program. Individuals were eligible to participate if they were at least 18 years old, located in the US, and sexual minorities (i.e., LGB). Before they started the study a brief description of the study and consent form was presented to the participant. If the participant agreed to participate in the study, they then pressed next to begin the survey. The survey was approximately 20 minutes in length, and the survey link remained active for up to an hour after the survey begun. In the current study, all the demographic variables were presented first, followed by the health measures (e.g., BSI-18, PSQI, etc.). The minority stress measures (i.e., HHRDS and stigma consciousness) and the moderator variables (i.e., social identity and hardiness) were presented last and were counterbalanced. This was done so that the responses to the minority stress measures would not influence the response to the moderator variables and vice versa.

**Measures**

**Demographics and Control Variables (Appendix A).** Social economic status, education, as well as ethnicity and age were assessed.

**General Stress.** In the present study, general stress was examined as a covariate. General stress was assessed via the Social Readjustment Ratings Scale (SRRS; Holmes & Rahe, 1967). The SRRS was originally developed to measure the relationship between
life events and the development of disease. Forty-three life events are scored, the number of "Life Change Units" that apply to events in the past year of an individual's life are added and the final score gives a rough estimate of how stress affects health. Rahe (1970) found that there was a .12 correlation between stress scale scores and illness. In the current study, the SRRS had an internal consistency alpha of .72. ($M = 3.91$, $SD = 2.80$).

**Health Behaviors.** In order to assess health behavior the *Health Behaviors Checklist* was used (HBCL; Vickers, Conway, & Hervig, 1990). HBCL consists of 40 items that assess both preventive (e.g., exercise, diet, etc.) and risky (e.g., alcohol, tobacco use, etc.) health behaviors. This scale has shown good internal consistency in assessing preventive health behaviors ($\alpha = .77$) and risky health behavior ($\alpha = .70$). In the present study the sub scales also showed good internal consistency in assessing preventive ($\alpha = .79$) and risky ($\alpha = .71$) health behaviors. In the present study, preventive health behavior $M = 3.18$, $SD = 0.52$, and risky health behavior $M = 3.61$, $SD = 0.75$.

**Physical Health.** *Pittsburgh Sleep Quality Index* (PSQI; Buysee, Reynolds, Monk, Burman & Kupfer, 2000). Sleep quality was assessed using the PSQI. Composed of 19 self-rated Likert-type items, the PSQI differentiates “poor” from “good” sleep by measuring seven domains: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction over the last month (Buysee et al., 2000). Higher scores indicate poorer sleep quality. The PSQI has good internal consistency and a reliability coefficient (Cronbach's $\alpha$) of .83. The internal consistency for the present study was good ($\alpha = .79$). In the present study $M = 6.94$, $SD = 4.16$. 
Cohen and Hoberman Inventory of Physical Symptoms (CHIPS; Cohen & Hoberman, 1983). This 33-item measure was used to assess physical symptoms of participants within the last month. The CHIPS contains items that were selected to include common physical symptoms (e.g., headaches, back pain, constant fatigue, etc.). Each item is rated on a scale ranging from (0) “Not at all” to (4) “Extreme bother.” Higher scores indicate higher negative physical symptoms. Internal consistency reliability has been reported to range between .88 and .95 (Cohen & Hoberman, 1983; Eby, Campbell, Sullivan, & Davidson 1995). For this study, the internal consistency was .95 ($M = 1.58, SD = 0.57$). In past research (Cohen & Hoberman, 1983) the CHIPS was found to predict use of student health services among two different samples of college students, thereby supporting the construct validity of the scale.

Short Form Health Survey (SF-12; Ware, Kosinski & Keller, 1996). The SF-12 is a 12-item measure that assesses general physical and mental health within the previous four weeks (e.g., “How does your current health limit you in certain activities?” and “How did your pain interfere with normal work?”). Higher scores indicate poorer physical health. The current study focused on the physical component summary score (PCS) of the SF-12. The PCS has shown high internal consistency ($\alpha = .86$) as well as validity in participants with and without physical health issues (Ware, Kosinski, Turner-Bowker & Gandek, 2002). In this study, the internal consistency of the PCS was good ($\alpha = .80$). In the present study, $M = 0.90, SD = 0.47$

Mental Health. Brief Symptoms Inventory-18 (BSI-18; Derogatis, 2000). The BSI-18 is a shortened version of the BSI (Derogatis & Spencer, 1982). The BSI-18
focuses on depression ($\alpha = .88$), anxiety ($\alpha = .86$) and somatization ($\alpha = .80$), as well as an overall score of general mental health ($\alpha = .89$) within the last two to four weeks. Higher scores indicate poorer mental health. The BSI-18 has been validated with other measures of mental health (e.g. SCL-90-R; Derogatis & Savitz, 2000) with correlations ranging from .91 to .96. In the present study the three subscales: depression ($\alpha = .92$), anxiety ($\alpha = .91$) and somatization ($\alpha = .85$) showed excellent internal consistency. In the present study: depression $M = 6.10$, $SD = 6.02$, anxiety $M = 5.10$, $SD = 5.32$, somatization $M = 3.20$, $SD = 3.98$.

**Perceived Stress Reactivity.** In order to measure perceived stress reactivity the Perceived Stress Reactivity Scale (PSRS; Schlotz, Yim, Zoccola, Jansen & Schultz, 2011) was used. The PSRS is a 23-item questionnaire with five subscales (Prolonged Reactivity, Reactivity to Work Overload, Reactivity to Social Conflicts, Reactivity to Failure and Reactivity to Social Evaluation) and an overall perceived stress reactivity score assessed within the last four weeks. Higher scores indicate greater perceived stress reactivity. The internal consistency alphas for the 5 subscales in a US sample are: Prolonged Reactivity, .62; Reactivity to Work Overload, .77; Reactivity to Social Conflicts, .71; Reactivity to Failure, .65; and Reactivity to Social Evaluation, .63 with the overall scale having an alpha of .87. The PSRS has good construct validity and showed expected associations with related constructs such as self-efficacy, neuroticism, chronic stress, and perceived stress. In the present study, the overall scale had excellent internal consistency ($\alpha = .89$). In the present study $M = 1.89$, $SD = 0.45$. 
**Stigma Consciousness.** The degree to which LGB people expect to be stereotyped or rejected by others due to their sexual orientation was assessed using the 10-item *Stigma Consciousness for Gay Men and Lesbians Questionnaire* (SCQ; Pinel, 1999). The scale uses a 7 point Likert-type scale ranging from *strongly disagree* to *strongly agree*. Higher scores indicate greater stigma consciousness. The wording of the scale was modified slightly to reflect inclusion of bisexual respondents. Preliminary internal consistency and validity of the scale was established by Pinel (1999) with an alpha of .81 for gay men and lesbians. The SCQ was also positively correlated with measures of self-consciousness and perceived discrimination. In the present study, the scale had excellent internal consistency ($\alpha = .86$). In the present study, $M = 3.02$, $SD = 0.63$.

**Psychological Social Identity.** In order to measure the psychological aspect of the gay social identity (cognitive and affective component) a modified version of the minority subscale of the *Multi Ethnic Identity Measure* (MEIM; Phinney, 1992) was used. The MEIM has been adapted to fit an LGB population by Fingerhut and colleagues (2005), and is the version that is used in the current study. This scale contains 8 items that assess connection to the minority identity. Sample items of minority group connection are: “I am happy I am a member of the LGB community” and “I have a clear sense of my sexual orientation and what it means for me.” Higher scores indicate greater psychological gay social identity. The adapted version of the MEIM has high internal reliability at assessing gay identity ($\alpha = .82$). There is currently no published predictive
validity information for the adapted version. For the present study, internal consistency was excellent ($\alpha = .91$). In the present study, $M = 3.55, SD = 0.81$.

**Behavioral Social Identity (Appendix B).** In order to measure the behavioral aspect of the gay social identity, a modified version of the *Involvement in Feminist Activity Scale* was used (IFAS; Szymanksi, 2004). The scale was adapted by changing the language used to assess participation in LGB activity rather than feminist activities (i.e., “I participate in LGB demonstrations, boycotts, marches and/or rallies” and “I am involved in research, writing, and or speaking about LGB issues”). A pilot study was conducted in order to assess the reliability and validity of the scale in an LGB population. One hundred and forty (79 men and 61 women) LGB individuals completed the adapted version of the IFAS consists of a 16-item scale that assessed involvement in LGB activity in a variety of areas. Pilot study results indicated that the scale showed high internal reliability in both gay men and women ($\alpha = .94$) and was negatively related to measures of anxiety ($r = -.17$) and depression ($r = -.29$) as expected. In the present internal reliability was also excellent, ($\alpha = .93$) and $M = 2.77, SD = 1.29$.

