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An Event-Level Structural Equation Model to Predict Alcohol Use Among Lesbian and Bisexual Women

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Sexual minority women have disproportionally higher rates of social anxiety and alcohol use problems compared with heterosexual women, with further evidence that this disparity is greater among bisexual women relative to lesbian women. The predominant theory for explaining these health disparities is Minority Stress theory (Meyer, 2003), although research to understand bisexual health relative to lesbian health is scarce. The current study focused on anticipated stigma as a primary explanatory mechanism in a sample of 230 lesbian and bisexual women. After completing a baseline questionnaire, participants next filled out daily text message surveys for 14 days to assess social anxiety and alcohol use. Results showed that anticipated stigma fully mediated the relationship between sexual orientation and social anxiety, but anticipated stigma did not predict alcohol use. An unexpected finding was that lesbian women were consuming more alcohol than bisexual women, inconsistent with past literature. Lastly, through utilizing multilevel structural equation modelling (MSEM), higher social anxiety predicted more alcohol consumption on a day (within-person) level, but did not significantly predict alcohol consumption on an aggregate (between-person) level. A second model revealed that anticipated stigma was a better mediator between sexual orientation and social anxiety than enacted stigma and outness when all three minority stressors were entered into the same model. Overall, these findings help us further understand the relationship between social anxiety and alcohol use among lesbian and bisexual women.
An Event-Level Structural Equation Model to Predict Alcohol Use Among Lesbian and Bisexual Women

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Doctor of Philosophy Dissertation

An Event-Level Structural Equation Model to Predict Alcohol Use Among Lesbian and Bisexual Women

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Thankfully, it is now time to move onto the next chapter!
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Chapter I:

LGB Health Disparities

Over the past two decades, there has been a dramatic increase in sexual orientation research, with many researchers and policymakers interested in sexual minority health relative to heterosexual people. There is now robust evidence that lesbian, gay, and bisexual (LGB)\(^1\) people tend to have significantly poorer mental health than heterosexual people such as higher levels of depression, anxiety, and substance use (Bostwick, Boyd, Hughes, & McCabe, 2010; Green & Feinstein, 2012; King et al., 2008; McCabe, Hughes, Bostwick, West, & Boyd, 2009; Meyer, 2003; Semlyen, King, Varney, & Hagger-Johnson, 2016). In a meta-analysis of studies conducted between 1997-2005, LGB people had 1.5 times higher rates of anxiety, depression, and substance use (such as alcohol and drug use) than heterosexual people (King et al., 2008).

Additionally, substance use among LGB adolescents increases into adulthood at a faster rate than it does compared to their heterosexual counterparts (Marshal, Friedman, Stall, & Thompson, 2009). More recently, data from the 2015 National Survey on Drug Use and Health (NSDUH) revealed LGB adults were more than twice as likely to report any illicit drug use, binge alcohol use, or to have any mental illness in the past year that met DSM-IV criteria (Medley et al., 2016).

These mental health disparities have a devastating impact on LGB peoples’ lives. Problematic substance use is associated with poorer performance in school and work, impaired decision making, and impaired functioning in social relationships (Blanco et al., 2008; Naimi, Lipscomb, Brewer, & Gilbert, 2003; White & Hingson, 2013). Substance use, including alcohol, is associated with higher risk for sexually transmitted infections such as HIV, as well as

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\(^{1}\) Since the focus of this study is on sexual orientation and not gender identity, I use the term “LGB” for clarity instead of “LGBT.”
violence, accidents, other injuries such as permanent brain damage, and death (Hingson, Zha, & Weitzman, 2009; Naimi et al., 2003; Schneider, Chersich, Neuman, & Parry, 2012; World Health Organization, 2014). Over time, binge or heavy alcohol consumption can lead to addiction, including Alcohol Use Disorder (AUD), a DSM-5 Axis-I diagnosis characterized as a chronic brain disorder. Binge drinking and heavy alcohol use can also lead to health problems including cancer, cardiovascular disease, and liver disease (Mostofsky, Chahal, Mukamal, Rimm, & Mittleman, 2016; Naimi, Nelson, & Brewer, 2010; Turati et al., 2014).

As the number of research studies on LGB people has risen over the past few decades, researchers have discovered that disparities frequently differ by demographic factors such as gender. For example, a meta-analysis looking at substance use among sexual minority youth found that being female led to 400% higher odds of substance use compared to heterosexual youth (Marshal et al., 2008). Additionally, although the 2015 NSDUH results mentioned above showed that LGB people were significantly more likely to binge drink than heterosexuals, further analyses showed the difference was significant for women, but not men (Medley et al., 2016). Lesbian and bisexual (LB) women were almost twice as likely as heterosexual women to report past month binge drinking. In fact, LB women reported higher binge drinking than gay and bisexual (GB) men (38% versus 33%, respectively). This trend also remains for past month heavy drinking, which is defined as five or more occasions of binge drinking in the past month: LB women are more than twice as likely to report heavy drinking than heterosexual women,
whereas GB men are slightly less likely to report heavy drinking than heterosexual men (though this latter effect was not significant).  

Another LGB subgroup disparity researchers have found only recently is that bisexual people oftentimes have far poorer mental health outcomes relative to their monosexual (i.e., lesbian/gay) counterparts (Bostwick, Boyd, Hughes, West, & McCabe, 2014; Ross et al., 2017; Russell & Fish, 2016). Previously, the majority of researchers combined monosexual and bisexual people together for analyses and referred to the sample as either lesbian/gay or LGB (Mohr & Kendra, 2011). Although this seemed sensible for statistical reasons, since LGB people are a small percentage of the population and collapsing into one group would result in a larger sample size, it was based on a false assumption that these groups are very similar. It is now clear that there are large and meaningful differences between monosexual and bisexual people. For example, Bostwick et al. (2010) showed that bisexual women were twice as likely to be diagnosed with social anxiety than monosexual (lesbian and heterosexual) women, whereas lesbian and heterosexual women did not significantly differ in social anxiety. Another difference is substance use. In one study, although LB women have higher heavy-quantity drinking than heterosexual women, (defined as 4+ drinks in 2 or less hours in the past year), the adjusted odds ratios were only significant for bisexual women (McCabe et al., 2009). Two recent reviews concluded that there is vast evidence that bisexuels have higher rates of mental health problems, and that further research and theory are needed to explain these patterns (Russell & Fish, 2016; Taylor, 2018).

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2 Although there is evidence that GB men drink more with age (Hatzenbuehler, Corbin, & Fromme, 2008a), the current study will focus on LB women since alcohol use patterns vary by gender.
In addition to being more likely to have anxiety, depression, or substance use, LGB people are 3-4 times more likely to have psychiatric comorbidity (i.e., having more than one disorder) as well (Cochran, Sullivan, & Mays, 2003). One recent study found that lesbian/gay (LG) youth in Canada were twice as likely to have a co-occurring anxiety or mood disorder with heavy drinking in the past 30 days compared to heterosexual youth, and bisexual youth were over three times as likely to have this comorbidity (Pakula, Shoveller, Ratner, & Carpiano, 2016).

When considering the causes and consequences of various mental disorders, oftentimes there is the meaningful overlap between different mental health disparities. For example, while there are a variety of biopsychosocial factors shown to predict problematic substance use and dependence, one in particular is that people with mental illnesses such as anxiety and depression become dependent on substances, including alcohol, to manage their symptoms and cope with distress (Conger, 1956; Khantzian, 1987). Social anxiety—defined here as an excessive, intense anxiety or fear of being judged, negatively evaluated, or rejected in a social or performance situation—appears to have higher comorbidity with alcohol-related problems than other anxiety disorders (Grant et al., 2005; Kessler et al., 1997). It is common for individuals struggling with social anxiety to use alcohol to manage their symptoms, such as reducing negative physiological arousal, reducing fear of negative evaluation, increasing positive affect, and to facilitate social interactions (Buckner, Heimberg, Ecker, & Vinci, 2013; Carrigan & Randall, 2003). Not surprisingly, individuals with high social anxiety report drinking more to cope with stress in social situations than those with low social anxiety (Buckner, 2013). Unfortunately, this maladaptive coping is linked with a higher risk of negative consequences associated with drinking, such as AUD and impairments in social, academic, and occupational functioning.
(Cooper, Frone, Russell, & Mudar, 1995; Litt, Lewis, Stahlbrandt, Firth, & Neighbors, 2012). In one study of the general population, 48% of individuals with a lifetime diagnosis of social anxiety disorder (SAD) also met the DSM-IV criteria for AUD, with evidence that social anxiety predated AUD (Grant et al., 2005).

**Summary**

LGB people experience higher rates of mental health issues, with further subgroup differences. For instance, LB women have higher rates of social anxiety and alcohol use than heterosexual women, with bisexual women significantly higher than lesbian women. The literature on social anxiety and alcohol use suggests these two outcomes could be related, although this has not been empirically tested in lesbian and bisexual women. In the next chapter, I discuss the underlying causes of LGB mental health disparities through a minority stress framework, with a focus on lesbian and bisexual women. In Chapter 3, I will review the literature on the relationship between social anxiety and alcohol, including some mixed findings. I argue that social anxiety and alcohol use are related, but that the social context in which drinking occurs is a crucial component to understanding this relationship.
Chapter II: Minority Stress

LGB health disparities stemmed from the belief that homosexual behavior is deviant, immoral, and unnatural. Historically, homosexuality has been viewed as an undesirable, pathological trait under which those afflicted may hope to ideally “cure” themselves, or at the very least, to manage their symptoms in some way (Bayer, 1987; Bayer & Spitzer, 1982; Mayes & Horwitz, 2005a). For instance, when the American Psychological Association (APA) published the first Diagnostic and Statistical Manual (DSM) in 1952, homosexuality was listed as a Sociopathic Personality disturbance (American Psychiatric Association, 1952). It continued to appear in later editions, despite growing controversy, though was reclassified as Sexual Orientation Disturbance (American Psychiatric Association, 1968) and then as Ego-dystonic Homosexuality (American Psychiatric Association, 1980; Drescher, 2015; Rubinstein, 1995). It was not fully removed until the DSM III-R was published in 1987 (American Psychiatric Association, 1987; Mayes & Horwitz, 2005b). In a book addressing whether homosexuality itself was a disease, Marmor (1980) wrote that it would be surprising if LGB people did not suffer more from mental distress when seeing the outright hostility and contempt that our society had toward homosexuality.

Drawing on classic theories of stigma and social stress, Meyer (2003) proposed a conceptual model to explain LGB disparities called the minority stress model. As with other theories of stigma, minority stressors stem from the social constructs contributing to the oppression of certain groups of people through labeling, stereotyping, and discriminating (Allport, 1954; Crocker, Major, & Steele, 1998; Goffman, 1963; Link & Phelan, 2001). Minority stressors are unique social stressors that LGB people experience that, in turn, lead to poorer
health. They are embedded in sociocultural processes that extend beyond any personal or group characteristics, are chronic, and are additive to general stressors such as daily hassles that anyone might experience regardless of sexual orientation (Meyer, 2003, 2007). Minority stressors, ranging from discriminatory laws to internalizing negative beliefs, have been linked with numerous physical and mental health outcomes (Goldbach, Tanner-Smith, Bagwell, & Dunlap, 2014; Hatzenbuehler, Corbin, & Fromme, 2008b; Hatzenbuehler, Keyes, & Hasin, 2009; Hatzenbuehler, Corbin, & Fromme, 2011; Lick, Durso, & Johnson, 2013; Newcomb & Mustanski, 2010).

Since the time when the APA classified homosexuality as a mental disorder, many countries have seen dramatic shifts in societal acceptance and tolerance for homosexuality. Same-sex marriage is legalized in certain places, and sexual orientation has been added to existing laws against discrimination and hate crimes (Koppelman, 2014). In the U.S. and Canada, 68% of people supported same-sex marriage in 2016, compared with only 44% as recently as 1996 (Pew Research Center., 2013; Pew Research Center., 2016). Although societal attitudes have improved, the unique stress experienced by LGB people—such as the fear of discrimination, rejection, and violence—continues to contribute to poorer mental health. For example, substance use such as heavy alcohol use has not declined among LGB youth between 1998 and 2013, although it has declined for heterosexual youth (Fish, Watson, Porta, Russell, & Saewyc, 2017). Furthermore, bisexual female youth actually showed an increase in substance use (Fish et al., 2017). Consistent with this finding, there is evidence that attitudes toward bisexuality continue to be more negative than toward homosexuality, which many researchers have hypothesized could underlie bisexual health disparities (Dodge et al., 2016; Friedman et al., 2014).
Bisexual Minority Stress (Biphobia)

Although bisexual people have poorer health outcomes than lesbian/gay people, the underlying mechanisms are less studied and understood compared to research on lesbian/gay health (Kaestle & Ivory, 2012; Rust, 2009; Taylor, 2018). When Meyer (2003) proposed the minority stress model, it was not common for researchers to study or acknowledge bisexual differences. One content analysis found that in 1997, less than 10% of published research studies on sexual minorities included separate data for bisexual participants, and by 2007 it was only 17% (Kaestle & Ivory, 2012). Although predominant theories of minority stress are rooted in the deviance of homosexuality, there is evidence that bisexuality is perceived as even less acceptable (Burke & LaFrance, 2016; Eliason & Schope, 2001; Herek, 2002; Yost & Thomas, 2012). The stigma surrounding bisexuality, commonly referred to as biphobia, is widespread among lesbian/gay (LG) people as well as among heterosexual people (Dodge et al., 2016). Many researchers have argued that minority stress could explain why bisexual people have worse outcomes than monosexual LG people, though it is not currently well understood in the empirical literature (Feinstein & Dyar, 2017; Ross et al., 2017; Taylor, 2018).

Brewster & Moradi (2010) identified three underlying biphobia themes while validating a scale in a bisexual sample. The first theme was the common view that bisexuality is an illegitimate and unstable sexual orientation. This view is apparent when considering the widespread beliefs that bisexual people are either confused, lying, experimenting, in denial about being straight/gay, or using their bisexual status to transition between being either straight or gay (Brewster & Moradi, 2010; Diamond, 2008; Ochs, 1996). Perhaps due to this belief that bisexuality is not a feasible or legitimate sexual orientation, bisexual women experience higher levels of assumed lesbian identity when in same-sex relationships (Dyar, Feinstein, & London,
2015), as well as assumed heterosexuality when in opposite-sex relationships (Israel & Mohr, 2004). Further evidence of this illegitimacy can be found in cultural terms such as “bi now, gay later” (Morrison, Harrington, & McDermott, 2010); “gay, straight, or lying” (Fahs, 2009); as well as “LUGs (lesbian until graduation)” (Diamond, 2003). This lack of validity is further apparent in legal court cases, in which refugees are much more likely to be granted asylum if they identify as lesbian/gay as opposed to bisexual, seeing as how the latter would raise suspicion that a person is lying to be granted asylum (Rehaag, 2009). In LGBT rights cases in the U.S., a legal report documented the terminology used and found that the term “bisexual” is virtually nonexistent in any court cases or briefings (Marcus, 2015).

The second biphobia theme identified by Moradi (2010) surrounds the common stereotype that bisexuals are hypersexual, promiscuous, sexually irresponsible, emotionally unattached from sex, and will cheat on their partners (Bostwick & Hequembourg, 2014; Bradford, 2004; Dobinson, MacDonnell, Hampson, Clipsham, & Chow, 2005; Li, Dobinson, Scheim, & Ross, 2013). This stereotype underlies the tendency of many heterosexuals (including couples) to eroticize and objectify bisexual women, as well as a hesitance from monosexual people (both heterosexual and LG) to date people who identify as bisexual (Feinstein & Dyar, 2017; Li et al., 2013). As Yoshino (2000) described, there is a norm surrounding monogamy that bisexual people are perceived to threaten. Stereotypes such as these are harmful in a number of ways. First, there is qualitative evidence that these stereotypes have a direct negative impact on bisexual peoples’ mental health and wellbeing (Li et al., 2013). Additionally, when a person feels that a stereotype might be salient in social situations, it could lead to social anxiety and altering
one’s behavior in order to avoid being associated with that stereotype (Pachankis & Goldfried, 2006).  