**Discrimination.** In order to measure lifetime discrimination, the *Heterosexist Harassment, Rejection and Discrimination Scale* (HHRDS; Szymanski, 2006) was used. The HHRDS is rated on 6-point Likert-type scale from 1 (the event has never happened to you) to 6 (the event happened almost all the time; more than 70% of the time). Mean scores were calculated with higher scores indicating greater experiences of heterosexist harassment, rejection and discrimination. The HHRDS contains three factors: harassment/rejection, workplace/school discrimination, other discrimination. The internal
consistency alpha for the HHRDS is .90. In the present study, principle components analysis (PCA) with varimax rotation in conjunction with parallel analysis (O’Connor, 2000), revealed two sub components of the HHRDS: discrimination from family and friends (α = .89) and discrimination from non-family or friends (α = .91). In the present study, discrimination from family and friends (DISC-F) $M = 1.20, SD = 1.11$ and discrimination from others (DISC-O) $M = .73, SD = .79$. Therefore, discrimination was examined as two variables, DISC-F and DISC-O.

**Hardiness.** In order to measure hardiness, the short Hardiness scale (DRS-15) was used (Bartone, 1995, 1999). This brief 15-item hardiness scale is able to assess the three facets of hardiness: commitment (α = .77), control (α = .71), challenge (α = .70) as well as an overall score (α = .83). In the current study the overall score had an internal consistency alpha of .86. In the present study, $M = 28.64, SD = 6.41$. 
Analytic Plan

Missing Data

There was a total of 304 responses to the online survey. Individuals who identified as transgendered (N = 5), had a pattern of responding that differed greatly from the rest of the sample (e.g., their values on the mental health items were all at the maximum), thus their responses were excluded from present analyses. In order to ensure quality responses from the participants, a question was included to assess whether the participants were reading the questions carefully (i.e., the participants were simply asked to choose 7 if they were reading the question). Twenty-two participants chose options other than 7; therefore their responses were excluded from the final sample. Therefore, the final sample included 277 participants. Beyond the 27 participants that were excluded, there was no missing data; therefore, parameter estimates and model tests were pursued in the context of Full Information Maximum Likelihood (FIML) methods implemented in AMOS 20 (Arbuckle, 2011).

Outliers

Outlier analyses were undertaken prior to all major analyses. The analyses were both non-model based and model based. For the former, multivariate outliers were found, but none had leverage scores four times greater than the mean leverage. Outliers were detected, however none had a significant leverage value, thus all data (N = 277) was entered into the model.

An additional set of outlier analyses were used based on model-based outlier analysis. This involved selecting an indicator for each latent variable and then regressing
the indicator for each endogenous variable onto the indicators for the variables of which the endogenous variable is assumed to be a linear function. This analysis used ordinary least squares regression in a limited information estimation framework. Standardized betas were examined; none had a standardized beta greater than 1.0, thus indicating no model-based outliers were present.

Non-normality

Multivariate normality was evaluated using Mardia’s test for multivariate normality. In addition, univariate indices of skewness and kurtosis were examined to determine if the absolute value of any of these indices was greater than 3 (Ullman, 2006). Several of the variables were positively skewed and were therefore square root transformed prior to inclusion in analysis.

Indices of Fit

Following recommendations of Bollen and Long (1993), a variety of global fit indices were used, including indices of absolute fit, indices of relative fit and indices of fit with a penalty function for lack of parsimony. These include the traditional overall chi square test of model fit (which should be statistically non-significant to illustrate that the sample covariance matrix is equal to the population covariance matrix), the Root Mean Square Error of Approximation (RMSEA; which should be less than .06 to declare satisfactory fit), the $p$ value for the test of close fit (which should be statistically non-significant), the Comparative Fit Index (CFI; which should be greater than .95); and the Tucker-Lewis Fit Index (TFI; which should be greater than .95) (Schreiber, Stage, King, Nora, & Barlow, 2006).
**Power and Sample Size Considerations**

Using MacCallum and colleagues (1996) power analysis for determination of sample size to assess the fit of a structural equation model based on RMSEA index, it was determined the minimum sample required to achieve a power of .80 with 42 degrees of freedom (see, Figures 3 and 4; 78 sample moments minus 36 free parameters) was N=247.

**Hypothesis Testing of Direct and Indirect Effects**

AMOS 20 (Arbuckle, 2011) was used to examine the direct effects between minority stress and health outcomes. In order to test the hypothesis that health behaviors and perceived stress reactivity mediate the association between minority stress and health outcomes, AMOS 20 (Arbuckle, 2011) was used to determine whether the indirect effects of the proposed model (i.e., paths f*i and g*h in, see Figures 3 and 4) were statistically significant. In order to examine the indirect effect of minority stress via perceived stress reactivity, bootstrapping was used in place of the more traditional Sobel test. The often-used Sobel test for mediation has the flaw of assuming the normality of the sampling distribution of the indirect effect (Hayes, 2009). However, the indirect effect tends to be asymmetric and have non-zero kurtosis and skewness. Therefore, bootstrapping, a more robust alternative, was used to examine the indirect effect of minority stress on health outcomes. Bootstrapping does not make assumptions about the shape of the sampling distribution of the indirect effect nor does it require the calculation of standard errors. Bootstrapping employs bias-corrected 95% confidence intervals thus allowing the researcher to say that the indirect effect is not zero, and therefore significant, if zero is not
located between the lower and upper bound. Thus, bootstrapping (N = 3,000) via AMOS 20 was used to generate confidence intervals in order to examine the indirect effect of perceived stress reactivity on the association between minority stress and health. The Baron and Kenny method (1986) was also employed to examine mediation.

**Hypothesis Testing of Conditional Indirect Effects**

When testing moderation, a multiple group model approach, which requires grouping individuals based on levels of a moderator, is a common technique for evaluating moderation within an SEM framework (Kline, 2005). Multi-group analysis allows for an examination of each path of the model as well as an examination of the indirect effect to test for moderated mediation. In order for a variable to significantly moderate a path, the difference between the levels of the moderator must yield a Z-score of +/-1.96 or greater. For these analyses, the moderators (i.e., social identity and hardiness) were split at the median and coded 0 (low) and 1 (high). To test for the statistical significance between low and high values, critical ratios were examined (Gaskin, 2012). The moderator variables included behavioral and psychological social identity as well as hardiness.
Results

Structural Equation Model Testing

Model 1a (Mental Health) and 1b (Physical Health): Initial Model Testing. A Confirmatory Factor Analysis (CFA) was conducted on the hypothesized models, via AMOS 20 software (Arbuckle, 2011). Maximum likelihood estimation was used because the variables were assumed to be normally distributed. The CFA indicated an inadequate fit with the data, $\chi^2 = 127.05, \text{DF} = 48, p < .001$ (CFI) = .94, (TLI) = .92, RMSEA = .08, 90% CI [.07, .13], PCLOSE < .05 for mental health. For physical health, the model fit was better, yet still inadequate, $\chi^2 = 118.4, \text{DF} = 48, p < .001$, CFI = .94, TLI = .92, RMSEA = .07, 90% CI [.05, .09], PCLOSE = .12. Mardia’s test for non-normality was conducted for both models and was found to be significant (kurtosis = 5.23, critical ratio = 2.72), indicating that the underlying assumptions of traditional maximum likelihood methods used in SEM had been violated (multivariate non-normality). The output also indicated negative error variance in both models; therefore, the solution was not admissible.

Model Modifications

In order to achieve adequate model fit, several modifications to the models were made. First, the model indicated that minority stress was not related to health behaviors. As a result, health behavior was examined as two separate variables (i.e., risky and preventative), however, neither improved model fit. Therefore, health behavior was removed from the revised model predicting mental and physical health. With health behaviors removed, the data fit the models slightly better ($\chi^2 = 96.05, \text{DF} = 44, p < .001$
(CFI) = .94, (TLI) = .92, RMSEA = .08, 90% CI [.06, .10] PCLOSE < .05 for mental health. χ² = 80.45, DF = 44, p < .001, CFI = .94, TLI = .92, RMSEA = .07, 90% CI [.05, .09], PCLOSE = .25 for physical health); however, none of the additional modification indices were theoretical feasible (i.e., all the suggested modifications did not make statistical or theoretical sense). Therefore, a Principle Components Analysis (PCA) along with a Monte Carlo simulated parallel analysis was conducted to examine if the appropriate amount of indicators were loading onto the proposed latent variables (discrimination, perceived stress reactivity and mental and physical health). Retention of the appropriate amount of variables is crucial for analysis such as exploratory factor analysis (EFA) (Tucker & MacCullum, 1997). Parallel analysis (PA) via a Monte Carlo simulation is a superior alternative than simply using other methods for examining retention of factors such as the Scree test or Kaiser’s eigenvalue-greater-than-one rule. Kaiser’s eigenvalue-greater-than-one-rule may lead to arbitrary decision-making, thus leading to the retention of trivial factors. The Scree test is subjective and has no definitive cut-off point that, like Kaiser’s, may lead to retention of trivial factors; Ledesma & Valero-Mora, 2007. PA via Monte Carlo simulation examines the eigenvalues of randomly generated data that is parallel to the obtained data with regards to size and number of variables. Eigenvalues, of the obtained data, that are larger than the 95th percentile of the randomly generated data are retained. PA has been shown to have the least variability and least sensitivity to different factors, thus making it the most accurate out of the three methods (Zwick & Velicer, 1986). The results of the PCA analyses for
discrimination and perceived stress reactivity are shown in the Appendix (see Appendices C and D, Table 2 and 3).

The PCA on the discrimination scale revealed a two-factor solution (see Appendix C, Table 8), one of which contained items pertaining to discrimination from family and friends; the other contained items pertaining to discrimination from individuals who were not family or friends. A Monte Carlo parallel analysis was conducted in order to examine the eigenvalues of the study data against randomly generated eigenvalues. The eigenvalues for the study data were larger, and therefore, the discrimination variable was split into two new discrimination variables and used in subsequent analyses: discrimination from family and friends (DISC-F) and discrimination from individuals who were not family or friends (DISC-O). When the minority stress latent variable was examined with three indicator variables (i.e., when stigma consciousness was examined with the two discrimination variables), total explained variance dropped from 65% to 55%. Also, whereas DISC-O (β = .84) and discrimination from family and friends (β = .86) loaded well on the same factor, stigma consciousness did not (β = .40). Therefore, Discrimination was examined as a latent variable with two indicator variables (DISC-F and DISC-O) and stigma consciousness was examined as an observed variable.

A PCA for the perceived stress reactivity scale (see Appendix D, Table 9) revealed four instead of the five hypothesized factors. A Monte Carlo parallel analysis was also conducted to examine the eigenvalues for the study data and randomly generated data. Only one eigenvalue in the study data was greater than the 95th percentile.
of the randomly generated data, indicating a single factor. Therefore, perceived stress reactivity was examined a single overall factor in subsequent analyses.

A PCA was also conducted in order to examine the mental and physical health latent variables. As shown in Appendix E (Table 10), the mental health variables (i.e., depressive symptoms, anxiety and somatization) load very highly onto one factor. In addition, the physical health variables (i.e., poor sleep quality, poor subjective health, and being bothered by physical symptoms) load very highly onto one factor (see Appendix E, Table 11). Therefore, for the next attempt at model fit, both the mental and physical health latent variables retained their original indicator variables.

**Model 2a (Mental Health) and 2b (Physical Health).** Model fit on the newly constructed model (as described above) was again examined. In these models, minority stress was examined via discrimination as a latent variable with two indicator variables and stigma consciousness as an observed variable. Health behavior was removed as a mediator and the overall score for perceived stress reactivity was examined as an observed variable. Results from this analysis revealed that the new discrimination variable (a single latent variable with two indicators) contained a Heywood case. A Heywood case occurs when a standardized loading is larger than one and the error variance is negative (Chen, Bollen, Paxton, Curran, & Kirby, 2001). A Heywood case will cause the model to be under identified and therefore result an inadmissible solution. The solution was again not admissible; therefore, further modifications were made (see Model 5 a and b, below). The Heywood case was treated as a specification error (i.e., the negative variance is the result of an overcompensation due to a
standardized loading being greater than one; Bollen & Davis, 2009) and the two discrimination variables were split into two observed variables (i.e., the discrimination latent variable contained the Heywood case, therefore the variable was modified).

*Figure 5a.* Model 2a depicting a modified version of the proposed mental health model. In this model, minority stress has been split into a discrimination latent variable with two indicators and stigma consciousness as an observed variable. Also, the health behavior variable has been removed and perceived stress reactivity was examined as an observed variable.
Figure 5b. Model 2b depicting a modified version of the proposed physical health model. In this model, minority stress has been split into a discrimination latent variable with two indicators and stigma consciousness as an observed variable. Also, the health behavior variable has been removed and perceived stress reactivity was examined as an observed variable.

Model 3a (Mental Health) 3b (Physical Health): Final Model. The final models are shown in Figures 6 and 7. The final models had acceptable fit for mental health, $\chi^2 = 14.16, DF = 8, p = .08, CFI = .99, TLI = .98, RMSEA = .05, 90\% CI [.00, .08], PCLOSE = .41$, and physical health, $\chi^2 = 9.05, DF = 8, p = .34, CFI = .99, TLI = .99, RMSEA = .02, 90\% CI [.00, .07] PCLOSE = .75$. Also, 60\% of the variability in poor mental health was explained by model 3a (mental health) and 54\% of the variability in poor physical health was explained by model 3b (physical health). In the final model, control variables (i.e., general stress, education, age, gender, and income) were also included. Control variables were included in the model by regressing the control variables onto the mental and physical health latent variables as well as covarying the
control variables with independent variables (i.e., DISC-F, DISC-O and SC). As recommended by Becker (2005), in order to have the best fitting models, control variables that were not significant were removed from the model (i.e., gender, education, and income were removed). The fit with the significant control variables was also acceptable for mental health, $\chi^2 = 33.14$, DF =17, $p = .01$, CFI = .98, TLI = .96, RMSEA = .06, PCLOSE = .29 and physical health, $\chi^2 = 62.35$, DF =38, $p = .01$, CFI = .97, TLI = .96, RMSEA = .04, PCLOSE = 53. There were no squared multiple correlations greater than 1.00, and no negative error variances, which indicates appropriate identification of the model. Also Mardia’s test of non-normality was non-significant (mental health; kurtosis = 1.17, critical ratio = .77; physical health; kurtosis = 1.80, critical ratio = 1.25), indicating that multivariate normality was not violated. Table 6 shows the correlations between all the variables for the mental health model, and Table 7 shows all the correlations for the physical health model. In the final models, the proposed minority stress latent variable has been separated into three indicator variables: DISC-F, DISC-O and SC. Perceived stress reactivity is no longer a latent variable; instead the overall score is examined as an observed variable. Finally health behavior has been completely removed from the models.
Figure 6. Final model examining the direct and indirect effects of minority stress on mental health. In this model, the latent variable discrimination was split into two observed variables (DISC-F and DISC-O). In order to achieve the best fitting model, non-significant covariates were removed (i.e., age and general stress were included in this model). *p < .05, **p < .01, ***p < .001.

Figure 7. Final model examining the direct and indirect effects of minority stress on physical health. In this model, the latent variable discrimination was split into two observed variables (DISC-F and DISC-O). In order to achieve the best fitting model, non-significant covariates were removed (i.e., education and general stress were included in this model). *p < .05, **p < .01, ***p < .001.
Correlations for Final Models

As shown in Tables 2 and 3, the majority of the variables were moderately to highly correlated with one another. Of three minority stress variables (i.e., DISC-F, DISC-O, and SC), DISC-F was the most strongly correlated with the poor mental (i.e., depressive symptoms, anxiety, and somatization) and physical (poor sleep quality, poor subjective health, and physical symptoms) outcomes.
Table 2.

*Correlations Between Variables (Mental Health)*

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*p < .05, **p < .01, ***p < .001; GS = General stress; DISC-O = Discrimination (other); DISC-F = Discrimination (family/friends); PSR = Perceived stress reactivity; SC = Stigma consciousness, SOM = Somatization; DEP = Depressive symptoms.*
Table 3.