The third biphobia theme is that of intolerance and hostility, resulting in exclusion, rejection, and discrimination of bisexual people by both heterosexual and LG people (Friedman et al., 2014; Herek, 2013). In the first household survey assessing heterosexuals’ attitudes toward bisexuals, not only did people have more negative feelings about bisexuals than homosexuals, but their negative feelings were stronger than toward any other religious, racial, ethnic or political group with the exception of intravenous drug users (Herek, 2002). Dodge (2016) found that participants in a National Survey of Sexual Health and Behavior were most likely to choose the “neither agree nor disagree” scale option toward bisexuals, indicating attitudes have become less negative since the first survey in 2002. In addition, bisexuals experience additive stigma from within the LGB community as well (Dodge et al., 2016). Bisexual people with opposite-sex partners are oftentimes shunned and excluded from LGB spaces, while being accused of taking advantage of straight privilege (Ochs & Rowley, 2005). In other words, since homosexuality has been historically stigmatized, having a heterosexual partner will provide access to the power and resources of heterosexual people (Israel & Mohr, 2004; Roberts, Horne, & Hoyt, 2015). One particularly prevalent example of hostility from within the LGB community can be seen in instances when bisexual women reveal they have opposite-sex partners. Celebrities such as Ani Difranco who started a relationship with a man were met with animosity and outrage by lesbians (Diamond, 2008). A well-known derogatory term within the lesbian community for bisexual women with an opposite-sex partner is “hasbian” (Storr, 1999).

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3 There is another construct, known as stereotype threat, in which a person subconsciously internalizes stereotypes and is therefore more likely to reinforce the stereotype in certain instances. Stereotype threat and internalized stigma are not the focus of the current study, but should be examined in future research.
Consistent with these themes, there is a lack of bisexual visibility in our society (i.e., media depictions, exemplars, and role models). When bisexuality is visible, it tends to be reinforcing negative stereotypes (Gomillion & Giuliano, 2011; Johnson, 2016; Yoshino, 2000). Furthermore, the above themes have likely contributed to the lack of research on bisexual health disparities. In the next section, I will next discuss different types of minority stress, which are important to understand bisexual health disparities.

**Proximal vs. Distal Minority Stressors**

Returning to the minority stress model, an important key feature is the distinction between external (referred to as “distal”) stressors such as harassment and discrimination, and more subjective, internal (referred to as “proximal”) stressors such as expectations of stigma, outness (openness and disclosure of sexual orientation), and internalizing negative societal beliefs (Meyer, 2003). These different minority stressors are unique, but often related. For example, lower outness predicts less enacted stigma – a distal minority stressor defined as harassment, discrimination, and rejection. On the other hand, lower outness is associated with higher anticipated stigma – a proximal stressor defined as the anticipation of harassment, discrimination, and rejection.

When trying to understand health disparities through a minority stress framework, it is important to consider the population and outcome of interest. Just as mental health outcomes can vary by LGB subgroups, different minority stressors vary by groups as well. For example, gay men experience higher rates of physical victimization than lesbian women, whereas bisexual people report lower levels of outness than gay and lesbian people (Koh & Ross, 2006; Legate, Ryan, & Weinstein, 2012). Enacted stigma, such as discrimination, is frequently used to measure minority stress. However, it is oftentimes not the best measure to explain health disparities for
people who might not open about their sexual orientation (e.g., bisexuals). In a study looking at the effect of discrimination on mental health, it was noted that bisexuals had the highest rates of mental disorders, yet the lowest rates of sexual orientation discrimination (Bostwick et al., 2014). Additionally, a minority stressor can have differential impacts on mental health outcomes. For example, Feinstein (2012) found that enacted stigma directly predicted depression among lesbians and gay men, but it did not directly predict social anxiety; instead, enacted stigma indirectly predicted social anxiety through various proximal minority stressors.

**Anticipated Stigma**

In order to study minority stress among lesbian and bisexual women, anticipated stigma is a measure that would account for differing levels of outness. An LGB person's sexual orientation does not have to be known or suspected to experience the harmful and negative effects of minority stress. If a person has not disclosed their sexual orientation, they might experience less prejudice and discrimination because they are hiding their stigmatized identity in order to avoid these negative outcomes. As first noted by Allport (1954) and Goffman (1963), those with a stigmatized identity oftentimes show increased alertness and hypervigilance in social situations as a way to protect themselves and avoid prejudice. In fact, there is evidence that the internal, chronic anticipation that a person with a stigmatized identity experiences is related to greater psychological distress and interpersonal difficulty than experiencing an acute, objective event of stigmatization (Chan & Mendoza-Denton, 2008; Quinn & Chaudoir, 2009; Thoits, 2010).

An increased hypervigilance due to anticipated stigma could explain why bisexual people have the lowest rates of outness (Dyar et al., 2015), as well as the highest rates of social anxiety (Bostwick et al., 2010). Though there are other potential reasons people might be more or less
“out,” such as relationship status (Morris, Waldo, & Rothblum, 2001), age (Baams, Grossman, & Russell, 2015), gender expression or family social support (Eliason & Schope, 2001; Legate et al., 2012), it is likely that the negative social view of bisexuality contributes to lower levels of outness. It therefore seems likely that bisexuals experience higher rates of anticipated stigma than monosexual lesbian/gay people.

**Measuring Minority Stress**

In order to measure minority stress among bisexuals, Moradi (2010) developed the Antibisexual Experiences Scale (ABES), based on the themes of biphobia discussed earlier. The ABES is a measure of enacted stigma from heterosexuals and LG people separately. Macleod et al. (2015) used composite scores of enacted stigma from heterosexuals and LGs and entered them each as separate predictors of anxiety. Enacted stigma from heterosexuals significantly predicted anxiety, but stigma from LG people did not. However, as the authors acknowledged in trying to make sense of their results, other measures such as anticipated stigma could be more important in predicting anxiety than enacted stigma in bisexuals. Although the exact numbers are unclear, many bisexual women “blend in” with LG people by not coming out as bisexual, particularly those in same-sex relationships who might be assumed to be lesbian (Roberts et al., 2015). Bearing in mind the themes of biphobia discussed, it would make sense to not assume participants are out as bisexual to LG people, which might partially explain why enacted stigma did not predict anxiety in the above study.

In addition to measuring the unique effects of biphobia, it is also important to understand the effect of minority stress on bisexual health disparities, which would require having a comparable measure of minority stress among bisexual and monosexual people. The most common method researchers have used for comparing bisexual and monosexual people has been
through adapting established scales to be more inclusive. Mohr and Kendra (2011) revised a scale looking at identity and group belonging, the Lesbian and Gay Identity Scale (LGIS; Mohr & Fassinger, 2000). The LGIS included items that only used the terms “lesbian” and “gay,” though as one author later admitted, it is likely that participants in the initial scale development were bisexual (Mohr & Kendra, 2011). In the updated version, the Lesbian and Gay and Bisexual Identity Scale (LGBIS) replaced any text containing “lesbian” or “gay” with “LGB.” Lehavot and Simoni (2011) took a similar approach, and adapted a scale initially intended to measure enacted stigma in lesbian women, the Heterosexist Harassment, Rejection, and Discrimination (HHRD) scale (Szymanski, 2006). Scenarios such as “how often in the past year have you been rejected by friends because you are a lesbian?” replaced the word “lesbian” with “LGB.” Although changing the wording to “LGB” is more inclusive than using “lesbian” or “gay,” this measure likely does not capture differences between the L, G, and B. Mohr and Kendra (2011) acknowledged the following:

Our decision to assess dimensions of a global LGB identity rather than a more specific identity group (e.g., lesbian) naturally limits the use of the LGBIS to measurement of perceptions related to a person’s status as a sexual orientation minority. The implications of this decision are apparent when considering whether LGB people might respond differently to items depending on whether the social identity reference is LGB versus a more specific group (e.g., affirmation of one’s identity as LGB vs. bisexual)… (p. 243).

Returning to the biphobia themes above, there are specific attitudes and stereotypes surrounding bisexuality, oftentimes perpetuated by monosexual LG people. If a bisexual person is asked about being rejected for being LGB, the question is interpreted as referring to their sexual minority status (i.e., same-sex behavior), not specifically about bisexuality. In other
words, being asked, “how often have you been rejected by friends because you are LGB?” would not conjure the same examples as “… because you are bisexual?” when accounting for the added negative connotation surrounding bisexuality aside from being a sexual minority. As Herek (2002) pointed out, “To understand bisexuals’ experiences with prejudice and discrimination, hostility directed specifically at bisexuality must be distinguished from antigay hostility” (p. 2). A recent study found that bisexuals were more likely to be open about being a sexual minority than about being bisexual, further demonstrating that there are meaningful differences between these identities (Mohr, Jackson, & Sheets, 2017).

Another issue is that adapted scales have contained questions that would only apply to same-sex minority stress, such as “I prefer to keep my same-sex relationships private” and “if it were possible, I would choose to be straight.” Researchers interested in measuring sexual orientation stigma should be aware that these items would not represent a valid comparison between groups, since it only measures same-sex stigma. If the goal is to understand why bisexuals have poorer health outcomes relative to gay and lesbian people, these items might mask meaningful group differences. Other studies, perhaps unknowingly, demonstrated why this would be the case. Kuyper and Fokkema (2011) wanted to compare minority stress and mental health by sexual orientation, and measured negative reactions exclusively on same-sex sexual attraction. Negative disclosure reactions significantly predicted mental health, but only among lesbian women. This result makes sense seeing as how bisexuals tend to be less out, and since the researchers only measured same-sex stigma, the study lacked construct validity. Ironically, in speculating why the link between negative reactions and psychological distress were only significant among LGs, the authors suggested it could be because bisexual people might “retreat to their opposite-sex attraction” as a buffer against the negative effects of minority stress.
Returning to the biphobia themes above, this explanation by the researchers exemplifies the prevalence of these beliefs in our society.

**Summary**

Minority stress is the predominant explanation for LGB health disparities, as well as further subgroup disparities. Bisexuals tend to report lower levels of outness and, as would be expected, lower levels of enacted stigma such as discrimination and victimization compared to LG people. In order to understand the mechanisms underlying bisexual health disparities, anticipated stigma might be an appropriate construct. Additionally, valid measures are needed to compare minority stress between bisexual and monosexual LG people.

In the current study, I adapted minority stress scales with wording based on how participants identified on a screener questionnaire. I first focused on a model looking at anticipated stigma. Next, I compared minority stress constructs (anticipated stigma, enacted stigma, and outness) as the mechanisms underlying bisexual disparities.
Chapter III:
Social Anxiety and Alcohol

Bisexual women have higher rates of both social anxiety and alcohol-related problems, but the relationship between these mental health outcomes is unclear. In general, social anxiety appears to have higher comorbidity with alcohol use and AUD than other anxiety disorders (Grant et al., 2005). However, it is unknown if and how this relationship applies to sexual minority women, who tend to drink more frequently and heavily than heterosexual women (Gruskin, Hart, Gordon, & Ackerson, 2001). Drabble et al. (2004) looked at data from a National Alcohol Survey in the U.S., and found no significant difference between how frequently bisexual and lesbian women were attending bars or parties in which alcohol was served. Bearing in mind the centrality of alcohol in LGB culture, this finding is not surprising. There was, however, significantly higher quantities of alcohol consumed by bisexual women than lesbian women when in social settings.

It could be the case that bisexual women drink more heavily to cope with mental distress, such as higher levels of social anxiety. This pattern would be consistent with stress coping theories (Conger, 1956; Khantzian, 1987), although not all studies have found a positive relationship between social anxiety and alcohol use. Although prospective and cross-sectional studies have found that social anxiety predicted higher alcohol consumption and alcohol-related problems (Carrigan & Randall, 2003; Tran & Smith, 2008), other studies found a negative relationship (Eggleston, Woolaway-Bickel, & Schmidt, 2004; Ham & Hope, 2006) or no relationship at all (Bruch & Buckner, 2006; Gills, 2006). Some of these inconsistencies might be due to the population being studied (i.e., there could be different relationships between clinical samples and undergraduates). It could also be because of the way alcohol is measured. For example, drinking as an outcome has been measured the following ways: as a yes/no for any
alcohol consumption; frequency of drinking days; quantity of drinking; through a comprehensive assessment such as the AUDIT; receiving a medical diagnosis such as AUD; frequency of binge drinking; or by measuring alcohol-related negative consequences such as getting in trouble with the law (Greenfield & Kerr, 2008). Oftentimes, results vary based on how alcohol use was defined and measured (Buckner et al., 2013).

Another factor is that it is important to consider the social context under which drinking does (or does not) occur. As others have pointed out, drinking can be both influenced by trait-level variables, as well as more contextual or within-person variation (Kassel & Veilleux, 2010; Mohr et al., 2005). It is unclear why social anxiety might be more closely related to AUD than other types of anxiety, but the very nature of social anxiety surrounds social contexts, and certain situations tend to be more anxiety-inducing than others. Kidorf and Lang (1999) tested the self-medication hypothesis among undergraduate students by inducing an extremely stressful situation for people with social anxiety. After being given an alcoholic beverage, participants were told that they would be asked to give a speech on their perceived most undesirable characteristic, which would be videotaped. Those with a higher baseline social anxiety inventory drank more than those with lower social anxiety, presumably to cope with their distress.

Although experimental designs are crucial to our understanding of variables and relationships, they lack external validity. In real-world settings, daily diary techniques make it possible to study relationships on a day level. These methods allow researchers to capture the circumstances close to when they occur, allowing for more accuracy and precision of measures. O’Grady, Cullum, Armeli, and Tennen (2011) measured the relationship between social anxiety and alcohol in a real-world setting using a daily diary technique for 30 days among undergraduate students. In this study, social anxiety predicted drinking, but only when
participants indicated feeling “awkward or embarrassed in public” on that day. In other words, social anxiety only predicted higher alcohol consumption on days in which an embarrassing event occurred. In the absence of reporting an embarrassing or awkward event, there were no significant differences between those with low and high social anxiety.4

Summary

The relationship between social anxiety and alcohol use is not clearly understood, both in general as well as among lesbian and bisexual women. There is evidence that the specific context in which drinking occurs might explain some discrepancies in the general literature, which demonstrates the importance of methods that capture both within-person and between-person variation. In the next chapter, I will describe how I measured social anxiety and alcohol use among lesbian and bisexual women utilizing a daily diary technique.

4 Another factor to explain the discrepancy in the literature is trait-level moderators. See Appendix A for information on an additional construct I had initially proposed, Rejection Sensitivity
Chapter IV:
The current study and hypotheses

The primary goals of this dissertation were to explain (1) bisexual health disparities through a minority stress framework, and (2) the relationship between social anxiety and alcohol use among lesbian and bisexual women. In order to shed light into these mechanisms, I tested two conceptual models, presented in Figures 1 and 2.

To assess minority stress, participants completed an online questionnaire assessing enacted stigma, anticipated stigma, and outness. Due to the nature of my research questions, the assessment of minority stress specified participants’ sexual identity (e.g, saying “bisexual” or “lesbian” in the wording of scale items). This increases the construct validity by making valid comparisons. Developers of previous scales have acknowledged these limitations to their scales, as they do not account for the unique, additive stress of bisexual identity (Dyar, Feinstein, Eaton, & London, 2016; Mohr & Kendra, 2011). For the current study, I used a skip logic algorithm in which the wording of sexual identity (“lesbian/gay” or “bisexual”) was based on how participants identified in a pretest screener questionnaire. To the best of my knowledge, this was the first study to specify sexual orientation and compare minority stress for individuals’ identities.

For the next part of the study, I measured daily social anxiety, alcohol use, and the social environment in which drinking occurred for 14 days via a mobile text message survey. Daily diary studies reduce recall bias, allowing for a more precise estimate of alcohol use patterns (Bolger, Davis, & Rafaeli, 2003). I used a retrospective self-report measure of alcohol by using an estimated blood alcohol concentration (eBAC) formula (Matthews & Miller, 1979). This measure takes various factors into account such as the time spent drinking, weight, and gender.
Applying this formula to self-report measures from previous day alcohol consumption correlates highly with breathalyzer results (Carey & Hustad, 2002). Additionally, I was able to examine how alcohol use varies on both a between-person level and a within-person level. Recent reviews have noted that the majority of past studies used between-person designs, which do not capture how the relationship might vary by specific context, mood, or stress level (Kassel & Veilleux, 2010; Mohr, Armeli, Tennen, & Todd, 2010). Furthermore, this relationship has not been studied in lesbian and bisexual women, a particularly at-risk population for alcohol problems.