Correlations Between Variables (Physical Health)

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*p < .05, **p < .01, ***p < .001; GS = General stress; DISC-O = Discrimination (other); DISC-F = Discrimination (family/friends); PSR = Perceived stress reactivity; SC = Stigma consciousness, PSQ = Poor sleep quality; PS = Physical symptoms, PSH = Poor subjective health.
Hypotheses Testing Results

Direct Effect

The following section describes the results of the hypotheses testing for the final model. Figures 6 and 7 describe the direct and indirect effects of the minority stress variables on mental and physical health.

Direct Effect (Aim 1)

Hypothesis 1a. Greater minority stress (i.e., discrimination and stigma consciousness) would be associated with poorer mental health (e.g., greater anxiety, somatization and depressive symptomatology).

As shown in Figure 6, DISC-F ($\beta = .14$) was positively associated with poorer mental health (i.e., greater depressive symptoms, anxiety, and somatization), consistent with expectations. In other words, greater self-report of discrimination from family and friends was associated with poorer mental health. In contrast, DISC-O ($\beta = .04$) and SC ($\beta = -.10$) were not directly associated with poor mental health. This finding contradicts the hypothesis that all minority stress variables would be associated with poorer mental health. Thus, the results have mixed support for the hypothesis that minority stress (i.e., discrimination and stigma consciousness) would directly predict poorer mental health.

Hypothesis 1b. Greater minority stress (i.e., discrimination and stigma consciousness) would be associated with poorer physical health (e.g., poorer sleep quality, greater negative physical symptoms and poorer overall physical health).

As shown in Figure 7, DISC-F ($\beta = .18$) was positively associated with poorer physical health (i.e., greater physical symptoms, poorer sleep quality, and poorer
subjective physical health), consistent with expectations. In other words, greater self-report of discrimination from family and friends was associated with poorer physical health. In contrast, DISC-O ($\beta = 0.08$) and SC ($\beta = -0.04$) were not directly associated with poor physical health. This finding contradicts the hypothesis that all minority stress variables would be associated with poorer physical health. Thus, the results have mixed support for the hypothesis that minority stress (i.e., discrimination and stigma consciousness) would directly predict poorer physical health.

**Conditional Direct Effect (Aim 2)**

**Research question for Aim 2.** The moderating role of social identity on the direct association between minority stress and health was explored as a research question. The moderating role of psychological and behavioral social identity was examined using multi-group analysis. Multi-group analysis (Kline, 2005) allows for an examination of each path of the model as well as an examination of the indirect effect to test for moderated mediation. In order for a variable to significantly moderate a path, the difference between the levels of the moderator must yield a Z-score of $\pm 1.96$ or greater. For these analyses, the moderators were split at the median and coded 0 (low) and 1 (high). To test for the statistical significance between low and high values, critical ratios were examined (Gaskin, 2012). Tables 4 and 5 show the results for the multi-group analysis for social identity. Results of these analyses indicated that psychological and behavioral social identity did not moderate any of the paths. In other words, engaging in activities relevant to the gay social identity and psychologically identifying with the gay
social identity neither buffered nor exacerbated the direct and indirect effects of minority stress on health (mental and physical).

Table 4.

Results from Multi-group Analysis (Mental Health)

<table>
<thead>
<tr>
<th>Model</th>
<th>Psychological Social Identity</th>
<th>Behavioral Social Identity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \beta )</td>
<td>( Z)-score</td>
</tr>
<tr>
<td>Direct</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>SC</td>
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<td>-.27</td>
</tr>
<tr>
<td>DISC-O</td>
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<td>.12</td>
</tr>
<tr>
<td>DISC-F</td>
<td>.29</td>
<td>.28</td>
</tr>
</tbody>
</table>

DISC-O = Discrimination (other); DISC-F = Discrimination (family/friends); SC = Stigma consciousness
Table 5.

*Results from Multi-group Analysis (Physical Health)*

<table>
<thead>
<tr>
<th>Model</th>
<th>Psychological Social Identity</th>
<th>Behavioral Social Identity</th>
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<tbody>
<tr>
<td></td>
<td>(\beta)</td>
<td>(Z)-score</td>
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<tr>
<td>Direct</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>SC</td>
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</tr>
<tr>
<td>DISC-O</td>
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</tr>
<tr>
<td>DISC-F</td>
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<td>.32</td>
</tr>
</tbody>
</table>

DISC-O = Discrimination (other); DISC-F = Discrimination (family/friends); SC = Stigma consciousness

**Indirect (Mediated) Effect (Aim 3 and 4)**

It was hypothesized that health behaviors would mediate the effect of minority stress on health outcomes (i.e., increased minority stress would be associated with decreased health behavior and poorer health outcomes; see hypotheses 3a and 3b). However, because health behavior was unrelated to minority stress in current sample, it was removed from the model. Therefore, the indirect effect of minority stress, via health behavior, on health outcomes was not examined (i.e., Aim 3).

**Research Question for Aim 4.** The mediating role of perceived stress reactivity in the association between minority stress and negative mental and physical health was examined.
Due to the non-significant direct effects of DISC-O and SC on mental and physical health (see Aim 1), only the indirect effect of DISC-F, via perceived stress reactivity, on mental and physical health was examined. To examine the indirect effect of DISC-F, via perceived stress reactivity, on health, bias corrected 95% confidence intervals were constructed via bootstrapping (N = 3000). Again, bootstrapping was used because it is a more robust method of examining the indirect effect compared to the more traditional Sobel test (Hayes, 2009). The indirect effect is significant if the confidence interval does not include zero. The Baron and Kenny (1986) method of mediation was also employed to examine the indirect effect of DISC-F, via perceived stress reactivity, on health outcomes. First, the direct effect of DISC-F on mental and physical health was examined. Then the direct effect of DISC-F on perceived stress reactivity and mental and physical health was examined. Then the indirect effect of DISC-F, via perceived stress reactivity, on mental and physical health was examined.

As discussed in Aim 1, the direct association between DISC-F and poor mental health was positive and significant (β = 14). As shown in Figure 6, DISC-F was also positively associated with perceived stress reactivity (β = .22). The indirect effect of DISC-F (indirect β = .16, 95% CI [.04, .28]) was also significant. This indicates that DISC-F is directly and indirectly, via perceived stress reactivity, associated with poorer mental health. Further, 35% of the variability in poor mental health can be explained by this indirect effect, suggesting partial mediation (i.e., in order to claim full mediation, the indirect effect must explain at least 80% of the variability in the dependent variable; Kenney, Kashy, & Bolger, 1998).
The indirect effect of perceived stress reactivity was also examined with regards to DISC-F and poor physical health. As discussed in Aim 1, the direct association between DISC-F was positive and significant (β = 18). As shown in Figure 7, DISC-F was also positively associated with perceived stress reactivity (β = .22). The indirect effect of DISC-F (indirect β = .15, 95% CI [.04, .26]) on poor physical health was also significant. This indicates that DISC-F is directly and indirectly, via perceived stress reactivity, associated with poorer physical health. Further, 31% of the variability in poor physical health can be explained by this indirect effect, suggesting partial mediation.

In summary, in both the mental and physical health models, only DISC-F had a significant direct effect on mental and physical health in the presence of perceived stress reactivity. Greater DISC-F was associated with poorer mental and physical health. The indirect or mediating effect of perceived stress reactivity in the association between minority stress and health was also significant. In other words, the association between DISC-F and poor mental and physical health was partially explained by perceived stress reactivity (i.e., in the presence of perceived stress reactivity, DISC-F continued to directly predict mental and physical health).

**Conditional Indirect Effect (Aim 5 and 6)**

**Research Question for Aim 5.** The potential moderating role of gay social identity in the association between minority stress, perceived stress reactivity, and subsequent mental and physical health was explored.

Due to the non-significant direct effect of DISC-O and SC on mental and physical health, only the indirect effects of DISC-F, via perceived stress reactivity, on mental and
physical health was examined. In order to examine whether social identity moderated the indirect effect of perceived stress reactivity on the association between DISC-F and health the bootstrapped (N= 3,000) indirect effect at high and low levels of the moderators were examined. In order to determine whether the indirect effect was significantly moderated, the nature of the indirect effect (i.e., whether the indirect effect goes from significant to non-significant) was examined.

Multi-group analyses revealed that neither behavioral nor psychological social identity moderated the indirect effect of minority stress on mental and physical health outcomes. For the mental health model, when social identity was low (behavioral social identity indirect $\beta = .16, 95\% CI [.01, .21]$; psychological social identity indirect $\beta = .18, 95\% CI [.04, .28]$), the indirect effect of DISC-F on poor mental health was significant. When social identity was high (behavioral social identity indirect $\beta = .17, 95\% CI [.03, .25]$; psychological social identity indirect $\beta = .19, 95\% CI [.03, .26]$), the indirect effect remained significant and of similar magnitude. In other words, social identity did not influence the indirect effect of DISC-F, via perceived stress reactivity on poor mental health.

Similar results were found for the physical health model. When social identity was low (behavioral social identity indirect $\beta = .05, 95\% CI [-.02, .10]$; psychological social identity indirect $\beta = .06, 95\% CI [-.01, .13]$) the indirect effect of DISC-F on poor physical health was non-significant. When social identity was high (behavioral social identity indirect $\beta = .05, 95\% CI [-.02, .11]$ psychological social identity indirect $\beta = .04, 95\% CI [-.01, .09]$), the indirect effect remained non-significant and of similar
magnitude. In other words, social identity did not influence the indirect effect of DISC-F, via perceived stress reactivity on poor mental health.

**Research Question for Aim 6.** The potential moderating role of gay social identity in the association between minority stress, health behavior, and subsequent mental and physical health was explored.

Aim 6, which proposed to examine the moderating effect of social identity on the indirect effect of minority stress, via health behavior, on health outcomes was not examined. Again, this association was not examined because, in this sample, minority stress was unrelated to health behavior.

**Conditional Direct and Indirect Effect (Aim 7)**

**Hypothesis 4.** Hardiness will buffer (i.e., weaken) the direct association between minority stress and poorer health outcomes.

Multi-group analyses were used to examine the moderating role of hardiness on the direct effect of minority stress on health outcomes. Results indicated that hardiness significantly moderated the direct effect of SC on mental health, $Z = -2.00$ (see Table 6), in the expected direction. At low levels of hardiness, SC ($\beta = -.05$) was not associated with poor mental health. At high levels of hardiness, SC ($\beta = -.24, p = .001$) was negatively associated with poor mental health. In other words, as hardiness increased, the direct association between SC and poor mental health became significantly negative. In contrast, hardiness did not moderate the direct association between discrimination (i.e., DISC-F and DISC-O) and poor mental health outcomes.
Analyses also revealed that hardiness also significantly moderated the direct effect of SC on poor physical health, $Z = -2.01$ (see Table 7). At low levels of hardiness, SC ($\beta = .05$) was not associated with poor physical health. At high levels of hardiness, SC ($\beta = -.16, p = .03$) was negatively associated with poor physical health. In other words, as hardiness increased, the direct association between SC and poor physical health became significantly negative (i.e., as hardiness increased, high SC was associated with better health.) Hardiness did not moderate the direct association between discrimination (i.e., DISC-F and DISC-O) and poor physical health outcomes. This finding is counter to what was hypothesized (i.e., hardiness would moderate the direct association between discrimination and poor physical health).

**Hypothesis 5.** Hardiness will buffer (i.e., weaken) the indirect association between minority stress and poorer health outcomes.

As with previous analyses, only the indirect effect of DISC-F will be examined. Results indicated that at low levels of hardiness ($\beta = .24, 95\% CI [.06, .31]$) the indirect effect is significant, whereas at high levels of hardiness ($\beta = .14, 95\% CI [-.001, .18]$), perceived stress reactivity no longer significantly mediates the association between DISC-F and poor mental health. However, as suggested by the overlap in confidence intervals, the moderating role of hardiness on the indirect effect of DISC-F on poor mental health was not statistically significant. In other words, the indirect effect of DISC-F on poor mental health did not differ by level of hardiness. In addition, hardiness did not moderate the indirect effect of DISC-F on poor physical health outcomes.
Table 6.

*Results from Multi-group Analysis (Mental Health)*

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<th>Model</th>
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</table>

*p < .05, **p < .01. DISC-O = Discrimination (other); DISC-F = Discrimination (family/friends); SC = Stigma consciousness.*

Table 7.

*Results from Multi-group Analysis (Physical Health)*

<table>
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*p < .05, **p < .01. DISC-O = Discrimination (other); DISC-F = Discrimination (family/friends); SC = Stigma consciousness.*
Discussion

The main aim of this study was to examine potential factors that may be influencing mental and physical health disparities in sexual minorities. Minority stress, a social stressor, has been examined with regards to mental health, but only recently had it been examined with regards to physical health outcomes in sexual minorities. Further, potential mechanisms by which minority stress may be influencing health outcomes in sexual minorities have been largely unexamined. Knowing how social factors are linked to health outcomes is paramount in examining causes of health disparities in sexual minorities. Lastly, potential moderators of the association between minority stress and health, such as social identity or personality factors such as hardiness, have also been under examined. Examining moderators of the direct and indirect effect of minority stress on health is important because it can inform potential interventions by providing resources to counteracting these effects. The current study aimed to examine these questions via a model that would evaluate the direct and indirect as well as conditional effects of minority stress (distal and proximal) on mental and physical health.

Overall, the results were mixed with some hypotheses being supported and others not. The original models as proposed were not supported; various model modifications were necessary to achieve adequate model fit. For example health behaviors, one of the proposed mediators, was removed from the model and perceived stress reactivity (PSR) was examined as an observed instead of latent variable. Also, minority stress was examined via three separate observed variables, stigma consciousness (SC) discrimination from family and friends (DISC-F) and discrimination from others (DISC-
O). The final models depict a model with three observed variables (DISC-O, DISC-F and SC) and a single latent variable for mental and physical health and an observed variable examined an indirect pathway via PSR.

**Direct Effects**

The current study examined both proximal (i.e., stigma consciousness) and distal (i.e., discrimination) minority stressors to examine their potential association with poor mental and physical health outcomes. Past literature has shown that both proximal and distal minority stress are associated with poorer mental and, to a lesser extent, poor/impaired physical health in sexual minorities (e.g., Huebner & Davis, 2007; Lewis et al., 2003; Meyer, 1995). Therefore, it was hypothesized that minority stress would directly predict poorer mental and physical health. Minority stress in the current study was measured via the Heterosexist Harassment, Rejection, and Discrimination Scale (HHRDS; Syzmanski, 2006). A principle components analysis (PCA) along with a parallel analysis revealed that there were two distinct factors that the HHRDS is measuring: discrimination from family and friends (DISC-F) and discrimination from others (DISC-O). When examined together, only DISC-F significantly predicted poorer mental and physical health in the present study. Thus, it appears that distal minority stress, especially discrimination from family and friends, is more predictive of poorer health compared to proximal minority stress (i.e., stigma consciousness). These results support previous studies that examined the effects of proximal and distal minority stress on mental (e.g. Fingerhut et al, 2010) and physical (e.g., Frost et al., 2011) health. In other words, although proximal and distal minority stressors may individually predict
poor health outcomes, when examined together, proximal minority stressors no longer significantly predicted poor health.

Results also indicate that it is important to distinguish the source of discrimination when examining the influence that discrimination may have on health. Typically, even though the HHRDS is comprised of three subscales (i.e., rejection and harassment, work/school discrimination, other discrimination), when the HHRDS has been used, a single overall score is used to predict health outcomes (e.g., Friedman & Leaper, 2010; Syzmanski, 2009; Syzmanski & Owens, 2009). Even when the three factors of the HHRDS are examined, their differential effect on health is not (i.e., although the three different factors were identified, the differential effect of rejection and harassment, work/school discrimination, and other discrimination on poor health was not; Lehavot & Simoni, 2011). Although different sources of discrimination may be positively associated with poorer health outcomes, as suggested by the current study, some sources of discrimination may be more detrimental to health than others.

It is particularly interesting that DISC-F was so strongly associated with poor mental and physical health as family and friends have been traditionally examined as a source of support and a buffer against the effects of discrimination (e.g., Yoshikawa, et al., 2004). Studies that have examined discrimination from family members have focused on its effects on homelessness (Milburn et al., 2006) and risky health behavior (Ryan et al., 2009) in LGB adolescents rather than poor health outcomes. The few studies have examined discrimination from family and friends versus others support the currents findings regarding the differential effects discrimination from family may have on health.
outcomes (e.g., Taylor et al., 1997). It is important to make these distinctions when attempting to tease apart the differential effects of discrimination on health in order to better understand why certain sources of discrimination influence health more than others.