After collecting daily data, I was able to measure random and fixed variations surrounding social anxiety and alcohol use. I utilized the Multilevel Structural Equation Model (MSEM) framework, which measures the within- and between-level variation as orthogonal components (Preacher, Zyphur, & Zhang, 2010). The within-level variance is estimated for the “lower level variables,” which for the current study will be on the day level. These day-level variables, social anxiety and alcohol, will be referred to as “Level 1 variables.” Level 1 variables can vary within clusters (individuals) and have random intercepts. The variables that do not vary within individuals, such as sexual orientation and minority stress variables, will be referred to as “Level 2 variables.” These variables have fixed paths and intercepts. MSEM is a preferable way to model variables at the day level, since it models within- and between-effects separately, creating latent constructs and accounting for various sources of measurement error. Other multilevel model (MLM) methods might conflate the within and between effects into a single coefficient, which can lead to model misspecification (Preacher et al., 2010; Preacher, Zhang, & Zyphur, 2016).

When analyzing data from a MSEM framework, it is generally recommended to first establish if there is variation (fixed and random) within the Level 1 variables. A common issue
with daily data is that responses tend to change over time, known as \textit{reactivity}. This habituation might lead to less (or more) accuracy over time, which is important to account for early on. Therefore, before testing my full model, I first focused on the Level 1 variables. Last, I added Level 2 variables to test the full MSEM models.

**Hypotheses**

Hypotheses 1-6 are presented in Figure 1. I hypothesized the following direct and indirect effects:

**Hypothesis 1:** Sexual orientation will predict anticipated stigma.

I predicted that bisexuels will report significantly higher levels of anticipated stigma than lesbians. Research has shown both heterosexual and LG people have more negative attitudes towards bisexuels (Dodge et al., 2016; Friedman et al., 2014; Herek, 2002). This might also partially explain why bisexuels have lower levels of outness than LGs (Legate et al., 2012).

**Hypothesis 2:** Sexual orientation will predict social anxiety.

I predicted that bisexuels will report significantly higher levels of social anxiety than lesbians, consistent with previous findings (Bostwick et al., 2014).

**Hypothesis 3:** Sexual orientation will predict alcohol consumption.

**Hypothesis 3a:** Bisexuels will have significantly higher eBAC values than lesbians.

**Hypothesis 3b:** Bisexuels will be more likely to consume 4 or more alcoholic drinks than lesbians (measured as a dichotomous yes/no).

I hypothesized that bisexual women will report higher rates of alcohol consumption than lesbian women, consistent with past research (Fish et al., 2017; McCabe et al., 2009). I will
measure alcohol in two ways. First, to test Hypothesis 3a, I will calculate an eBAC score for each participant reporting alcohol use in a social setting (described in detail below). Next, to test Hypothesis 3b, I will code binge drinking as a dichotomous yes/no outcome. Binge drinking is defined as consuming four or more drinks on the same occasion for women (it is five or more for men) by the Substance Abuse and Mental Health Services Administration (SAMHSA), which conducts the annual National Survey on Drug Use and Health (NSDUH).

**Hypothesis 4:** Anticipated stigma will predict social anxiety.

I hypothesized that higher anticipated stigma will significantly predict higher levels of social anxiety. Goffman (1963) was one of the first to note that individuals with a stigmatized identity approach social interactions with higher stress and vigilance. More recently, anticipated stigma has been linked to increased psychological distress (Quinn & Chaudoir, 2009). This hypothesis is also consistent with the minority stress model: Anticipated stigma is a proximal minority stressor, which should predict mental health outcomes including social anxiety (Meyer, 2003).

**Hypothesis 5:** Anticipated stigma will predict alcohol consumption.

**Hypothesis 5a:** Higher anticipated stigma will predict higher eBAC.

**Hypothesis 5b:** Higher anticipated stigma will increase likelihood of consuming four or more alcoholic drinks (measured as a dichotomous yes/no).

I hypothesized that higher levels of anticipated stigma will predict higher alcohol use. As mentioned before, the predominant explanation for LGB disparities including substance use is minority stress (Meyer, 2003).
**Hypothesis 6:** Social anxiety will predict alcohol consumption.

**Hypothesis 6a:** On the day (within) level, higher social anxiety will predict higher eBAC.

**Hypothesis 6b:** On the individual (between) level, higher social anxiety will predict higher eBAC.

**Hypothesis 6c:** On the day (within) level, higher social anxiety will increase the likelihood of consuming four or more alcoholic drinks (measured as a dichotomous yes/no).

**Hypothesis 6d:** On the individual (between) level, higher social anxiety will increase the likelihood of consuming four or more alcoholic drinks (measured as a dichotomous yes/no).

Using MSEM, I simultaneously estimated both fixed and random paths (they were not constrained to be equal, allowing separate estimates within the same model). I predicted that the overall level of social anxiety would predict drinking on the aggregate level, as well as social anxiety on the day level would predict more drinking. This hypothesis is consistent with past research and the self-medication hypothesis (Conger, 1956; Khantzian, 1987), in which individuals will drink to cope with social anxiety symptoms. I first tested this hypothesis using eBAC as the main outcome, and then with binge drinking as the outcome. Furthermore, I predicted that the day-level effect would be stronger, since the intercepts are free to vary and fluctuate.
In order to test Hypotheses 7-13, I compared different minority stressors as the mechanisms underlying higher rates of social anxiety among bisexual women (full model presented in Figure 2). I hypothesized the following direct and indirect effects:

**Hypothesis 7:** Sexual orientation will predict anticipated stigma.

Similar to Hypothesis 1, I predicted that bisexuals would report significantly higher levels of anticipated stigma than lesbians. Unlike Hypothesis 1 in the previous model, this model controlled for enacted stigma and outness, which are two factors shown to predict anticipated stigma as well (Feinstein, Goldfried, & Davila, 2012; Pachankis, Goldfried, & Ramrattan, 2008; Wessel, 2017). I have argued that anticipated stigma can be an especially useful construct for understanding bisexual health disparities, and therefore I predicted that bisexuals will have significantly higher anticipated stigma than lesbians, even when controlling for other factors.

**Hypothesis 8:** Sexual orientation will predict outness.

I predicted bisexuals will have lower levels of outness, replicating past research (Balsam & Mohr, 2007; Dyar et al., 2015). Furthermore, it is likely that the effect size in previous research has been underestimated due to not specifying sexual identity (e.g., item wording as “LGB” vs. “bisexual”). In support of this claim, there is recent evidence that bisexuals are much more hesitant to openly discuss being bisexual than to discuss being LGB (Mohr et al., 2017). Aside from fear of rejection and stigmatization, there are other reasons bisexuals might be less likely to be out. For example, being in a same-sex romantic relationship, independent of sexual

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5 I only looked at social anxiety as the main outcome for this analysis, since the focus was on the Level 2 minority stress paths for social anxiety, as opposed to the day level effect of social anxiety and alcohol use in the previous model
orientation, is a predictor of outness (Balsam, Beauchaine, Rothblum, & Solomon, 2008; Morris et al., 2001; Rostosky & Riggle, 2002; Veldhuis et al., 2017).

**Hypothesis 9:** Sexual orientation will predict enacted stigma.

Past research has shown that lesbian women report higher levels of enacted stigma than bisexual women (Bostwick et al., 2014; Kuyper & Fokkema, 2011), and I predicted that this study will replicate this finding. However, since the current model controls for outness, I would not be surprised if this discrepancy between bisexual and lesbian women to be as large or robust as in previous studies. Furthermore, previous studies only accounted for LGB stigma, as opposed to sexual orientation-specific stigma. It is unclear what role this differential item wording will have on results.

**Hypothesis 10:** Anticipated stigma will predict social anxiety.

Similar to Hypothesis 4 in the previous model, I predicted that higher levels of anticipated stigma will significantly predict higher levels of social anxiety. When including outness and enacted stigma in the same model, I predicted that anticipated stigma will be the strongest predictor of social anxiety, consistent with the literature that the chronic anticipation can be more distressing than an acute, objective instance of discrimination (Thoits, 2010).

**Hypothesis 11:** Outness will *not* predict social anxiety.

I hypothesized that the path from outness to social anxiety will not be significant when controlling for anticipated and enacted stigma. This hypothesis is somewhat exploratory. However, past researchers have hypothesized that anticipated stigma and enacted stigma are the underlying reasons why outness and social anxiety are related (Balsam & Mohr, 2007; Pachankis
& Goldfried, 2006; Pachankis et al., 2008). Once these other factors are controlled for, I did not predict that outness would explain additional variance in social anxiety.

**Hypothesis 12:** Enacted stigma will *not* predict social anxiety.

I hypothesized that the path from enacted stigma to social anxiety would not be significant. This prediction is consistent with Feinstein (2012), who found that enacted stigma did not directly predict social anxiety when other proximal stressors were in the same model.

**Hypothesis 13:** Sexual orientation will predict social anxiety.

Similar to Hypothesis 4 in the previous model, I predicted that this model would replicate past findings that bisexuals have significantly higher social anxiety than lesbians (Bostwick et al., 2014).
Chapter V:

Method

Recruitment and Screening

LGB women were recruited to participate through Facebook, email announcements, and referrals (incentivized snowball sampling). Next, as shown in Figure 3, individuals interested in participating clicked on a link directed to the survey on the website Qualtrics. Prospective participants completed a brief 1-2 minute screening questionnaire. Participants who were at least 21, identified as lesbian/gay or bisexual women, and had consumed alcohol in the last two weeks qualified to participate. This online recruitment lasted seven days. On the last day of recruitment, we reached the maximum enrollment number for bisexual women, and subsequently changed the screening criteria to only lesbian women. A total of 500 people participated in the screener, of whom 230 completed the study, 238 did not qualify (or identified as bisexual after we reached our maximum enrollment), and 32 either did not complete the screener or the full online survey. Figure 4 provides more details on screening and retention.

T1 Baseline survey

Eligible participants next completed a 15-20 minute online questionnaire to assess demographics, minority stress, and general psychological variables (T1/Level 2 variables). At the end of the survey, participants provided their cell phone numbers and their time of day preference to receive daily surveys (options were 8am, 12pm, or 5pm EST). Once the survey was complete, participants were given a unique referral code and a link to refer others to the study (see Figure 3). Each time a prospective participant used another person’s referral code, the referee was entered in a raffle to win a $50 Amazon gift card. Within a few hours of completing
the T1 survey, participants received an automatic welcome text message with a $5 Amazon gift code.

**T1 Baseline Measures.**

*Demographics.* Participants reported their age, gender identity, education, income, race/ethnicity, social class, weight, and relationship status.

*Anticipated Stigma.* Items from The Heterosexist Harassment, Rejection, and Discrimination (HHRD) scale were adapted for the current study. The HHRD is a 14-item scale used to measure the frequency of enacted stigma, such as “being rejected by friends.” This scale has demonstrated high reliability (α=.90; Szymanski, 2006). The original scale included item wordings such as “because you are lesbian,” but for the current study I used a skip logic algorithm to base the wording on how participants identified (“lesbian” or “bisexual”) in the prescreening. The reliability for the current study was similar to previous studies (α=.89). To adapt the HHRD scale for anticipated stigma, participants were asked how likely they thought 16 negative events would occur, from 1 (*very unlikely*) to 5 (*very likely*). Two items were added that were not on the original scale to include LGBTQ friends, and two items that were less relevant to anticipated stigma were removed. Lastly, two new scenarios were added that seemed appropriate for the current study: “people not wanting to date you” (Quinn & Chaudoir, 2009) and “your family being hurt and/or embarrassed.”

*Enacted stigma.* The same scenarios that were adapted from the HHRD scale (Szymanski, 2006) for anticipated stigma were used to measure enacted stigma. Participants were asked how frequently in the last year the following events have occurred, from 1 (*never*) to 5 (*almost all of the time*). The same skip logic algorithm using the answer provided from the
sexual orientation question determined the wording of the items. The reliability in the current study was the same as it was for anticipated stigma, as well as similar to past studies using the HHRD scale ($\alpha=.89$).

*Outness.* The Outness Inventory (OI; Mohr & Fassinger, 2000) was used to assess how open participants are with friends, family, coworkers, and healthcare providers about their sexual orientation, from 1 (*definitely does not know*) to 4 (*definitely knows, and is openly talked about*). As described above, skip logic using the answer provided from the sexual orientation question determined the wording of the items. The OI has been well-validated in previous research. Items were added that were not on the original scale to include LGBTQ friends. For the current study, the scale demonstrated acceptable reliability ($\alpha=.84$).

**Daily data**

On the day after completing the T1 survey, participants received their first of 14 daily surveys to assess social anxiety, alcohol consumption, and social context from the previous day. The timeframe of 14 days allowed for enough social events involving alcohol within this sample. Participants received a text instructing them to “Press 1 to begin,” which automatically sent the first question assessing social anxiety from the previous day. If participants did not finish the survey within two hours, a friendly reminder text message was sent to complete the survey. At the end of 14 days, participants were given a second Amazon gift code up to $20, plus a link to the debriefing statement. Participants received $1 for each daily survey completed and a bonus $6 if they completed at least ten days of the survey.

**Daily Measures.**
**Social Anxiety.** Five questions assessed state-level social anxiety from the previous day. Each day, participants were asked to think about how they felt yesterday and asked questions such as “I was worried or anxious I’d say or do the wrong thing during a social situation,” from 1 (not at all) to 4 (a lot). Four of the items were previously used and validated in a daily study, demonstrating high reliability and convergent validity (Kashdan & Steger, 2006). This scale does not include physical symptoms of anxiety, so an additional question to assess physical symptoms was added, based on an item from the Positive and Negative Affect scale (PANAS): “I got nervous or jittery thinking about or during a social situation” (Watson et al., 1988).

**Alcohol Use.** To assess prior day alcohol consumption, participants were asked how many drinks they had yesterday, what time they started drinking, and what time they stopped drinking. These items, along with weight, were used to estimate eBAC (Matthews & Miller, 1979). Binge drinking, which was looked at as a separate variable than eBAC, was defined as consuming four or more drinks in a day (defined using the federal guidelines).

**Social context.** In order to contextualize social anxiety and alcohol, participants were asked to indicate if they were drinking alone, on a date or with a romantic partner, with a friend/few friends, at a bar/party/concert or other celebration, and/or before going somewhere/“pregaming.” These scenarios were adapted from a cross-sectional study looking at the effect of drinking motives and social anxiety on alcohol consumption in different social settings (Terlecki et al., 2014). Participants could check all that apply, and any response other than exclusively drinking alone was included in the main analysis to predict drinking in social situations.
Chapter VI:

Planned Analyses

First, I examined the descriptive statistics, correlations, and distributions for all of the Level 1 and Level 2 variables. The eBAC values were not normally distributed and were square-root transformed to reduce skewness. I examined the reliability statistics of all scales to examine the overall alphas. For Level 1 variables, I looked at both the statistics for each day separately in addition to the overall statistics for all of the days combined.

After ensuring scale reliability, I created average scores for each of the scales to be used in the main analyses. Sexual orientation was coded as dichotomous (0 = bisexual and 1 = lesbian) for all analyses. Any drinking that occurred in a social situation was included in the following equation to compute eBAC: 
\[(c/2) \times (GC/w) - (.02 \times t),\]
where 
- \(c\) = total standard drinks consumed,
- \(GC\) = gender constant (9.0 for women, 7.5 for men),
- \(w\) = weight in pounds,
- \(t\) = total hours spent drinking (Matthews & Miller, 1979). The eBAC values were calculated separately if participants reported exclusively drinking alone, which were not included in the main analyses. A dichotomous binge drinking variable (0 = less than 4 drinks, and 1 = 4 or more drinks) was created. To look at relationship status and anxiety/depression medications as control variables, responses were combined and turned into dichotomous variables (0 = single, 1 = not single; 0 = any meds, 1 = no meds, respectively). 6

Missing Data and Parameter estimates

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6 Although there could be meaningful differences between varying responses, such as dating vs. cohabiting vs. married/civil unions, or between depression vs. anxiety meds, it is not the focus of the current study and cell sizes for each of the options was limited.
All analyses were run in MPlus version 8 (Muthen & Muthen, 2017). Data were inspected for missingness, which is described in detail below. For most analyses, full-information maximum likelihood (FIML) estimates were used, with missing at random data imputed. For analyses including alcohol, the model was run twice: once with days in which drinking did not occur as missing data, and another with 0 instead of missing. Conceptually these two ways of measuring alcohol are different, since the primary hypothesis is on quantity and a large amount of 0s might skew the intercept and results. However, large amounts of missing data can be cause for concern when running multilevel models, especially when running mediation analyses. To reconcile this issue, this response was coded separately and each analysis run twice. When meaningful differences between these two responses are found, these will be noted. To run analyses with binge drinking as a dichotomous outcome, weighted least squares (WLS) estimates were used.

Model Building

Level 1 variables.

Unconditional Models. The first step with multilevel data is to run baseline, unconditional (i.e., “empty”) models on each of the Level 1 variables. These models provided the intraclass correlation coefficient (ICC), which is the percentage of variance in each variable that can be explained at the cluster (individual) level. It is based on the heterogeneity of the random intercepts, which are each person’s cluster-level means relative to the grand intercept, while adjusting for the within-cluster variance to be explained \[\frac{(\text{Tau00})}{(\text{Tau00}+\text{sigma squared})}\]. The output provides the estimates used to calculate the ICC, which are the grand intercept, variance of the cluster-level intercepts, and the within-cluster variance. I also reported the AIC/BIC model
fit indices as baseline estimates, which should decrease for conditional models. Empty models do not provide slope estimates since there are no predictors.

Reactivity. Once it was established that there was a significant amount of variance to be explained in the unconditional models, I tested reactivity by predicting social anxiety and alcohol by day in the study.

Social Anxiety predicting alcohol. Next I looked at the Level 1 effect of social anxiety on alcohol, providing a preliminary test of Hypotheses 6a-6d.

Level 2 variables.

Covariates. Next, Level 2 covariates were added one at a time into the models. I regressed the intercepts for social anxiety and eBAC on all possible Level 2 covariates to see which, if any, are having a significant effect. This will inform which controls to include in models.

Mediators. In order to test Hypotheses 1-6, I ran the multilevel mediation model with all of the fixed and random paths proposed in Figure 1, first without covariates and then with covariates. I used the modern MSEM approach, in which Level 1 variables are modeled as latent constructs and are not constrained to be equal. This model estimates a grand slope while allowing the intercepts to vary by individuals (clusters). This model was run three different ways: twice with eBAC values (with and without 0s for days when no drinking occurred), and then with binge drinking as a dichotomous outcome.

Next, in order to test Hypotheses 7-12, I ran the full mediation model in Figure 2, first with and then without covariates. Unlike the above model, the only random path was to regress social anxiety on day to control for reactivity. All other paths were fixed estimates since the
focus was on how the Level 2 variables (sexual orientation, minority stressors) predicted social anxiety.
Chapter VII: Results  

Participant demographics. As shown in Table 1, 230 participants completed the T1 survey, of which 115 identified as lesbian/gay and 114 identified as bisexual. One participant who identified as queer was able to complete the T1 survey and sign up for daily text messages due to an early platform malfunction. Since the identity “queer” is an inclusive term for sexual/romantic orientation, their sexual orientation and minority stress data are missing in all analyses. Among those who participated, 90.4% \( (n = 208) \) identified as cisgender women, 2.2% \( (n = 5) \) identified as transgender women, and 7.4% \( (n = 17) \) identified as genderqueer, gender-fluid, and/or two-spirit (Indigenous-specific term). Seventy-nine percent \( (n = 181) \) of the sample identified as Caucasian/White. The average age was 26.6 \( (SD = 5.24; \text{range} = 21-53) \) and the average weight was 166 pounds \( (SD = 45.7) \). There were no significant differences by sexual orientation for gender, race, age, or weight; \( ps > .1 \).

As shown in Table 2, bisexuels reported lower household income, \( \chi^2 (6, n = 229) = 17.27, \ p = .008 \). There was a near-even split between rural and urban residence, with only a small minority of people living in a rural setting \( (n = 15) \). Almost half of participants identified as middle class \( (n = 103) \), but bisexuels were significantly more likely to be working class/living in poverty, \( \chi^2 (4, n = 229) = 12.16, \ p = .016 \). Almost all participants had at least some college, and more than 1/3 had postgraduate work or degrees \( (n = 87) \). There were no significant differences by sexual orientation for education or residence; \( ps > .1 \).

Table 3 displays relationship status and partner gender. Less than a quarter of participants were single \( (n = 55) \) and the majority of participants \( (n = 143) \) were in a long-term relationship, domestic partnership, or married. Although there were no significant differences between lesbian
and bisexual women on being single or in a relationship, there was a significant difference in
being polyamorous, with 19 bisexuals indicating being polyamorous compared to 5 lesbian
women, \( \chi^2(1, n = 229) = 9.26, p = .002 \). For partner gender, 14 bisexual women reported
currently having both a male and female partner; an additional 47 bisexual women were in a
long-term relationship and/or married to a male partner, and 13 with a female partner. Seventy-
three lesbians were in a long-term relationship or married to a woman. One lesbian selected
“male” as partner gender. Approximately 29 participants had transgender and/or genderqueer
partners, though it should be noted that there is some overlap due to the “check all that apply”
option on the questionnaire as well as the wording of the question (the “male” and “female”
partner options did not specify cisgender vs. transgender, so it is difficult to know exact
numbers).

**T1 Psychosocial variables.** Table 4 displays the means and standard deviations, and
Table 5 displays the zero-order correlations among the T1 variables of interest.

*Baseline Alcohol Use.* When asked how often they had drank alcohol, most participants
reported “sometimes.” Very few bisexual females reported drinking more than “sometimes” (\( n =
12 \)), whereas the number of lesbian women reporting “quite a bit/most days” or “always/every
day” was almost three times higher than this (\( n = 35 \), \( \chi^2(3, n = 229) = 15.17, p = .002 \).
Somewhat inconsistent with past research and my hypotheses, lesbian women reported a
significantly higher number of drinks on days when drinking (\( M = 2.57, SD = 1.45 \)), compared to
bisexual women (\( M = 2.22, SD = 1.14 \), \( t(227) = 1.98, p = .049 \).

*Other substance/medication use.* Ninety people (almost 40\%) reported no cannabis or
anxiety/depression medication use in the past two weeks. In total, over a third of participants
reported cannabis use in the past two weeks, and almost a quarter of the sample reporting
depression or anxiety medication in the past two weeks. There were 28 participants who reported both cannabis and depression/anxiety medication in the past two weeks, and 29 people reported taking both depression and anxiety medication. A higher percentage of bisexual women were taking anti-anxiety medications than lesbian women, $\chi^2 (1, n = 229) = 13.25, p < .001$. There were no differences by sexual orientation for depression medication or cannabis use, although cannabis results are trending toward significance with slightly more lesbians reporting use; $p < .1$.

**Minority Stress Variables.** The raw means and standard deviations for minority stress variables are displayed in Table 4. Anticipated stigma and outness were normally distributed, though enacted stigma was slightly skewed. Consistent with Hypotheses 1 and 9, bisexual women reported significantly higher levels of anticipated stigma, $t(227) = 2.83, p = .005$, and significantly lower levels of outness, $t(227) = 9.29, p < .001$. Unlike past studies, and consistent with Hypothesis 8, there were no differences by sexual orientation for enacted stigma, $p > .1$.

**Daily Data (Level 1)**

**Text message response rates.** Among the 230 participants who completed the T1 online survey, 225 filled out at least one of the 14 daily text message surveys (shown in Figure 4). One participant entered the wrong phone number in the T1 online survey. The rightful owner of the phone number notified us it was a wrong number. It is unclear if the other four participants entered the wrong phone number, had a phone setting that blocked our messages, or chose not to participate.
Among those who answered at least one daily survey \((n = 225)\), the daily response rate ranged from 87% \((n = 196)\) to 99% \((n = 223)\) completed surveys per day. In total, the response rate was 92.3% (see Table 6).

**Social Anxiety and Alcohol.** Table 6 shows the means and standard deviations for social anxiety, alcohol amount/time, eBAC, and social context when drinking. The social anxiety scale was normally distributed, and demonstrated high reliability (day-level alphas ranged from ~.85-.93). Participants could “check all that apply” for where they were when they drank. Among the participants who completed at least one survey, 94% (211 of the 225) participants reported at least one instance of drinking in a social setting. Across all participants, there were 889 days total in which drinking occurred in a social setting. The average number of days over the 2-week period in which people reported drinking in a social situation was 3.87, and the total average number of days when drinking alone was included was 4.86. Out of the 889 drinking days, the average number of drinks was 2.59 \((SD = 1.9)\). The average number of hours spent drinking in a social situation was 2.64 \((SD = 2.27)\), which tells us participants reported roughly one drink per hour of drinking. The number of drinks was much lower when exclusively drinking alone \((M = 1.69, SD = 1.88)\).

**Drinking Context.** There were 212 days in which people exclusively drank alone, but these were not included in main analyses since the focus is on social situations. The most frequently reported social context was drinking with friends \((n = 474)\), followed by with a romantic partner or on a date \((n = 368)\), then lastly going out to a bar/concert/party or other celebration \((n = 343)\). There were very few instances of people selecting “before going out/pregaming” \((n = 22)\).
Binge drinking. The total number of instances of binge drinking in social contexts was 204 (out of 889 events), occurring among 94 participants in total across the 14 days. In other words, 23% of the time people were drinking in social situations they had four or more drinks, and 41% of participants reported at least one instance of binge drinking in a social situation. Binge drinking while exclusively alone was very rare, with only 15 instances across six participants (data not shown).

eBAC. The mean eBAC for drinking in social situations was .05 (SD = .04. The eBAC estimates for “with friends” and “on a date” were the same as the overall eBAC (M = .05), but was higher for going out to a bar/concert/party or other celebration (M = .07). It is worth noting that participants could “check all that apply,” so there is a lot of overlap between these contexts. For example, 53% of those who reported being “out” also checked “with friends,” and 21% of those who reported being “out” also selected “with romantic partner/on a date.”

Because the data were skewed (skewness = 1.79), the square root of the values were used as the outcome for analyses (M = .2, SD = .08, skewness = .94 after transformation). When the 0s were included for the instances when participants did not drink, the data were once again skewed (skewness = 1.539). From a statistical modeling perspective, having skewed data is preferable to having 70% data missing; the main analyses will be run with and without 0s to compare the results.

There were 17 instances in which eBAC values were negative. These were primarily due to participants reporting a minimal number of drinks over an extended period of time (e.g., 1 drink from 8pm-12am; 2 drinks from 11am-11pm). In the Matthews and Miller equation (1979), a calculation involving time is subtracted, which could lead to negative values when including an extended period of time. Weight was an additional factor in at least one instance, since weight is
a denominator in the first part of the equation (e.g., a participant who weighed 350 pounds had four drinks over six hours). These 17 values were changed to .002, which was the lowest positive eBAC value. In order to examine the impact these values might have had on the analyses, I also ran all models with these 17 cases excluded. There were no significant differences in any effect sizes or p-values when these 17 cases were excluded.

**Unconditional models**

Table 7 includes three unconditional models. The ICC for social anxiety was .449, indicating 45% of the unique variance can be explained on the individual level. Also, there was both significant within and between variance of the intercepts, indicating both individual and daily variation in social anxiety ($p < .001$). Next, the empty model for the square-root transformed eBAC was run. The ICC was .349, as well as both significant between and within variance, again indicating there is variance to be explained ($p < .001$). Next, I re-ran the empty model with these 0 values in the dataset to reduce a large amount of missing data. As expected, with a majority of 0 values included, the ICC was attenuated to .216 and the within variance went up, though the within and between variance to be explained was still significant.

**Level 1 paths**

**Reactivity.** As shown in Table 8, day in the study was nested within participants, and social anxiety and eBAC values were each regressed on day. Day in the study predicted social anxiety, such that for each day in the study, social anxiety ratings went down by .02 units ($\beta = .021, SE = .007, p < .001$). Day in the study also significantly predicted alcohol in three instances: when looking at eBAC values with missing data for days when participants did not drink, each day in the study resulted in a .001 decrease in eBAC values. When I re-ran the model
with 0s included for those who reported not drinking, this significant effect of a .001 daily decrease remained the same (although the residual variance increased from .001 to .009). The AIC/BIC went down from the empty model, as should be the case. Day in the study significantly predicted binge drinking within persons, with an increase of binge drinking odds by .043 per day in the study ($p < .05$).

**Social Anxiety predicting alcohol.** Table 8 displays the Level 1 random intercept models. After determining that there was significant variance to be explained among the Level 1 measures, eBAC values were regressed on social anxiety scores with a fixed slope and random intercept. Consistent with Hypothesis 4, there was a significant positive effect of social anxiety on eBAC at the day level ($\beta = .014, SE = .003, p < .001$). Somewhat unexpected, although consistent with other research findings, the between slope variance was actually negative and significant ($\beta = -.021, SE = .006, p = .001$). In other words, on the individual level, social anxiety predicted lower alcohol scores on the aggregate level. Next, the model was run without the 0s for days when drinking did not occur, and instead as missing values. The day-level estimate remained the same ($\beta = .01, SE = .004, p < .05$). The negative between slope variance was attenuated and no longer significant ($\beta = -.012, SE = .009, p > .05$).

When looking at binge drinking as a dichotomous outcome, the odds of binge drinking significantly increased by .29 for every 1-unit increase in social anxiety on the day level ($\beta = .228, SD = .088, p = .028$). On the individual level, social anxiety did not significantly predict binge drinking ($p = .4$).

**Level 2 paths**
**Covariates.** Each Level 2 covariate was individually entered into level 1 models for social anxiety and alcohol, shown in Table 9. Age was not a significant predictor of social anxiety or eBAC. Class, income, and education level all predicted social anxiety. Social class had the strongest effect, such that with each unit decrease in social class, social anxiety went up by almost .2 units ($\beta = .194$, $SE = .047$, $p < .001$). Relationship status significantly predicted eBAC, such that not being single predicted higher eBAC ($p = .02$). Being transgender also predicted a .37 increase in social anxiety, $p = .004$.

For future analyses, social class and gender were included as a covariate on social anxiety. Since social class, income, and education are all similar variables, the decision to use social class was because it was the strongest predictor of the three, as well as is not conflated with other variables (e.g., income and education can be conflated with age and geographical location). Frequency of alcohol use (the number of total drinking days presented in Table 3) and relationship status were included as a covariate for alcohol.

**Hypothesis testing**

**Model 1.** In order to test Hypotheses 1-6, I first ran the full mediation model without any control variables entered (see Table 10). Consistent with Hypothesis 1, bisexual women were more likely to have higher rates of anticipated stigma than lesbian women ($\beta = -.257$, $SE = .09$, $p = .005$). And consistent with Hypothesis 2, bisexual women also were significantly more likely to have higher social anxiety than lesbian women ($\beta = .183$, $SE = .072$, $p = .01$).

For Hypothesis 3, I found the opposite of what I predicted: Lesbian women had significantly higher eBAC scores than bisexual women ($\beta = .022$, $SE = .007$, $p = .003$). Furthermore, lesbians had significantly higher odds of binge drinking (see Table 11). The
indirect path from sexual orientation to eBAC via social anxiety was not significant, \( p = .69 \), although it should be noted that this path only accounted for the between-level variance and not within-level variance (since sexual orientation is a Level 2 variable, the indirect path does not include the random effect).

For Hypothesis 4, the direct effect of anticipated stigma on social anxiety was significant: for each unit increase in anticipated stigma, social anxiety significantly increased by .29 points on the scale (\( \beta = .29, SE = .051, p = .011 \)). The indirect mediation path was significant, indicating anticipated stigma mediates the effect of sexual orientation on social anxiety (\( \beta = -.075, SE = .029, p = .011 \)).

Inconsistent with Hypothesis 5, there was no significant direct effect of anticipated stigma on alcohol consumption, either as eBAC or as binge drinking; \( ps > .1 \). The indirect effects from sexual orientation to drinking via anticipated stigma were not significant; \( ps > .1 \).

Consistent with the preliminary analyses for Hypothesis 6, there was a positive within variance of social anxiety on eBAC (\( \beta = .014, SE = .003, p < .001 \)), as well as the likelihood of binge drinking (\( \beta = .220, SE = .064, p = .001 \)). However, social anxiety negatively predicted eBAC scores on the aggregate level (\( \beta = -.015, SE = .008, p = .049 \)). Social anxiety did not significantly predict binge drinking on the aggregate level, \( p > .1 \).

Next, I re-ran the model with the control variables entered (see Tables 10 and 11). On the day level, controlling for day in the study strengthened the relationship between social anxiety and alcohol, both for eBAC values as well as binge drinking odds. Lower social class and being transgender significantly predicted higher social anxiety, and frequency of drinking and not being single significantly predicted higher alcohol use (\( ps \leq .05 \)). The effects of sexual
orientation and anticipated stigma on social anxiety were very slightly attenuated, but still significant. The negative relationship between social anxiety and eBAC was drastically reduced and no longer significant ($p = .61$).