**Indirect Effects**

Previous studies examining risky health behaviors in sexual minorities have found, compared to their heterosexual counterparts, sexual minorities are more likely to consume higher rates of alcohol, tobacco, and illicit drugs (e.g., McCabe, Hughes, & Boyd, 2004; Ortiz-Hernández, Gómez, & Valdés, 2009). The few studies that have examined the effects of minority stress on health behavior have found that sexual minorities who report higher minority stress are more likely to also report higher substance abuse (e.g., McCabe, Bostwick, Hughes, West, & Boyd, 2010). Therefore, it was hypothesized that health behaviors would mediate the association between minority stress and health. For this sample, minority stress was unrelated to health behaviors. The measure used in this study, the Health Behaviors Checklist (HBCL; Vickers, Conway, & Hervig, 1990) had the ability to assess both risky and preventative health behavior. Although the health behavior scale demonstrated good internal reliability, it may be the case that for this particular sample, the items assessing risky health behavior may not have been the most relevant. Studies that have examined the correlational association between minority stress and health behavior have focused on more specific behaviors such as substance abuse, risky sexual behavior and other risky health behaviors (e.g., McCabe et al., 2010). Further, these studies measured actual occurrences of the behaviors
(i.e., How many times have you had unprotected sex in the last month) as opposed to assessing the degree to which an individual agrees with a health behavior statement. The HBLC had very few questions that assessed substance abuse (one assessing chemical stimulants, one addressing tobacco use, and use assessing alcohol consumption) and none that assessed risky sexual behavior. Future studies should attempt to test proposed the model with risky health behaviors that might be more specific to sexual minorities (e.g., risky sexual behavior) as well as assessing actual occurrences of these behaviors (rather than relying on self-report).

Previous research has established links between psychological and physiological stress reactivity and subsequent health outcomes (e.g., Gerin & Pickering, 1995; McEwen, 2004). Although no studies have examined the effect of minority stress on perceived stress reactivity (PSR), it is possible that minority stress may influence subjective, or perceived, stress reactivity as well. Due to the self-report nature of this study, PSR (rather than physiological stress reactivity) was examined as a possible mediator in the association between minority stress and health. Recently, PSR has been shown to be predictive of objective acute stress reactivity in response to a lab stressor (Schlotz, Hammerfeld, & Ehlert, & Gaab, 2011). In this study, those who were high in PSR, particular reactivity to social evaluation, exhibited higher endocrine reactivity to a lab stressor. For the current study, no directional hypothesis was made for the mediating role of PSR in the association between minority stress and health. This was due to the lack of studies examining the effect of minority stress on PSR.
Analyses revealed that PSR partially mediated the association between DISC-F and poor mental and physical health. This suggests that PSR may potentially be a mechanism by which minority stress affects health outcomes. This finding falls in line with the literature examining the effects of minority stress on objective stress reactivity in ethnic minorities (e.g., cardiovascular reactivity; Sawyer, Major, Cassad, Townsend & Mendes, 2012) and women (e.g., endocrine reactivity; Townsend, Major, Gangi, & Mendes, 2011). These studies have found that experimentally manipulated discrimination is associated with increased cardiovascular (e.g., ethnic; Sawyer et al., 2012), and endocrine (e.g., gender; Townsend et al., 2011) responses. In other words, increased minority stress is associated with increased cardiovascular and endocrine reactivity. Currently, there are no studies that have examined the effect of minority stress on objective stress reactivity in sexual minorities. Although the measure stress reactivity was measured subjectively in the current sample, this study provides an important first step in identifying the association between minority stress and stress reactivity in sexual minorities. It will be important for future studies to examine the association between minority stress and physiological stress reactivity.

**Moderators**

Two potential moderators in the association between minority stress and health were also examined: social identity (psychological and behavioral) and hardiness. Although there seems to be a direct benefit with regards to social identity and health, research examining the potential moderating role of social identity in the association between minority stress and health has been mixed with some suggesting a buffering
effect (e.g. weakening the association between discrimination and depressive symptomatology; Jones, Cross, & DeFour, 2007; Lee, 2005; Mossakowksi, 2003) and others suggesting an exacerbating effect (e.g., strengthening the association between discrimination and depressive symptomatology; McCoy & Major, 2003; Noh et al., 1999; Sellers et al., 2006). Upon examination of the bivariate correlations, it is clear that social identity (psychological and behavioral) is unrelated to stigma consciousness and positively related to the two discrimination variables, suggesting that increased social identity is related to increase self-report of discrimination. In other words, individuals who are more highly psychologically and behaviorally engaged in the gay social identity self-report greater discrimination. This finding falls in line with other studies that have found that sexual minorities who are more highly identified with the gay identity tend to recognize or acknowledge discrimination at greater rates that those who are not highly identified (e.g., Meyer, 2003). However all of the interactive effects of social identity on the association between minority stress and health were null. In other words, social identity did not moderate the direct or indirect effects of minority stress on poor health. These findings support previous cross-sectional studies examining the influence of ethnic identity on racism (i.e., ethnic social identity was found to have neither a buffering nor an exacerbating effect on the association between racism and poor health; Lee, 2003). However, given the correlational and cross-sectional nature of the study, definitive conclusions as to whether or not social identity moderates the effects of minority stress on health are tenuous. Social identity should be examined experimentally (e.g.,
experimentally induced) or perhaps more implicitly in order to further explore the role of social identity in the association between minority stress and health.

When examining the models, hardiness did not moderate the direct or indirect effects of discrimination. This finding contradicts previous findings that have suggested hardiness may moderate (i.e., weaken) the direct association between discrimination and health outcomes in ethnic minorities (Dion et al., 1992) Contradiction with previous work may be due to the source of discrimination (i.e., family and friends) that was measured in the current study (i.e., in the Dion et al (1992) study, lifetime racism, without examination of source, was examined). Perhaps hardiness functions differently for different sources of discrimination. This finding speaks to the importance of examining different sources of discrimination and their differential effect of poor health.

Hardiness moderated the direct effects of SC on poor mental and physical health (i.e., as hardiness increased, high SC was associated with better health). This may suggest that individuals who see stressors as challenges, instead of threats, may benefit from being aware of the stereotypes associated with their identity (i.e., highly resilient individuals who are consciously aware of the negative stereotypes associated with their minority status may use this information differently than low resilient individuals and subsequently experience health benefits). However, it is important to keep in mind that although these results are promising, the study design is correlational in nature, further examination of the role of hardiness in the association between minority stress and health is needed.
General Stress

Researchers have suggested that health disparities may exist in sexual minorities because of unique stressors experiences by sexual minorities. In other words, Minority stress has been proposed to be a unique stressor that influences health above and beyond the general stressors of everyday life (e.g., Meyer, 1995). In the current study, general stress predicted poor health, as was expected. DISC-F was the only minority stress variable to predict poor mental and physical health outcomes in the presence on general stress. However, all three-minority stress variables continued to significantly predict perceived stress reactivity in the presence of general stress. These findings provide further evidence for the unique nature of minority stress and its association to health outcomes.

Implications

There are several theoretical and practical implications of the present study. First, the study provides a testable model by which researchers can examine minority stress and its direct and indirect effects on health outcomes. Although theoretical models had been previously established (e.g., Minority Stress Model; Meyer; 1995, 2003) seldom have these models been tested empirically. Specifically, the current study provides a model to empirically examine the direct and indirect effects of minority stress on physical health, an area that has been largely understudied in regards to sexual minorities. The model can potentially also be applied to other minorities as well (e.g., ethnic, gender, etc.), though further studies would be needed to compare how well the model would fit other minority
populations. Further, due to the many changes and exploratory nature of the current model, a confirmatory factor analysis of the model is needed.

Second, the current study describes a potential mechanism by which minority stress may be influencing health outcomes, perceived stress reactivity. Although evidence was provided regarding the possible mediating role of objective stress reactivity (e.g., cardiovascular responses to racial discrimination; Merritt et al., 2006), no studies to date had examined the indirect effect of minority stress via perceived or subjective stress reactivity. Again, it is important to note that perceived stress reactivity has been shown to be predictive of objective stress reactivity (Schlotz et al., 2011). A significant amount of the total variability explained (i.e., 35% for poor mental health and 31% for poor physical health) in the association between DISC-F and poor health can be attributed to the indirect effect (i.e., the association between DISC-F and poor health, via perceived stress reactivity). Although correlational, the positive association between minority stress and perceived stress reactivity suggests that increased minority stress may be associated with increased perceived reactivity to stressful events across various areas of the individual’s life (i.e. increased experiences of discrimination and stigma consciousness may be associated with increased stress reactivity in different domains of a person’s life).