**Model 2.** To test Hypotheses 7-13, anticipated stigma, enacted stigma, and outness were entered as mediators between sexual orientation and social anxiety. I first ran the full mediation model without any control variables entered (see Table 12). Consistent with Hypothesis 7, bisexuals had significantly higher anticipated stigma than lesbians ($\beta = -.257, SE = .091, p = .004$). Also, as predicted from Hypothesis 8, bisexuals had lower levels of outness ($\beta = .678, SE = .073, p < .001$). Inconsistent with Hypothesis 9, sexual orientation did not predict enacted stigma, $p > .1$.

Next, Hypotheses 10-12 examined the effect of various minority stressors on social anxiety. As expected, anticipated stigma significantly predicted social anxiety above and beyond the other minority stressors ($\beta = .197, SE = .084, p = .019$). The indirect effect was marginally significant predicting social anxiety from sexual orientation via anticipated stigma ($\beta = -.051, SE = .028, p = .07$). Neither enacted stigma nor outness predicted social anxiety, $ps > .1$. Next, I re-ran the model with the controls entered. As seen in Table 12, none of the results drastically changed when the control variables were entered.
Chapter VII:

Discussion

The current study contributes novel insight into the mechanisms underlying bisexual health disparities, as well as the relationship between social anxiety and alcohol use among lesbian and bisexual women. Many researchers have speculated that minority stress is the explanatory mechanism for bisexual health disparities such as social anxiety (Bostwick & Hequembourg, 2014; Feinstein & Dyar, 2017). The empirical evidence linking minority stress to health outcomes, however, has been limited to bisexual-specific scales such as ABES (Brewster & Moradi, 2010). This study was the first to compare anticipated stigma among lesbian and bisexual women, by specifying the wording of their sexual orientation in the scale items. Furthermore, measuring social anxiety and alcohol use on the day level allowed for higher precision and accuracy in understanding the relationship between social anxiety and alcohol consumption. As many others have pointed out, the specific context in which substance use occurs is crucial to understanding why it is occurring (Kassel & Veilleux, 2010; Mohr et al., 2005).

In the first model I presented, I examined the role of anticipated stigma and social anxiety as mediators of alcohol use among LGB women. As hypothesized, bisexual women had higher anticipated stigma than lesbian women, which, in turn, fully mediated the relationship between sexual orientation and social anxiety. These findings suggest that anticipated stigma, as expected, is an appropriate minority stress measure to explain higher rates of social anxiety among bisexuals.

For Hypothesis 3, I found the opposite of what I predicted: Lesbian women were drinking in higher quantities than bisexual women. Preliminary evidence of this trend was found in the
screening questionnaire, in which the overwhelming majority of bisexual women only indicated drinking “sometimes” in the past two weeks, which was the lowest amount of alcohol use to qualify for the study, compared to less than a third of lesbian women indicated drinking “sometimes.” This drinking effect ended up being quite robust in the current study. Even after controlling for alcohol frequency, lesbian women had higher eBAC levels as well as likelihood of binge drinking occurrences. Although many studies have shown bisexual women have higher rates of binge drinking and alcohol-related problems, alcohol use is much higher in the LGB community than in the general population—regardless of how it is measured (Fish et al., 2017; Marshal et al., 2008; Marshal et al., 2009; McCabe et al., 2009). Though it does not appear that this unexpected finding was due to the way alcohol use was measured, a study recently published found no significant differences between bisexual and lesbian women when measuring heavy drinking defined as six or more drinks (Fish & Hughes, 2018). Another possible explanation is that there was sample bias. In support of this possibility, one recent study compared binge drinking among lesbian and bisexual women in two very different samples – one in a nationally representative household survey, and the other surveyed bar patrons in San Francisco. In the nationally representative sample, lesbian women reported binge drinking (4+ drinks) three times higher than bisexual women (15% vs. 5%, respectively). However, when bar patrons were surveyed, bisexual women reported more than twice the rate of binge drinking compared to lesbians (65% vs. 32%, respectively). It is unclear why the current study did not replicate past findings, but having a skewed sample is a possibility.

Relationship status also appeared to be an important factor, but in an unexpected direction: Those in relationships were drinking more than those who were single. One possibility is that in the current study, sexual orientation and/or relationship status was conflated with
immersion in LGB social circles, which is indicative of more alcohol use (Condit, Kitaji, Drabble, & Trocki, 2011; L. Drabble & Trocki, 2014). On the other hand, there is evidence that bisexual women with a male partner have significantly higher rates of binge drinking than bisexual women with a female partner (Molina et al., 2015). Since bisexual women were more likely to have a male partner than a female partner in this sample, this could have contributed to the finding. There is also evidence that sexual minority women in non-cohabiting (vs. cohabiting) relationships are similar to single women in terms of alcohol-related problems and likelihood of alcohol dependence (Veldhuis et al., 2017). Parsing out these relationship status differences will be crucial to furthering research on LGB women’s alcohol use.

Although anticipated stigma predicted social anxiety (Hypothesis 4), another unexpected finding was that anticipated stigma did not predict higher drinking. It could be the case that anticipated stigma predicts more alcohol consumption, but only under certain conditions. Evidence to support this possibility can be found in a study looking at gay-related rejection sensitivity, a similar construct to anticipated stigma (Pachankis et al., 2008). Gay-related rejection sensitivity is a combined score of gay men’s anxiety and expected likelihood of homophobic events in ambiguous vignettes, such as “being seated in the back of a restaurant with your same-sex partner” or “not receiving a wedding invitation for your same-sex partner.” Pachankis et al. (2014) found that gay men’s scores interacted with the structural stigma, such as negative societal attitudes and policies, of their past geographic locations, to predict higher drinking. In other words, gay-related rejection sensitivity only predicted alcohol use when gay men previously resided in areas with more homophobic policies and attitudes.

The last hypotheses in my first model looked at the relationship between social anxiety and alcohol consumption. Interestingly, the random Level 1 path was consistent with my
hypothesis of a significant positive relationship, but the fixed Level 2 path was not. In fact, when eBAC was the outcome, social anxiety predicted lower rates of drinking on the individual (aggregate) level. However, since this effect was not present when 0s for non-drinking days were not included, as well as when controls were entered, this finding is likely due to conflating frequency with quantity. Those who drank more frequently would have higher intercepts, since excessive 0s would bring the mean down. I focused on quantity instead of frequency in the current study since 1) past studies have found lesbian and bisexual women do not differ in frequency, and 2) because social anxiety can also lead to social avoidance (Buckner et al., 2013), reducing opportunities to drink in social situations. This finding certainly might explain some of the inconsistent outcomes in the literature, such as finding a negative or insignificant relationship between social anxiety and alcohol (Buckner et al., 2013; Eggleston et al., 2004; Ham & Hope, 2006). Variations in social anxiety on the day level predicted eBAC scores as well as binge drinking odds, further demonstrating the importance of using methods such as MSEM in order to separate fixed and random paths.

For the second model I tested in Figure 2, I compared various minority stressors – enacted stigma, anticipated stigma, and outness - as mediators between sexual orientation and social anxiety. As hypothesized, anticipated stigma remained significantly higher in bisexual women, even when other minority stressors were included in the model. This finding provides further evidence that anticipated stigma is an important measure to explain bisexual health disparities.

Consistent with past findings (Kuyper & Fokkema, 2011), bisexuals reported significantly lower levels of outness than lesbian women, even after controlling for enacted and anticipated stigma. Unlike past studies, however, the current study adapted the OI to specifically
ask about openness about being “bisexual” and “lesbian.” Considering the recent finding that bisexual women are more open discussing being LGB as opposed to bisexual (Mohr et al., 2017), if the research question involves understanding differences between bisexual and lesbian women, wording items in a specific way will improve the validity and precision of the scale. I suspect that if I had asked about outness as LGB instead of specifically bisexual, the effect size might not have been as large.

Inconsistent with past research (Bostwick et al., 2014), there were no significant differences between lesbian and bisexual women on enacted stigma. This finding could be due to how the scale was adapted, since past research only accounted for sexual minority and same-sex stigma. This model also controlled for outness – a factor which is typically shown to predict enacted stigma. Additional studies should explore whether and how enacted stigma differs between lesbian and bisexual women.

Lastly, anticipated stigma predicted social anxiety above and beyond other minority stress variables. Although the indirect effect was only moderately significant (p=.07), it was the primary minority stressor to explain differences in social anxiety between lesbian and bisexual women. Based on both of the models that I tested for the current study, anticipated stigma appears to be a preferable way to measure minority stress and to explain higher social anxiety among bisexuels relative to lesbians.

**Study Limitations**

There are a number of study limitations concerning sample bias. I recruited participants through social media and incentivized snowball sampling much quicker than expected (~1 week), which prevented outreach to more diverse groups. Seventy-nine percent of the sample
identified as White/Caucasian, the mean age was 26 years old, and only 15 participants resided in a rural setting. Due to these skewed sample characteristics, generalizing these results should be done with caution. Furthermore, less than 1/4 of the participants were single, which prevented further subgroup analyses by relationship status. I also did not recruit heavy drinkers into the study, with almost 90% of bisexual respondents and 69% of lesbian respondents indicating they drank alcohol “sometimes” in the past 2 weeks (the lowest possible amount to qualify into the study). It is unclear if these results would replicate in other samples, including with heavier drinking patterns.

Another study limitation is that my inclusion criteria were limited to bisexual- and lesbian-identified women. As other researchers have recently pointed out, a growing number of women are choosing to identify as queer – an umbrella term used for all gender and sexual minorities (Gray & Demarais, 2014). Due to limited resources, I was unable to recruit queer-identifying women into the study. As this area of research moves forward, it is crucial to include and understand queer-identifying individuals.

**Future directions**

The current study provides evidence that anticipated stigma is a useful construct to measure minority stress, and that making scale wording inclusive of different sexual orientations can lead to different/more precise patterns of results. Although the HHRD and OI have been validated in previous studies, the next step is to conduct exploratory factor analyses and measurement invariance tests to validate the scales adapted for this study. Particularly, it is important to identify the sources of stigma (e.g., friends vs. healthcare providers), as well as the nature of the events (e.g., rejection vs. harassment or discrimination). There could likely be measurement invariance found between bisexual and lesbian women, which would be a crucial
next step toward understanding minority stress differences as explanatory mechanisms of health outcomes.

Another future direction is to replicate these results using ecological momentary assessment (EMA). EMA is a data collection method in real time, oftentimes measuring within-day fluctuations. EMA is a more precise method than retrospective recall for measuring substance use and internal cues in real-world settings (Shiffman, 2009). Although the daily diary method of data collection is much more precise than other methods, it is possible that participants’ responses to how they felt yesterday could have been influenced by their current mood. The directionality between social anxiety and alcohol would also be further established with EMA. Without confirming the directionality, an alternative possibility is that drinking more alcohol increased negative affect. This phenomenon is known as the “crying-into-your-beer” effect (Steele & Josephs, 1988). Though others have pointed out this might be more specific to solitary drinking (Mohr et al., 2001), which would not be relevant to the current study, it cannot be ruled out entirely without additional research.

Furthermore, the relationship between social anxiety and alcohol could be influenced by specific social environments. One study found that among undergraduate students, being on a date or when meeting new people strengthened the relationship between social anxiety and alcohol (Terlecki, Ecker, & Buckner, 2014). There could also be differences between straight and LGB social contexts for lesbian and bisexual women, which should be the focus of future studies examining social context.

Interventions
Research on LGB health disparities can help with the design and implementation of various interventions. First, through informing and training mental health professionals about LGB disparities and the added stigma surrounding bisexuality, LGB people can be supported and learn to cope with various stigma-related stressors with the help of professionals (Feinstein, Dyar, & Pachankis, 2017). For example, Feinstein et al. (2017) suggested clinicians should educate themselves about negative stereotypes surrounding bisexuality in order to prevent perpetuating these stereotypes, which could cause an unnecessary burden their clients.

Additionally, digital health interventions, such as e-therapy apps to help reduce depression, anxiety, and substance use, have a lot of potential for helping gender and sexual minorities. Many evidence-based apps are now widely accessible for individuals who might benefit more from (or in addition to) traditional mental health settings. Unfortunately, a recent review revealed that virtually no e-therapy apps address gender or sexual minority issues (Rozbroj, Lyons, Pitts, Mitchell, & Christensen, 2014). Furthermore, almost all of the mental health apps included in the review assumed heterosexuality of users and did not contain inclusive language or content (Rozbroj et al., 2014). By drawing on research including the present study, digital health interventions should incorporate the unique challenges experienced by sexual and gender minorities. E-therapy apps can include exercises to help reduce social anxiety and substance use, as well as to provide strategies for dealing with stigma (Feinstein et al., 2017; Lucassen, Merry, Hatcher, & Frampton, 2015). Through understanding the stressors that sexual and gender minorities experience, both through a minority stress framework as well as a health/substance use perspective, evidence-based digital interventions have potential to buffer the effects of minority stress and improve health and wellbeing.

Conclusions
Bisexual women generally have poorer health outcomes compared to monosexuals (both LGs and heterosexual). In the current study, I found mixed evidence for this finding: lesbian women had lower levels of social anxiety, but higher alcohol consumption. The primary conceptual framework to understand LGB health disparities has been the minority stress model, which distinguishes between proximal and distal stressors. Although there is evidence that societal attitudes and stigma surrounding bisexuality are more negative than those toward lesbians and gay men, there is a lack of research and understanding around bisexual mental health relative to LG health. I have argued that anticipated stigma would be a better way to measure bisexual minority stress than other minority stress constructs, such as outness and enacted stigma. The current study supported the use of anticipated stigma as an explanatory mechanism for social anxiety, but not alcohol use. Lastly, my study provides insight into the relationship between social anxiety and alcohol use. I initially hypothesized that both the within- and between-level effects would be significant and positive, but when separating these effects, only the within-level effect remained. The next step will be to replicate these findings, but understanding the role of minority stress in bisexual health disparities is an invaluable starting point.


https://www.statmodel.com/download/Causalmediation.Pdf


http://www.pewglobal.org/2013/06/04/the-global-divide-on-homosexuality/


Table 1: Participant demographics

<table>
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<th>Variable</th>
<th>Bisexual(^b)</th>
<th>Lesbian(^b)</th>
<th>Total(^c)</th>
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<td>(%)</td>
<td>(n)</td>
<td>(%)</td>
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<td>3</td>
<td>2.6</td>
</tr>
</tbody>
</table>

\(M\) \(SD\)  \(M\) \(SD\)  \(M\) \(SD\)  \(F\)

| Age       | 26.13 | 5  | 27.14 | 5.45 | 26.6 | 5.25 | 2.12 |
| Weight    | 170.7 | 52.2 | 161.82 | 37.8 | 166 | 45.7 | 2.18 |

\(^a=114, ^b=115, ^c=230\) (included participant who identified as “queer”)

\(^*p < .05, **p < .01, ***p < .001\)
Table 2: Participant Demographics (continued)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Bisexual&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Lesbian&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Total&lt;sup&gt;c&lt;/sup&gt;</th>
<th>χ²</th>
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<td>0-20,000</td>
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<td>8 7</td>
<td>33 14.4</td>
<td>17.27**</td>
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<td>8 7</td>
<td>17 7</td>
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<tr>
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<td>11 9.6</td>
<td>10 8.7</td>
<td>21 9.2</td>
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<td>7 6.1</td>
<td>8 3.5</td>
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</tr>
<tr>
<td>Residence</td>
<td></td>
<td></td>
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<td>.98</td>
</tr>
<tr>
<td>Urban</td>
<td>53 46.5</td>
<td>60 52.2</td>
<td>113 49.3</td>
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<tr>
<td>Suburban</td>
<td>54 47.4</td>
<td>47 40.9</td>
<td>102 44.1</td>
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<tr>
<td>Rural</td>
<td>7 6.1</td>
<td>8 7</td>
<td>15 6.6</td>
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<tr>
<td>Social class</td>
<td></td>
<td></td>
<td></td>
<td>12.16*</td>
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<tr>
<td>Upper class</td>
<td>1 0.9</td>
<td>2 2.6</td>
<td>4 1.7</td>
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<tr>
<td>Upper-middle class</td>
<td>16 14</td>
<td>23 20</td>
<td>39 17</td>
<td></td>
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<tr>
<td>Middle Class</td>
<td>45 39.5</td>
<td>58 50.4</td>
<td>103 45</td>
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<tr>
<td>Working Class</td>
<td>47 41.2</td>
<td>31 27</td>
<td>78 34.1</td>
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<tr>
<td>Living in Poverty</td>
<td>5 4.4</td>
<td>0 0</td>
<td>5 2.2</td>
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<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td>5.1</td>
</tr>
<tr>
<td>High school diploma</td>
<td>4 3.5</td>
<td>2 1.7</td>
<td>6 2.6</td>
<td></td>
</tr>
<tr>
<td>Some college</td>
<td>26 22.8</td>
<td>18 15.7</td>
<td>44 19.2</td>
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<tr>
<td>Undergraduate College degree</td>
<td>43 37.7</td>
<td>49 42.6</td>
<td>92 40.2</td>
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<tr>
<td>Some postgraduate work</td>
<td>16 14</td>
<td>11 9.6</td>
<td>27 11.8</td>
<td></td>
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<tr>
<td>Postgraduate degree</td>
<td>25 21.9</td>
<td>35 30.4</td>
<td>60 26.2</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>=114, <sup>b</sup>=115, <sup>c</sup>=230 (included participant who identified as “queer”)

*p < .05, **p < .01, ***p < .001
Table 3: Participant relationship status and partner gender

<table>
<thead>
<tr>
<th>Variable</th>
<th>Bisexual\textsuperscript{a}</th>
<th>Lesbian\textsuperscript{b}</th>
<th>Total\textsuperscript{c}</th>
<th>( \chi^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Relationship status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>30 13.1</td>
<td>25 10.9</td>
<td>55</td>
<td>.66</td>
</tr>
<tr>
<td>Dating, casual</td>
<td>13 5.7</td>
<td>16 7</td>
<td>29</td>
<td>.34</td>
</tr>
<tr>
<td>Dating, long term</td>
<td>32 14</td>
<td>44 19.2</td>
<td>76</td>
<td>2.68</td>
</tr>
<tr>
<td>Domestic partnership</td>
<td>25 10.9</td>
<td>31 13.5</td>
<td>56</td>
<td>.78</td>
</tr>
<tr>
<td>Married or civil union</td>
<td>11 4.8</td>
<td>13 5.7</td>
<td>24</td>
<td>.17</td>
</tr>
<tr>
<td>Polyamorous</td>
<td>19 8.3</td>
<td>5 2.2</td>
<td>24</td>
<td>9.26**</td>
</tr>
<tr>
<td>Other</td>
<td>9 3.9</td>
<td>3 1.3</td>
<td>12</td>
<td>3.22</td>
</tr>
<tr>
<td><strong>Partner gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>27 84</td>
<td></td>
<td></td>
<td>55.84***</td>
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<tr>
<td>Male</td>
<td>61 1</td>
<td>62 27.1</td>
<td>80.34***</td>
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<tr>
<td>Transgender male</td>
<td>5 0</td>
<td>5 2.2</td>
<td>5.52*</td>
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</tr>
<tr>
<td>Transgender female</td>
<td>3 1</td>
<td>4 1.7</td>
<td>1.04</td>
<td></td>
</tr>
<tr>
<td>Genderqueer</td>
<td>11 9</td>
<td>20 8.7</td>
<td>.239</td>
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</tbody>
</table>

\textsuperscript{a}=114, \textsuperscript{b}=115, \textsuperscript{c}=230 (included participant who identified as “queer”)

\( *p < .05, **p < .01, ***p < .001 \)
Table 4: T1 Psychosocial Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Bisexual</th>
<th>Lesbian</th>
<th>Total</th>
<th>χ²</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Alcohol Frequency in Last 2 Weeks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0.9</td>
</tr>
<tr>
<td>Sometimes</td>
<td>102</td>
<td>89.5</td>
<td>79</td>
<td>68.7</td>
</tr>
<tr>
<td>Quite a bit/most days</td>
<td>11</td>
<td>9.6</td>
<td>32</td>
<td>27.8</td>
</tr>
<tr>
<td>Always/Every day</td>
<td>1</td>
<td>0.9</td>
<td>3</td>
<td>2.6</td>
</tr>
<tr>
<td>Psychiatric/Recreational Medicine Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Anxiety</td>
<td>38</td>
<td>33.3</td>
<td>15</td>
<td>13</td>
</tr>
<tr>
<td>Depression</td>
<td>32</td>
<td>28.1</td>
<td>25</td>
<td>21.7</td>
</tr>
<tr>
<td>Cannabis</td>
<td>36</td>
<td>31.6</td>
<td>47</td>
<td>40.9</td>
</tr>
<tr>
<td>Average Drinks/Day</td>
<td>2.22</td>
<td>1.14</td>
<td>2.57</td>
<td>1.45</td>
</tr>
<tr>
<td>Anticipated Stigma (1–5)</td>
<td>2.61</td>
<td>0.71</td>
<td>2.36</td>
<td>0.67</td>
</tr>
<tr>
<td>Enacted Stigma (1–5)</td>
<td>1.62</td>
<td>0.57</td>
<td>1.68</td>
<td>0.53</td>
</tr>
<tr>
<td>Outness (1-4)</td>
<td>2.6</td>
<td>0.6</td>
<td>3.27</td>
<td>0.5</td>
</tr>
<tr>
<td>Skewness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Drinks/Day</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anticipated Stigma (1–5)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Enacted Stigma (1–5)</td>
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<td></td>
<td></td>
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<tr>
<td>Outness (1-4)</td>
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</tbody>
</table>

*p < .05, **p < .01, ***p < .001
Table 5: Zero-order correlations between T1 variables

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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>--</td>
<td>0.096</td>
<td>.130*</td>
<td>-.204**</td>
<td>0.102</td>
<td>.151*</td>
<td>-.185**</td>
<td>0.055</td>
<td>.525**</td>
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<tr>
<td>2</td>
<td>--</td>
<td>-0.123</td>
<td>-0.049</td>
<td>.281**</td>
<td>.316**</td>
<td>-0.054</td>
<td>0.118</td>
<td>.170**</td>
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</tr>
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<td>3</td>
<td>--</td>
<td>0.109</td>
<td>-.194**</td>
<td>-0.101</td>
<td>0.077</td>
<td>.160*</td>
<td>0.080</td>
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<td></td>
</tr>
<tr>
<td>4</td>
<td>--</td>
<td>-.341**</td>
<td>-.513**</td>
<td>.210**</td>
<td>.198**</td>
<td>-.191**</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>--</td>
<td>.223**</td>
<td>0.041</td>
<td>-0.069</td>
<td>0.058</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>--</td>
<td>-.196**</td>
<td>-.113</td>
<td>.138*</td>
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</tr>
<tr>
<td>7</td>
<td>--</td>
<td>.703**</td>
<td>-.398**</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>8</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td>-0.015</td>
</tr>
<tr>
<td>9</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).
* . Correlation is significant at the 0.05 level (2-tailed).
Table 6: Day-level behaviors based on 2,906 days of collected data

<table>
<thead>
<tr>
<th>Behavior</th>
<th># of days</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social anxiety</td>
<td>2906</td>
<td>90</td>
</tr>
<tr>
<td>Drinking in social setting</td>
<td>889</td>
<td>30</td>
</tr>
<tr>
<td>Binge drinking in social setting (4+ drinks)</td>
<td>204</td>
<td>7</td>
</tr>
<tr>
<td>Drinking alone</td>
<td>212</td>
<td>7</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>M</th>
<th>SD</th>
<th>Skewness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social anxiety (1-4)</td>
<td>1.89</td>
<td>0.6</td>
</tr>
<tr>
<td>Number of drinks</td>
<td>2.59</td>
<td>1.9</td>
</tr>
<tr>
<td>Time spent drinking</td>
<td>2.64</td>
<td>2.27</td>
</tr>
<tr>
<td>eBAC (before square root transformation)</td>
<td>0.05</td>
<td>0.04</td>
</tr>
<tr>
<td>eBAC (after square root transformation)</td>
<td>0.2</td>
<td>.08</td>
</tr>
<tr>
<td>eBAC (square root transformed + 0s added)</td>
<td>0.06</td>
<td>0.01</td>
</tr>
</tbody>
</table>

<p>| Average # social drink days                                   | 3.87     | 3.03     | 0.93     |
| Average # total drink days                                    | 4.86     | 3.47     | 0.6      |</p>
<table>
<thead>
<tr>
<th>Model</th>
<th>Fixed Effects</th>
<th>Random Effects</th>
<th>Model Fit Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>ICC</td>
<td>β₀₀</td>
</tr>
<tr>
<td>1</td>
<td>Social Anxiety</td>
<td>2906</td>
<td>.449</td>
</tr>
<tr>
<td>2</td>
<td>Square root eBAC (with missing values)</td>
<td>889</td>
<td>.349</td>
</tr>
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<td>3</td>
<td>Square root eBAC (with 0s included)</td>
<td>2906</td>
<td>.216</td>
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** p<.001, * p<.05
Table 8: Level 1 random intercept models

<table>
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<tr>
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<th>Fixed Effects</th>
<th>Random Effects</th>
<th>Model Fit Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IV:</td>
<td></td>
<td></td>
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<tr>
<td>DV: Social Anxiety</td>
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<td></td>
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<tr>
<td></td>
<td>β</td>
<td>SE</td>
<td>p</td>
</tr>
<tr>
<td>Day</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>eBAC (with 0s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social anxiety</td>
<td>-.021</td>
<td>.006</td>
<td>.01</td>
</tr>
<tr>
<td>Day</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>eBAC (without 0s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social anxiety</td>
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<td>.008</td>
<td>.084</td>
</tr>
<tr>
<td>Day</td>
<td></td>
<td></td>
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<tr>
<td>Binge (with 0s)</td>
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</tr>
<tr>
<td>Social anxiety</td>
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<td>.135</td>
<td>.044</td>
</tr>
<tr>
<td>Day</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Binge (without 0s)</td>
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<tr>
<td>Social anxiety</td>
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<td>.162</td>
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<td>Day</td>
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</tbody>
</table>

*Day=day in study; binge=binge drinking (1=yes)
Table 9. Fixed intercepts regressed on Level 2 covariates

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Social Anxiety</th>
<th></th>
<th>eBAC (with 0s included)</th>
<th></th>
<th>eBAC (without 0s included)</th>
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<tr>
<td></td>
<td>β</td>
<td>p-value</td>
<td>β</td>
<td>p-value</td>
<td>β</td>
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<td>IV:</td>
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<td>.136</td>
<td>-.001</td>
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<td>Social Class</td>
<td>.194</td>
<td>&lt;.001</td>
<td>-.001</td>
<td>.8</td>
<td>.007</td>
</tr>
<tr>
<td>Income</td>
<td>.066</td>
<td>.004</td>
<td>.003</td>
<td>.221</td>
<td>-.002</td>
</tr>
<tr>
<td>Education</td>
<td>-.112</td>
<td>.001</td>
<td>.003</td>
<td>.369</td>
<td>.001</td>
</tr>
<tr>
<td>Transgender (1=transgender)</td>
<td>.368</td>
<td>.004</td>
<td>-.008</td>
<td>.543</td>
<td>.002</td>
</tr>
<tr>
<td>Relationship status (1=not single)</td>
<td>-.058</td>
<td>.519</td>
<td>.02</td>
<td>.02</td>
<td>-.01</td>
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Table 10: MSEM hypotheses 1-6 predicting eBAC

<table>
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<tr>
<th></th>
<th>Without Controls</th>
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<th>With Controls</th>
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<th></th>
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<tbody>
<tr>
<td></td>
<td>β</td>
<td>SE</td>
<td>p</td>
<td>β</td>
<td>SE</td>
<td>p</td>
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<td>Direct Paths</td>
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<tr>
<td>Random effects</td>
<td></td>
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</tr>
<tr>
<td>Day-&gt;SA</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-0.02</td>
<td>0.003</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Day-&gt;ALC</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.001</td>
<td>0</td>
<td>0.001</td>
</tr>
<tr>
<td>SA-&gt;ALC</td>
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<td>0.003</td>
<td>&lt;.001</td>
<td>0.014</td>
<td>0.001</td>
<td>&lt;.001</td>
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<td>Fixed Effects</td>
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</tr>
<tr>
<td>Class-&gt;SA</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.111</td>
<td>0.045</td>
<td>0.014</td>
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<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>0.01</td>
<td>0.005</td>
<td>0.053</td>
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<tr>
<td>Freq-&gt;Alc</td>
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<td>-</td>
<td>-</td>
<td>0.012</td>
<td>0.001</td>
<td>&lt;.001</td>
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<tr>
<td>SO-&gt;ALC</td>
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<td>0.007</td>
<td>0.003</td>
<td>0.011</td>
<td>0.005</td>
<td>0.015</td>
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<td>SO-&gt;AS</td>
<td>-0.257</td>
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<td>0.005</td>
<td>-0.258</td>
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<td>0.004</td>
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<td>0.072</td>
<td>0.011</td>
<td>-0.158</td>
<td>0.071</td>
<td>0.027</td>
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<td>AS-&gt;SA</td>
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<td>0.252</td>
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<td>&lt;.001</td>
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<tr>
<td>SA-&gt;ALC</td>
<td>-0.015</td>
<td>0.008</td>
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*Day=day in study, SO=sexual orientation (1=lesbian), AS=anticipated stigma, SA=social anxiety, ALC=eBAC (with 0s), Freq=drinking frequency, class = social class, gender=cisgender/transgender (1=transgender), relstat=single/not single (1=not single)
Table 11: MSEM hypotheses 1-6 with binge (no/yes) as a dichotomous outcome

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*Day=day in study, SO=sexual orientation (1=lesbian), AS=anticipated stigma, SA=social anxiety, ALC=binge (1=yes), Freq=drinking frequency, class = social class, gender=cisgender/transgender (1=transgender), relstat=single/not single (1=not single)
Table 12: MSEM hypotheses 7-13 predicting social anxiety from minority stress variables

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*Day=day in study, SO=sexual orientation (1=lesbian), AS=anticipated stigma, ES=enacted stigma, OI=outness, SA=social anxiety, class = social class, gender=cisgender/transgender (1=transgender)
Figure 1. Anticipated stigma serial mediation model (Hypotheses 1-6)
Figure 2: Minority Stress model predicting social anxiety (Hypotheses 7-13)
Figure 3. Study flow chart: consent, referrals, surveys, incentives, debrief
Figure 4. Screening and study completion

500 individuals participated in the screener questionnaire

- Did not qualify for 1+ of the following:
  - Under 21 (n=30)
  - Identified as men (n=14)
  - Did not identify as gay/lesbian or bisexual (n=121)
  - No alcohol in last 2 weeks (n=115)
  - Identified as bisexual after we enrolled maximum (n=35)

32 did not complete online survey

230 enrolled in 14-day text message survey

5 did not complete text message surveys

211 reported at least one instance of drinking in a social situation (total drinking days = 889)
Appendix A:

Rejection Sensitivity

Below are additional analyses looking at rejection sensitivity (RS) as a moderator in my models. I had initially included this measure in my dissertation proposal, but the scale properties were not reliable, and therefore the estimates are questionable (see below).

Background

RS is a concept rooted in theories of attachment and interpersonal relationships, and is conceptualized as both a dispositional trait as well as a function of past rejection by peers, family members, or romantic partners. People who are higher in RS are more sensitive to social rejection and tend to anxiously expect, readily perceive, and overreact to it (Downey & Feldman, 1996). Higher levels of exclusion, particularly during early stages of development, contribute to higher RS in adulthood (London, Downey, Bonica, & Paltin, 2007). Experimental studies have shown that individuals high in RS show increases in negative affect following social rejection. I predicted that individuals who are high in RS would be more likely to drink alcohol when socially anxious. For my current study, I predicted that higher RS would strengthen the within-level path between social anxiety and alcohol, and the between-level path from anticipated stigma to social anxiety and to alcohol use.
Hypothesized models

**Hypothesis 1**: RS will moderate the random slope between social anxiety and drinking (see below).

**Hypothesis 2**: Rejection sensitivity will moderate the fixed path between anticipated stigma and social anxiety (see below).

**Hypothesis 3**: Rejection sensitivity will moderate the fixed path between anticipated stigma and alcohol use (see below).
Measure

During the T1 baseline survey, the Adult Rejection Sensitivity Questionnaire (A-RSQ) was administered. The A-RSQ is an 18-item questionnaire consisting of nine scenarios involving social rejection, such as “You approach a close friend to talk after doing or saying something that seriously upset him/her.” For each of the scenarios, respondents rated the likelihood of being rejected, from 1 (very unlikely) to 3 (very likely), as well as how concerned they would be if they are rejected, from 1 (not at all concerned) to 3 (very concerned; Downey, Berenson, & Kang, 2006). The A-RSQ scale is an adapted version of the original RSQ, and has been well-validated in representative adult samples (Berenson et al., 2009; Downey & Feldman, 1996). The likelihood of rejection is multiplied by the level of concern of rejection, and then averaged across the other scenarios to calculate an RS score. Two of the nine scenarios were removed that were not equally applicable to lesbian and bisexual women—one involved the issue of sexual protection with a partner and the other was about approaching a stranger at a party. For the current study, the “concerned” subscale had acceptable reliability ($\alpha = .76$), but the “expect” subscale was not acceptable ($\alpha = .62$). Removing scale items reduced the reliability further, making the scale and estimates unusable.