Repeated exposure to minority stress has been suggested to lead to heightened stress reactivity through dysregulation of physiological systems. Repeated exaggerated stress reactivity may ultimately lead to dysregulation of physiological systems (McEwen, 2004). This dysregulation may be exacerbated due to the unique nature of minority stress and its potential additive effects above and beyond general stress experienced in everyday
life. Although further studies are needed to confirm this finding, the results of the current study are a significant first step in examining mechanisms that may link minority stress and poor health.

Third, the results suggest the importance of examining different sources of discrimination and assessing how they may differentially be associated with poor health. Although the measure used to assess discrimination has the capability of assessing three factors (i.e., harassment/rejection, workplace/school discrimination and other discrimination), typically an overall score is used when examining the association between discrimination and health. If, as the results suggest in the current study, there is truly a difference between discrimination experiences from family and friends and discrimination experienced from others then examining these factors separately is essential.

Fourth, although preliminary, the buffering effect of hardiness on the direct effect of SC may be of practical use for clinicians. In other words, hardiness is a potential resource that clinicians might work to increase with sexual minorities. Although hardiness is considered a personality factor, individuals are able to increase psychological hardiness via training (Khoshaba & Maddi, 2001). Training to increase psychological hardiness is currently used in many college campuses and in 2003 the American Psychological Society launched a campaign based on hardiness research that focused on skills that improved resiliency in school aged children in response to school stressors and home stressors. Although further studies are needed, given the results of the present
study, hardiness training might be of benefit to sexual minorities, especially those experiencing chronic minority stress.

**Limitations**

Although this study had numerous implications with regard to sexual minority stress and health, it also had its limitations. First, the study took place entirely online; therefore, all the measures of health were self-reported. Further, stress reactivity also had to been examined as a self-reported measure, thus perceived stress reactivity (PSR) was examined. However, it is important to note that PSR has been shown to be predictive of objective stress reactivity. In general, self-report measures of health might be problematic because responses might not be entirely honest or accurate. Nevertheless, obtaining self-reported measures is a commonly accepted method of assessing health, even when studies take place in laboratories.

Another possible limitation to the generalizability of the current study was the relatively small amounts of discrimination and poor health reported by the current sample. With regards to the discrimination measure, overall the majority of participants did not report a considerable amount of discrimination. This is not too surprising, as other studies that have assessed lifetime discrimination via the HHRDS in sexual minorities have also found relatively low to moderate amounts of self-reported discrimination (e.g., Syzmanski, 2009). The current sample also did not report a considerable amount of poor mental or physical health. Although this is contrary to what has been found in different samples (i.e., studies that have used national samples have found that sexual minorities tend to report moderate to large amounts of poor mental and physical health; Mays &
Cochran, 2001; Cochran & Mays, 2007), if discrimination is associated with poor health, then it makes sense that individuals reporting little discrimination would also report less poor health outcomes. This may potentially be attributed to the sample demographics (i.e., young, educated, etc.) as well as to how the sample was collected (i.e., via Mturk). Some have suggested that the Mturk population may not be as representative as the US population because the Mturk population tends to be younger (~60% are 30 years old or younger) and more educated (~40% have bachelor degrees) compared to US population as a whole (Ross, Zalidvar, Irani, & Tomlinson, 2010). Nevertheless, the results indicate that even modest amounts of discrimination, especially from family and friends, are associated with poorer mental and physical health in this sample.

An additional limitation of the study is its cross-sectional design. All the associations examined in this study were correlational in nature and therefore statements of causality cannot be made (i.e., unequivocal evidence that minority stress causes poor health outcomes directly and indirectly). However, taking into consideration these limitations, the present results are theoretically and practically important. A recent review on minority stress and physical health in sexual minorities indicated that evidence for a link between minority stress and poor physical health is growing, but how the two are linked is still unclear (Lick, Durso, & Johnson, 2013). The authors suggest further examining the causal links between minority stress and health via physiological stress reactivity in sexual minorities. Although the current study examined perceived stress reactivity and is correlational in nature, it still provides initial empirical evidence for the indirect association of minority stress and physical health via PSR.
Future Directions

The current study provides solid foundation for future research to examine the effects of minority stress on mental and physical health. One next step would be to experimentally examine minority stress in sexual minorities. Studies experimentally examining the effects of minority stress have focused solely on race and gender. Correlational studies help researchers establish preliminary associations between variables, but experimental studies are necessary to truly examine if the effect is due to your variable of interest. One reason why it is difficult to conduct experimental studies in sexual minorities is due to the issue of disclosure of identity. Sexual minorities may not want to disclose their identity for fear of discrimination, thus making collecting data in a lab setting difficult. This issue becomes even more salient when conducting research in rural areas. With that in mind, it is important to measure objective stress reactivity (e.g. cardiovascular, endocrine, immune) in response to experimentally manipulated minority stress in sexual minorities in order to establish causal links in the association between minority stress and health.

The model would also benefit from examination via longitudinal studies. The stress literature suggests that repeated exaggerated stress reactivity might ultimately lead to dysregulation of physiological systems (McEwen, 2004) and subsequently poor health. In order to truly examine the effects of minority stress on health, these effects must be examined over time. One way examining effect of minority stress on poor health over time is via ecological momentary assessment (EMA) or daily dairy studies. Examining minority stress via EMA would also increase the ecological validity of the model, as it
would allow examination of actual daily encounters with minority stress and its influence on psychological and physiological reactivity over time. The role of social identity must also be examined over time to determine how social identity may developmentally influence the association between minority stress and health. It has been suggested (e.g., Cass, 1979), that the gay social identity develops in stages with the last stage being commitment to the gay social identity. It would be beneficial to exam how the different stages of the gay social identity differentially influence the association between minority stress and health over time. Examining the role of hardiness over time, as well as developmentally between young and older adults, in the association between minority stress and health would also allow for a better understanding of its potential buffering effect. This can also be done through longitudinal naturalistic studies via EMA or daily dairy studies.

Future studies should also further examine the role of social identity on the association between minority stress and health. Recent studies have begun to experimentally manipulate social identity in order to examine its buffering effect on general stressors (Huasser, Kattenstroth, Dick, & Mojzisch, 2012). In this study, group identity was created via the minimal group paradigm (i.e., wearing same color t-shirts was sufficient to create group identity) and further reinforced by having group members complete a writing task together. The authors found that those in the group identity condition, compared to those who were not (i.e., these participants worked independently and did not form a group identity) exhibited less cardiovascular reactivity in response to a speech stressor. In other words, experimentally induced group identity was able to buffer
the effects of social stressors on stress reactivity However, in another recent study that experientially manipulated minority status by creating a fake minority identity (i.e., being an inductive reasoner when tasks required deductive reasoning), found that when individuals believed that they had a minority status they were more likely to respond physiologically to the task with a threat approach (i.e., a cardiovascular index that indicates disengagement in a task). On the other hand, when they were led to believe that being an inductive reasoner would be beneficial, the participants responded physiologically to the task with a challenge approach (i.e., a cardiovascular index that indicates approach towards or engagement in a task). In other words, this study suggests that a holding a minority identity, even for a very limited amount of time, is capable of eliciting robust negative physiological responses. These studies suggest that further research is needed to examine the role of social identity in the association between minority stress and health.

**Conclusions**

In conclusion, the current study examined proximal (stigma consciousness) and distal (discrimination) processes that may be associated with poor mental and physical health in sexual minorities. Further, potential indirect effects via perceived stress reactivity, were examined. Both the direct and indirect, via PSR, effect of DISC-F on poor mental and physical health was significant controlling for general stressors. This suggests that discrimination from family and friends, in sexual minorities, is a source of stress that may directly and indirectly influence poor health. Possible sources of resilience, social identity and psychological hardiness were also examined. Although
social identity did not offer a source of resilience (e.g., null effects were found),
conclusive findings cannot be made with regards to the role of social identity in the
association between minority stress and health. With regards to hardiness, although some
buffering effects were found, further studies (e.g. experimental and longitudinal) are
required to verify these findings.

Although health disparities continue to be an area of concern for the LGB community, the present study provides evidence, as well as possible avenues for further research, for the direct and indirect association between minority stress and poor health. It is the hope of the author that continued research in this area would inform public policy with regards to the importance of minimizing minority stressors (i.e., discrimination and stigma consciousness) and thus potentially lessening health disparity in sexual minorities.
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Appendix A: Demographics

1. What is your gender?
   - Male
   - Female
   - Transgender
   - Other
   - Prefer not to answer

2. In what age range do you fall in?
   - 18-25
   - 26-33
   - 34-41
   - 42-49
   - 50+

3. Please indicate your yearly income.
   - $15,000 or less
   - $15,001-$25,000
   - $25,001-$40,000
   - $40,001-$60,000
   - $60,001-$85,000
   - $85,000-$100,000
   - $100,001 or more
   - Unknown

4. Please indicate the highest level of education completed.
   - Grammar School
   - High School or equivalent
   - Vocational/Technical School (2 year)
   - Some College
   - College Graduate (4 year)
   - Master's Degree (MS)
   - Doctoral Degree (PhD)
   - Professional Degree (MD, JD, etc.)
   - Other

5. What is your ethnic/cultural background?
White/Caucasian
African American/Black
Chinese
Asian Indian
Middle Eastern
Filipino/a
Vietnamese
Korean
Japanese
Hispanic, Chicano/a or Latino/a
American Indian, Aleutian, Native Hawaiian or Native Alaskan
Multi-racial or multi-ethnic
Other

6. What is the gender of the people that you have ever had sexual contact with?
I have never had sexual contact with anyone
I have had sexual contact with only males.
I have had sexual contact with only females.
I have had sexual contact with both males and females.

7. What is the gender of the people that you currently feel sexually attracted to?
I am not sexually attracted to either males or females
I am sexually attracted to only males
I am sexually attracted to only females
I am sexually attracted to both males and females

8. Thinking about your sexual orientation, which of the following best describes your sexual identity? (Please note that some duplicates exist in the following list. For example, you will see both “heterosexual” and “straight.” Please choose the term that you would use to describe yourself.
Gay
Lesbian
Bisexual
Homosexual
Heterosexual
Queer
Straight
Other
Prefer not to answer
Appendix B: Behavioral Social Gay Identity

Involvement in LGB Activities Scale

Instructions: For each of the following statements, indicate to what degree it describes your involvement in the stated activity, using the scale below. 1 (very untrue of me) to 7 (very true of me). Note: LGB= Lesbian, Gay and Bisexual.

1. I write to politicians and elected officials concerning LGB issues.
2. I educate others about LGB issues.
3. I participate in LGB demonstrations, boycotts, marches and/or rallies.
4. I attend conferences/lectures/classes/training on LGB issues.
5. I attend LGB organizational, political, social, community and/or academic activities or events.
6. I am involved in anti-heterosexist work.
7. I am active as an LGB individual in political activities.
8. I am involved in research, writing, and or speaking about LGB issues.
9. I am involved in organizations that address the needs of other minority groups (i.e. women, people of color, people with disabilities, etc.).
10. I am involved in planning and organizing LGB events and activities.
11. I vote for political candidates that support LGB issues.
12. I donate money to LGB groups or causes.
13. I am involved in LGB teaching and/or mentoring activities.
14. I am a member of one or more LGB organizations and/or groups.
15. I read LGB literature.
16. I am a member of one or more LGB listserves.
Appendix C: Results of Principle Component Analysis for Discrimination

Table 8
2-Factor Solution for Discrimination

<table>
<thead>
<tr>
<th>Rotated Component</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treated unfairly by educators</td>
<td>.963</td>
<td>-.215</td>
</tr>
<tr>
<td>Treated unfairly by co-workers, boss, or supervisors</td>
<td>.874</td>
<td>-.032</td>
</tr>
<tr>
<td>Treated unfairly by fellow students/colleagues</td>
<td>.807</td>
<td>.038</td>
</tr>
<tr>
<td>Treated unfairly by service workers</td>
<td>.697</td>
<td>.103</td>
</tr>
<tr>
<td>Treated unfairly by strangers</td>
<td>.603</td>
<td>.208</td>
</tr>
<tr>
<td>Treated unfairly by health providers</td>
<td>.766</td>
<td>.045</td>
</tr>
<tr>
<td>Denied promotion/raise</td>
<td>.814</td>
<td>-.094</td>
</tr>
<tr>
<td>Treated unfairly by family</td>
<td>.05</td>
<td>.850</td>
</tr>
<tr>
<td>Heterosexist name calling</td>
<td>.453</td>
<td>.200</td>
</tr>
<tr>
<td>Threatened with physical or verbal harm</td>
<td>.498</td>
<td>.320</td>
</tr>
<tr>
<td>Rejected by family</td>
<td>.102</td>
<td>.818</td>
</tr>
<tr>
<td>Rejected by friends</td>
<td>.195</td>
<td>.663</td>
</tr>
<tr>
<td>Heterosexist name calling from family</td>
<td>-.280</td>
<td>.998</td>
</tr>
<tr>
<td>Heterosexist name calling from friends</td>
<td>.322</td>
<td>.564</td>
</tr>
</tbody>
</table>

1. Loadings in bold are > .40. Eigenvalue for factor 1 = 7.59, factor 2 = 1.46; 1. Results of Principle Component Analysis with Varimax Rotation
### 4-Factor Solution for Perceived Stress Reactivity

<table>
<thead>
<tr>
<th></th>
<th>Rotated component</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Wrong criticized</td>
<td>.892</td>
</tr>
<tr>
<td>Too many tasks</td>
<td>.800</td>
</tr>
<tr>
<td>Little time for job</td>
<td>.685</td>
</tr>
<tr>
<td>Too many demands</td>
<td>.672</td>
</tr>
<tr>
<td>Tasks are hard to manage</td>
<td>.661</td>
</tr>
<tr>
<td>Making mistakes (confidence)</td>
<td>.521</td>
</tr>
<tr>
<td>Criticized by others</td>
<td>.594</td>
</tr>
<tr>
<td>Unexpected results</td>
<td>.393</td>
</tr>
<tr>
<td>Unresolved conflicts</td>
<td>.392</td>
</tr>
<tr>
<td>Social stress</td>
<td>.332</td>
</tr>
<tr>
<td>Relax after work</td>
<td>.920</td>
</tr>
<tr>
<td>Spare time after work</td>
<td>.874</td>
</tr>
<tr>
<td>When under stress</td>
<td>.674</td>
</tr>
<tr>
<td>Public speaking</td>
<td>.388</td>
</tr>
<tr>
<td>Argue with others</td>
<td>.308</td>
</tr>
<tr>
<td>Work criticized</td>
<td>.684</td>
</tr>
<tr>
<td>Gossiped about</td>
<td>.613</td>
</tr>
<tr>
<td>Argue with others (upset)</td>
<td>.590</td>
</tr>
<tr>
<td>Failure (acceptance)</td>
<td>.852</td>
</tr>
<tr>
<td>Failure (uncomfortable)</td>
<td>.777</td>
</tr>
<tr>
<td>Goal attainment</td>
<td>.731</td>
</tr>
<tr>
<td>Mistakes (annoyed)</td>
<td>.340</td>
</tr>
</tbody>
</table>

1. Results of Principle Component Analysis with Varimax Rotation

Note. Eigenvalue factor 1 = 9.34, factor 2 = 1.35, factor 3 = 1.07, factor 4 = 1.02
Appendix E: Standardized and Unstandardized Coefficients for Mental and Physical Health

Table 10.

*Standardized and Unstandardized Coefficients (Mental Health)*

<table>
<thead>
<tr>
<th>Observed</th>
<th>Latent</th>
<th>$\beta$</th>
<th>$B$</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somatization</td>
<td>Poor Mental Health</td>
<td>.69</td>
<td>1.04</td>
<td>.07</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Poor Mental Health</td>
<td>.90</td>
<td>.74</td>
<td>.06</td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td>Poor Mental Health</td>
<td>.80</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

Table 11.

*Standardized and Unstandardized Coefficients (Physical Health)*

<table>
<thead>
<tr>
<th>Observed</th>
<th>Latent</th>
<th>$\beta$</th>
<th>$B$</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor Sleep Quality</td>
<td>Physical Health</td>
<td>.71</td>
<td>15.39</td>
<td>1.29</td>
</tr>
<tr>
<td>Physical Symptoms</td>
<td>Physical Health</td>
<td>.84</td>
<td>.92</td>
<td>.06</td>
</tr>
<tr>
<td>Poor Subjective Health</td>
<td>Physical Health</td>
<td>.81</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>