Analyses

In order to test Hypothesis 1, I regressed the random slope on the fixed RS path, using a method referred to as “random coefficients prediction” (RCP). Unlike the random intercept-only models used thus far, adding a random slope will allow the slopes to vary for each person (cluster), in addition to letting the intercepts vary at the cluster level. Regressing a random slope on a Level 2 variable is a recommended way to look at cross level interactions (Muthén, 2013; Preacher et al., 2016; Raudenbush & Bryk, 2002) Unlike the previous analyses, this analysis will
only model the random slope on the day level, and social anxiety will be group mean-centered, i.e., the effect is measured relative to the individual (cluster). Regressing this slope on RS tests whether the strength of the relationship between social anxiety and alcohol changes as a function of RS.

Results

Descriptives. The Rejection Sensitivity subscales were each normally distributed. Bisexuals reported significantly higher scores on the “concern” subscale compared to lesbian women, $t(226) = 2.77, p = .006$. There were no significant differences on the “expect” subscale, $p > .1$.

Hypothesis 1. When the random slope was regressed on RS, it significantly strengthened the relationship between social anxiety and alcohol on the day level, but in the opposite direction as expected. As shown below, those with lower RS scores had a steeper slope between social anxiety and alcohol. People with high RS did not seem to drink more when their social anxiety was high. In other words, those with a lower trait-level measure were more likely to drink more when socially anxious. People with lower RS drank more overall, but the effect was especially pronounced when more socially anxious.
RCP: RS predicting random slope

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*AS=anticipated stigma; RS=rejection sensitivity; Alc = square root transformed eBAC values

*AS=anticipated stigma; RS=rejection sensitivity; eBAC = square root transformed eBAC values
**Hypothesis 2.** I did not find support for RS predicting social anxiety, nor was the interaction with anticipated stigma significant. Sexual orientation is the only significant predictor of social anxiety in this model.

**Hypothesis 3.** RS predicted lower alcohol and the interaction with anticipated stigma marginally predicted alcohol in an unexpected direction. Lower RS predicted drinking more, but only when a person reported lower levels of anticipated stigma. Among individuals with high anticipated stigma, RS levels do not predict drinking.
### Table 10: MSEM with RS as a moderator

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<td>.084</td>
<td>0.003</td>
<td>0.002</td>
<td>.061</td>
</tr>
</tbody>
</table>

*SO=sexual orientation, AS=anticipated stigma, SA=social anxiety, ALC=ebac (with 0s), Freq=drinking frequency, class = social class, gender=transgender (1=transgender), relstat=single/not single (1=not), RS=rejection sensitivity

**Discussion**

RS significantly interacted with the random slope between social anxiety and alcohol in an unexpected way: those with lower RS are more likely to drink when socially anxious than those with higher RS. Perhaps individuals high in RS drink less out of fear of rejection due to being intoxicated, though it is unclear if these results are accurate. Furthermore, although I originally proposed that RS might interact with anticipated stigma, it interacted in an unfathomable way. People who reported higher anticipated stigma were not reporting drinking differences based on RS, but among those with lower anticipated stigma scores, higher RS predicted lower alcohol consumption.
Although I had initially proposed to look at RS as a moderator, the scale properties were not reliable in the present sample and the estimates shown are not trustworthy. The alpha coefficient for the RS “expect” subscale was poor, and many items were not correlated or slightly negatively correlated. One possibility is that this scale does not generalize to lesbian and bisexual women. An area for future research is to do an exploratory factor analysis (EFA) in order to see if any of the items load on the same factors.
Appendix B:

Survey Announcement

Subject line: Participants wanted for a survey on LGBT women’s health

You are invited to participate in a study about LGBT women’s social relationships and health behaviors. I am a graduate student at the University of Connecticut and I am conducting this research for my dissertation.

If you are eligible and would like to participate, you will receive up to $25 in Amazon credit for 1 – 1 ½ hours of your time over the next two weeks. Additionally, if you refer other LGBT women to the study, you will be entered into a raffle to win $50 in Amazon credit.

You must be at least 21 years of age to participate. Below is a link to see if you qualify. It should take no more than 1-2 minutes of your time. If you qualify, you will next be asked to fill out a 15-20 minute online questionnaire. After today you will be asked to take a once-a-day text message survey, 1-2 minutes per day, for two weeks.

Note: please do not take this screener more than once, or you will be disqualified from participating.

Here is the link to see if you qualify: [http://bit.ly/LGBTwomen](http://bit.ly/LGBTwomen)

All data for this study is confidential, and you do not have to participate if you do not want to. I would be happy to answer any questions you may have at any time. You may contact me, the graduate researcher, at Stephanie.finneran@uconn.edu or at (845) 419-8449. If you have any questions about your rights as a research participant, you may contact the UConn Institutional Review Board (IRB) at (860) 486-8802. The IRB is a group of people who review research studies to protect the rights and welfare of research participants.
Appendix C:
Consent forms and debrief

Screener consent form:

Thank you for your interest in the study!

Please review the information sheet below, then click “next” to take the screener questionnaire to see if you qualify.

Information Sheet for Participation in a Research Study

Principal Investigator: Seth Kalichman, PhD
Student Researcher: Stephanie Finninan, MA
Study Title: Screener for daily text message survey on LGBT women’s health behavior

Introduction
You are invited to fill out a brief screening questionnaire to see if you qualify for a research study on women’s health.

Why is this study being done?
If you qualify, we will ask you questions to understand how various social and psychological influences relate to health behaviors.

What are the study procedures? What will I be asked to do?
Filling out the screener should take 1-2 minutes of your time. We will ask you demographics and questions about diet, alcohol, exercise, and when you last went to the doctor. Once you complete the screener, a message will pop up showing if you qualify for the study or not.

If you qualify for our study, we will ask you to continue with an online survey. This survey should take approximately 15-20 minutes. Next, you will receive instructions for completing a brief daily survey via text message. These surveys should take no more than 1-2 minutes per day, for two weeks. If eligible, the entire time for this study should be between 1 – 1 ½ hours over a span of two weeks. Some research requires that the full purpose of the study not be explained. Since this is an ongoing study, we will not disclose our screening criteria in the near future. If you would like more information
about our screening criteria, please email the student researcher, Stephanie Finneran, at Stephanie.finneran@uconn.edu.

**What are the risks or inconveniences of the study?**
Some of the questions are of a sensitive nature, including your gender, sexual orientation, and health behaviors. You do not have to answer any questions that make you uncomfortable, and you may discontinue at any time. Additionally, you can find more information on LGBT mental health resources here: https://www.nami.org/Find-Support/LGBTQ.

If you do not qualify for the study, we will not use your data. If you do qualify for the study, we will take every precaution to protect your privacy and confidentiality.

**What are the benefits of the study?**
There are no direct benefits from this study. However, the results will help us better understand LGBT women's health issues.

**Will I receive payment for participation? Are there costs to participate?**
There are no costs and you will not be paid for the screening. If you qualify for our study and would like to participate, you will receive up to $25 in Amazon credit for participating.

**How will my personal information be protected?**
The platform used to collect your data is very secure. All servers are behind firewalls and all security software is up to date. These programs are actively monitored to ensure there are no breaches to the network at any time.

Only the researchers involved in this study will have access to the answers you provide. There will be no links in our datasets with any of your identifiable information.

We will do our best to protect the confidentiality of the information we gather from you but we cannot guarantee 100% confidentiality. Your confidentiality will be maintained to the degree permitted by the technology used. Specifically, no guarantees can be made regarding the interception of data sent via the Internet by any third parties.

You should also know that the UConn Institutional Review Board (IRB) and Research Compliance Services may inspect study records as part of its auditing program, but these reviews will only focus on the researchers and not on your responses or involvement. The IRB is a group of people who review research studies to protect the rights and welfare of research participants.

**Can I stop being in the study and what are my rights?**
You do not have to be in this study if you do not want to. If you agree to be in the study, but later change your mind, you may drop out at any time. There are no penalties or consequences of any kind if you decide that you do not want to participate.

If you attempt to take this screener questionnaire more than once, you will not be eligible to participate in the study under any circumstances.

**Whom do I contact if I have questions about the study?**
Take as long as you like before you make a decision. We will be happy to answer any question you have about this study. If you have further questions about this study or if you have a research-related problem, you may contact the student researcher, Stephanie Finneran, at Stephanie.finneran@uconn.edu or at (845) 419-8449. If you have any questions concerning your rights as a research participant, you may contact the University of Connecticut Institutional Review Board (IRB) at 860-486-8020.
Additional consent form for those who qualify:

You have qualified to participate in our study! Click "next" below to continue to the full online survey. This should take 15-20 minutes. When you're finished, the last part of the study will be daily text messages!

Please read the information sheet below for the next part of the study:

Information Sheet for Participation in a Research Study

Principal Investigator: Seth Kalichman, PhD
Student Researcher: Stephanie Finneran, MA
Study Title: Daily text message survey on LGBT women's health behavior

Introduction
You will be asked to first fill out an online survey, and then you will receive a brief survey via text message once a day for the next two weeks.

Why is this study being done?
We are interested in understanding the relationship between social relationships and women's health behaviors. We will ask you a variety of social and psychological questions to see how it relates to health.

What are the study procedures? What will I be asked to do?
If you agree to participate, this survey should not take more than 1.1 ½ hours of your time over the course of two weeks.

The first part of the study is an online survey that should take 15-20 minutes. It involves questions about coping with stress, stressful experiences and relationships -- including social support, coming out, and experiences with rejection and discrimination.

At the end of this survey, you will receive instructions for completing a daily survey via text message, as well as how you will receive your Amazon voucher code. These text surveys should take no more than 1-2 minutes per day for two weeks. Questions include your current stress level, your social environment, and health behaviors. At the end of the two weeks, you will receive a text message with an additional Amazon voucher code (please see payment information below).

Some research requires that the full purpose of the study not be explained before you participate. We will give you a full explanation at the end of the study.

(continued on next page)
We will give you a full explanation at the end of the study.

**What are the risks or inconveniences of the study?**
Some of the questions are of a sensitive nature, including your social relationships, stress, and health behaviors. You do not have to answer any questions that make you uncomfortable, and you may discontinue at any time. Additionally, you can find more information on LGBT mental health resources here: https://www.nami.org/Find-Support/LGBTQ

Another risk is that of a breach of privacy or confidentiality. We will take every safety and security precaution to minimize this risk.

**What are the benefits of the study?**
There are no direct benefits from this study. However, the results will help us better understand LGBT women's health issues.

**Will I receive payment for participation? Are there costs to participate?**
You can earn a total of $25 for this study. In total, you will receive:

Code you will receive with first text message: $5
Second Amazon voucher: $0-20
*based on number of completed text surveys
Total amount: $0-25

Shortly after you complete the online survey (within 24 hours), you will receive a text message with a $5 Amazon voucher code.

Next, at the end of the two-week period of the once-a-day text survey, you will receive another Amazon voucher. This will be based on the total number of text message surveys you complete. Each day will add $1 to your total. You will also receive a $6 bonus if you complete more than 10 of the daily surveys. In other words, if you complete all 14 days, you will receive $1/day = $14, plus a $6 bonus for doing at least 10 days = $20.

The standard rate that you pay for text message rates will apply.

**How will my personal information be protected?**
The platform used to collect your data is very secure. All servers are behind firewalls and all security software is up to date. These programs are actively monitored to ensure there are no breaches to the network at any time.

Only the researchers involved in this study will have access to the answers you provide. There will be no links in our datasets with any of your identifiable information.

(continued on next page)
The standard rate that you pay for text message rates will apply.

**How will my personal information be protected?**
The platform used to collect your data is very secure. All servers are behind firewalls and all security software is up to date. These programs are actively monitored to ensure there are no breaches to the network at any time.

Only the researchers involved in this study will have access to the answers you provide. There will be no links in our datasets with any of your identifiable information.

We will do our best to protect the confidentiality of the information we gather from you but we cannot guarantee 100% confidentiality. Your confidentiality will be maintained to the degree permitted by the technology used. Specifically, no guarantees can be made regarding the interception of data sent via the Internet by any third parties.

You should also know that the UConn Institutional Review Board (IRB) and Research Compliance Services may inspect study records as part of its auditing program, but these reviews will only focus on the researchers and not on your responses or involvement. The IRB is a group of people who review research studies to protect the rights and welfare of research participants.

**Can I stop being in the study and what are my rights?**
You do not have to be in this study if you do not want to. If you agree to be in the study, but later change your mind, you may drop out at any time. There are no penalties or consequences of any kind if you decide that you do not want to participate. If you have already enrolled and have completed any surveys, you will still receive payment based on the same criteria we have laid out (for example, if you complete two daily text messages, you would receive $7 in total Amazon voucher codes).

**Whom do I contact if I have questions about the study?**
Take as long as you like before you make a decision. We will be happy to answer any question you have about this study. If you have further questions about this study or if you have a research-related problem, you may contact the student researcher, Stephanie Finneran, at Stephanie.finneran@uconn.edu. If you have any questions concerning your rights as a research participant, you may contact the University of Connecticut Institutional Review Board (IRB) at 860-486-8602.
Debriefing statement:

Thank you so much for completing our study!!

If you have any questions or comments about the study, please do not hesitate to reach out to me at Stephanie.finneran@uconn.edu or at (845) 419-8449.

To tell you a bit more about the study, we were interested in the unique mental health challenges due to the stress of being a sexual minority. Specifically, we were looking at these effects on social anxiety and alcohol use, which disproportionately affect sexual minorities. If you would like to find mental health resources, or to learn more about minority stress and mental health, please visit the following website: https://www.nami.org/Find-Support/LGBTQ

Just as a reminder, the amount on your second Amazon gift code will be up to $20 depending on the number of surveys you completed ($1 per daily survey, plus a $6 bonus if you did at least 10 surveys, so that's 14 x $1 + $6 = $20). Please contact me if you lose your Amazon code.
Appendix D:
Survey items

Screener survey questionnaire:
If you were given a referral code by someone who invited you to participate in this survey, please record that code here: ______________________________________________________________

What is your age, in years? __________

What is your gender?

- Man, not transgender
- Woman, not transgender
- Man of transgender experience (Trans man, Transsexual man, FtM)
- Woman of transgender experience (Trans woman, Transsexual woman, MtF)
- Genderqueer
- Gender identity not listed: ________________________________________________

How do you identify your sexual orientation?

- Lesbian or gay
- Bisexual
- Heterosexual
- Asexual
- Sexual orientation not listed: _____________________________________________
How frequently do you exercise?

- Never
- Sometimes
- Quite a bit/most days
- Always/Every day

How often do you eat fast food?

- Never
- Sometimes
- Quite a bit/most days
- Always/every day

How often do you eat fruits and vegetables?

- Never
- Sometimes
- Quite a bit/most days
- Always/every day

How often have you had alcohol in the last 2 weeks?

- Not at all
- Sometimes
- Quite a bit/most days
- Always/every day
On a typical day when you are drinking, how many drinks do you have? (1 drink = a beer, a glass of wine, or a mixed drink/shot of liquor): _____________________________________________________

How frequently do you visit a primary care doctor?

- [ ] Less than once every three years
- [ ] Less than once a year
- [ ] About once a year
- [ ] More than once a year
Additional T1 Survey for those who qualified:

What is your relationship status? Select all that apply

☐ Single

☐ Dating, casual

☐ Dating, long term

☐ Domestic (living together) partnership

☐ Married or Civil Union

☐ Polyamorous

☐ Relationship status(es) not listed (e.g., open)

What is the gender of your partner(s)? Check all that apply

☐ Male

☐ Female

☐ Transgender male

☐ Transgender female

☐ Genderqueer
What is the highest level of education you have completed?

- Some high school or less
- High school diploma
- Some college
- Undergraduate college degree (e.g., AA, BS, BA)
- Some postgraduate work
- Postgraduate degree (e.g., MA, MS, PhD, MD)

In what environment do you currently reside?

- Urban
- Suburban
- Rural

How would you best characterize your social class?

- Upper class
- Upper-middle class
- Middle Class
- Working Class
- Living in Poverty
What is your race/ethnicity?

- African/African American/Black
- American Indian/Native American
- Arab American/Middle Eastern
- Asian/Asian American
- Caucasian/European American/White
- Hispanic/Latina/o American
- Pacific Islander/Pacific Islander American
- Biracial/Multiracial
- Race/ethnicity not listed

What is your annual household income?

- 0-20,000
- 20,001-40,000
- 40,001-60,000
- 60,001-80,000
- 80,001-100,000
- 100,000-150,000
- 150,000 and above

What is your current weight (in pounds)?
Display This Question:
If How do you identify your sexual orientation? = Bisexual

For each of the following scenarios, *how likely* do you think these are to happen? If your sexual orientation is *not known*, how much would you *expect the following* to occur if your sexual orientation were known?

Being *rejected or left out* because you are bisexual:

<table>
<thead>
<tr>
<th></th>
<th>Very Unlikely</th>
<th>Somewhat Unlikely</th>
<th>Maybe</th>
<th>Somewhat Likely</th>
<th>Very Likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. By your straight friends</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2. By your LGBT friends</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>3. By your family members</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4. By your co-workers, fellow students, or colleagues</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
Being *treated unfairly* because you are bisexual:

<table>
<thead>
<tr>
<th></th>
<th>Very Unlikely</th>
<th>Somewhat Unlikely</th>
<th>Maybe</th>
<th>Somewhat Likely</th>
<th>Very Likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. By your family</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>6. By your straight friends</td>
<td></td>
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<tr>
<td>7. By your LGBT friends</td>
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<tr>
<td>8. By your teacher, boss,</td>
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<tr>
<td>supervisor, or professor</td>
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<tr>
<td>9. By your coworkers, fellow</td>
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<tr>
<td>students, or colleagues</td>
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<td></td>
</tr>
<tr>
<td>10. By people in service jobs</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(by store clerks, waiters,</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bartenders, waitresses, bank</td>
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<td></td>
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<tr>
<td>tellers, mechanics, and others)</td>
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<tr>
<td>11. By people in helping jobs</td>
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<tr>
<td>(doctors, nurses, psychiatrists,</td>
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<tr>
<td>caseworkers, dentists, school</td>
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<td>counselors, therapists,</td>
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<tr>
<td>pediatricians, school</td>
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<td>principals, gynecologists,</td>
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<td></td>
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<tr>
<td>and others)</td>
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</tbody>
</table>
Display This Question:

If How do you identify your sexual orientation? = Bisexual

*How likely* do you think each of these scenarios would be to occur because you are bisexual? If your sexual orientation is not known, how much would you *expect the following* to occur if your sexual orientation were known?

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Very Unlikely</th>
<th>Somewhat Unlikely</th>
<th>Maybe</th>
<th>Somewhat Likely</th>
<th>Very Likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. Getting denied a job, assignment, promotion, or other such thing at work that you deserved</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>13. Being verbally insulted, made fun of, gossiped about, harassed or picked on</td>
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<tr>
<td>14. Being pushed, shoved, hit, or threatened with harm</td>
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<tr>
<td>15. People not wanting to date you</td>
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<tr>
<td>16. Your family being hurt and/or embarrassed</td>
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</tr>
</tbody>
</table>
Next, for each scenario please indicate *how frequently* the following events *have occurred* to you in the last year.

**Being rejected or left out** because you are bisexual:

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Once in a While</th>
<th>Sometimes</th>
<th>A lot</th>
<th>Almost all of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. By your straight friends</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. By your LGBT friends</td>
<td></td>
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<tr>
<td>3. By your family members</td>
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<td></td>
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<tr>
<td>4. By your co-workers, fellow students, or colleagues</td>
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</tbody>
</table>

**Being treated unfairly** because you are bisexual:

<table>
<thead>
<tr>
<th></th>
<th>Never (1)</th>
<th>Once in a While (2)</th>
<th>Sometimes (3)</th>
<th>A lot (4)</th>
<th>Almost all of the time (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. By your straight friends</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. By your LGBT friends</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. By your family members</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
8. By your teacher, boss, supervisor, or professor

9. By your co-workers, fellow students, or colleagues

10. By people in service jobs (by store clerks, waiters, bartenders, waitresses, bank tellers, mechanics, and others)

11. By people in helping jobs (by doctors, nurses, psychiatrists, caseworkers, dentists, school counselors, therapists, pediatricians, school principals, gynecologists, and others)
Please indicate how frequently the following events have occurred to you in the last year because you are bisexual:

<table>
<thead>
<tr>
<th>Event</th>
<th>Never</th>
<th>Once in a While</th>
<th>Sometimes</th>
<th>A lot</th>
<th>Almost all of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. Getting denied a job, assignment, promotion, or other such thing at work that you deserved</td>
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<td>15. People not wanting to date you</td>
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</tr>
<tr>
<td>16. Your family being hurt and/or embarrassed</td>
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<td></td>
</tr>
</tbody>
</table>

117
Display This Question:
If How do you identify your sexual orientation? = Lesbian or gay

For each of the following scenarios, how likely do you think these are to happen? If your sexual orientation is not known, how much would you expect the following to occur if your sexual orientation were known?

Being rejected or left out because you are lesbian/gay:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Very Unlikely</th>
<th>Somewhat Unlikely</th>
<th>Maybe</th>
<th>Somewhat Likely</th>
<th>Very Likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. By your straight friends</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>2. By your LGBT friends</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>3. By your family members</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>4. By your co-workers, fellow students, or colleagues</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
Being treated unfairly because you are lesbian/gay:

<table>
<thead>
<tr>
<th></th>
<th>Very Unlikely</th>
<th>Somewhat Unlikely</th>
<th>Maybe</th>
<th>Somewhat Likely</th>
<th>Very Likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. By your straight friends</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. By your LGBT friends</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. By your family members</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>8. By your teacher, boss, supervisor, or professor</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>9. By your co-workers, fellow students, or colleagues</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. By people in service jobs (by store clerks, waiters, bartenders, waitresses, bank tellers, mechanics, and others)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. By people in helping jobs (by doctors, nurses, psychiatrists, caseworkers, dentists, school counselors, therapists, pediatricians, school principals, gynecologists, and others)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
How likely do you think each of these scenarios would be to occur because you are lesbian/gay? If your sexual orientation is not known, how much would you expect the following to occur if your sexual orientation were known?

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Very Unlikely</th>
<th>Somewhat Unlikely</th>
<th>Maybe</th>
<th>Somewhat Likely</th>
<th>Very Likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. Getting denied a job, assignment, promotion, or other such thing at work that you deserved</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Being verbally insulted, made fun of, gossiped about, harassed or picked on</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Being pushed, shoved, hit, or threatened with harm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. People not wanting to date you</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Your family being hurt and/or embarrassed</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Next, for each scenario please indicate **how frequently** the following events **have occurred** to you in the last year.

**Being rejected or left out** because you are lesbian/gay:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Never</th>
<th>Once in a While</th>
<th>Sometimes</th>
<th>A lot</th>
<th>Almost all of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. By your straight friends</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. By your LGBT friends</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. By your family members</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. By your co-workers, fellow students, or colleagues</td>
<td></td>
<td></td>
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</tbody>
</table>

**Being treated unfairly** because you are lesbian/gay:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Never</th>
<th>Once in a While</th>
<th>Sometimes</th>
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<td></td>
<td></td>
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<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>
10. By people in service jobs (by store clerks, waiters, bartenders, waitresses, bank tellers, mechanics, and others)

11. By people in helping jobs (by doctors, nurses, psychiatrists, caseworkers, dentists, school counselors, therapists, pediatricians, school principals, gynecologists, and others)
Please indicate **how frequently** the following events **have occurred** to you in the last year because you are lesbian/gay:

<table>
<thead>
<tr>
<th>Event</th>
<th>Never</th>
<th>Once in a While</th>
<th>Sometimes</th>
<th>A lot</th>
<th>Almost all of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. Getting denied a job, assignment, promotion, or other such thing at work that you deserved</td>
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<td>13. Being verbally insulted, made fun of, gossiped about, harassed or picked on</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Use the following rating scale to indicate how open you are about being bisexual to the people listed below. Try to respond to all of the items, but leave items blank if they do not apply to you. If an item refers to a group of people (e.g., work peers), then indicate how out you generally are to that group.

<table>
<thead>
<tr>
<th></th>
<th>Definitely does not know</th>
<th>Might know, but rarely talked about</th>
<th>Definitely knows, but rarely talked about</th>
<th>Definitely knows, and openly talked about</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Immediate family</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Extended family</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. New straight friends</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Old straight friends</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. New LGBTQ friends</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Old LGBTQ friends</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Coworkers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Healthcare providers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Display This Question:

*If How do you identify your sexual orientation? = Lesbian or gay*

Use the following rating scale to indicate how open you are about being lesbian/gay to the people listed below. Try to respond to all of the items, but leave items blank if they do not apply to you. If an item refers to a group of people (e.g., work peers), then indicate how out you generally are to that group.

<table>
<thead>
<tr>
<th></th>
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<th>Definitely knows, and openly talked about</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Immediate family</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2. Extended family</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>3. New straight friends</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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<td>☐</td>
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</tr>
<tr>
<td>5. New LGBTQ friends</td>
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<td>☐</td>
<td>☐</td>
<td>☐</td>
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<td>6. Old LGBTQ friends</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>7. Coworkers</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>8. Healthcare providers</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
In the last two weeks, please indicate which of the following substances you’ve taken

☐ Anti-anxiety medication (such as klonopin, Xanax)

☐ Anti-depression medication (such as Prozac, Wellbutrin, etc.)

☐ Stimulant medication (such as Ritalin, Adderall, Vyvanse, etc.)

☐ Lithium

☐ Cannabis

☐ Other ____________________________________________________________

You have reached the end of our online survey! The final part of the study will be a brief daily text message survey for 2 weeks. Your first text message will have a $5 Amazon code. At the end of two weeks, you will receive another Amazon code up to $20 (the amount will be based on how many text surveys you fill out -- it's $1 per survey plus a $6 bonus if you complete 10 days or more, so 14 x $1 + $6 = $20).

__________________________________________________________________________________________

* Please enter your phone number below to participate in brief daily text message survey.

__________________________________________________________________________________________

__________________________________________________________________________________________

Please select your preferred time of day to receive the daily text messages.

☐ 8am EST (5am PST)

☐ 12pm EST (9am PST)

☐ 5pm EST (2pm PST)
You will receive text messages from (860) 772-0448. Each survey will vary between 7 and 10 questions. Please make sure to complete all questions in a survey.

Please hit "next" at the bottom to submit your answers, and you're done with the online survey!

One last thing. We'd love your help spreading the word about the study. If you tell your friends about our study you can win a $50 Amazon code! Each time someone uses your referral code below, you will be entered to win a $50 Amazon raffle!

**Here is your unique 4-digit referral code:** $\{e://Field/refcode\}$

Just share your referral code and this survey link: http://bit.ly/LGBTwomen

Thanks!!
Daily text message surveys

First text message on Day 1:
Welcome to the UConn study! Your $5 Amazon code is _____ . You’ll receive your 1st survey tomorrow, & another Amazon code at end of 2 weeks. Thanks!

On the next day and for 14 days:
Hello, this is the UConn research time! Please think about how you felt yesterday and answer the following questions. Press "1" to continue.
I was worried or anxious I’d say or do the wrong thing during a social situation
1=Not at all
2=A little
3=Moderately
4=A lot
5=I prefer not to answer"

I was scared to be in a social situation
1=Not at all
2=A little
3=Moderately
4=A lot
5=I prefer not to answer"

I got nervous or jittery thinking about or during a social situation.
1=Not at all
2=A little
3=Moderately
4=A lot
5=I prefer not to answer"

I was worried or anxious about what someone was thinking of me in a social situation.
1=Not at all
2=A little
3=Moderately
4=A lot
5=I prefer not to answer”

I felt uncomfortable and embarrassed when thinking about or in a social situation
1=Not at all
2=A little
3=Moderately
4=A lot
5=I prefer not to answer”

How many alcohol drinks did you have yesterday (1 drink = a beer, a glass of wine, or a mixed drink/shot of liquor)? Enter "a" if you prefer not to answer

What time did you start drinking ( __:___AM/PM)? Enter "a" if you prefer not to answer

What time did you stop drinking ( __:___AM/PM)? Enter "a" if you prefer not to answer

Where did you drink alcohol yesterday? Enter all that apply (Example ""3,5"")
1=alone
2=bar/club/party/celebration
3=with close friend/few friends
4=date/with romantic partner
5=before going somewhere/"pregaming"
6=prefer not to answer"

Thank you for taking the survey! Please delete your responses from your phone to protect your privacy and confidentiality.

At the end of 14 days:
Thanks for being part of our study! Your 2nd Amazon code is ___. Please click here for more study info/feedback: http://bit.ly/2xHNUSG
Example of unconditional model for social anxiety (SA; ID=nested within persons):

USEVARIABLES ARE
   ID SA;
   MISSING = ALL(9999);
   BETWEEN IS ;
   WITHIN IS ;
   CLUSTER IS ID;

analysis:
   type = twolevel random;
   estimator = ml;

MODEL:
   %WITHIN%
   SA;
   %BETWEEN%
   SA;

Looking at social anxiety (SA) predicting drinking (SQ0= eBAC with 0s included) with a random intercept and fixed slope:

USEVARIABLES ARE
   ID SA SQ0;
   MISSING = ALL(9999);
   BETWEEN IS ;
   WITHIN IS ;
   CLUSTER IS ID;

ANALYSIS:
   TYPE = TWOLEVEL;
   estimator = ml;
MODEL:

%WITHIN%
SQ0 ON SA;

%BETWEEN%
SQ0 ON SA;

Running the MSEM in Figure 1 w/ eBAC (with 0s included) as the main outcome (SO=sexual orientation; SA=social anxiety; SQ0=eBAC; AS=anticipated stigma; class=social class; g=gender; rel=relationship status; f=frequency of drinking in past 2 weeks):

USEVARIABLES ARE
day ID SO SA SQ0 AS class g rel fa ;
MISSING = ALL(9999);
BETWEEN IS SO AS class g rel fa ;
WITHIN IS Day; !SA SQMM0;
CLUSTER IS ID;
ANALYSIS: TYPE IS MISSING;
TYPE IS TWOLEVEL;
estimator = ml;
MODEL:

%WITHIN%
SQ0 SA;
SQ0 SA on Day;
SQ0 ON SA;

%BETWEEN%
class g rel fa sa SQ0 AS;
SA on class g;
sq0 on rel fa;
SQ0 ON SO (cdash);
SQ0 ON AS (b1);
SQ0 ON SA (b2);
AS ON SO (a1);
SA ON SO (a2);
SA ON AS (d1);
MODEL INDIRECT:
SQ0 IND SO;
SA IND SO;
SA IND SO;

Running the MSEM in Figure 1 w/ binge (yes/no) as the main outcome:
categorical = binge;

USEVARIABLES ARE
day ID SO SA binge AS class g rel fa ;
MISSING = ALL(9999);
BETWEEN IS SO AS class g rel fa ;

WITHIN IS Day;
CLUSTER IS ID;

ANALYSIS: TYPE IS MISSING;
TYPE IS TWOLEVEL;
estimator = WLSM;
MODEL:

%WITHIN%
SA;
Binge SA on Day;
Binge ON SA;

%BETWEEN%
class g rel fa sa Binge AS;
SA on class g;
Binge on rel fa;
Binge ON SO (cdash);
Binge ON AS (b1);
Binge ON SA (b2);
AS ON SO (a1);
SA ON SO (a2);
SA ON AS (d1);
IAS WITH OI;
MODEL CONSTRAINT:
NEW(a1b1 a2b2 a1d1b2 totalind total);
a1b1 = a1*b1;
a2b2 = a2*b2;
a1d1b2 = a1*d1*b2;
TOTALIND = a1*b1 + a2*b2 + a1*d1*b2;
TOTAL = a1*b1 + a2*b2 + a1*d1*b2 + cdash;

Running the MSEM in Figure 2 (SO=sexual orientation; SA=social anxiety; ES=enacted stigma; AS=anticipated stigma; OI=outness inventory):

USEVARIABLES ARE
ID SO SA ES AS DAY OI;
MISSING = ALL(9999);
BETWEEN IS SO ES AS OI;
WITHIN IS Day;
CLUSTER IS ID;
ANALYSIS: TYPE IS MISSING;
TYPE IS TWOLEVEL;
estimator = ml;
MODEL:
%WITHIN%
SA ON DAY;
%BETWEEN%
sa ES OI SO;
OI ON SO;
AS ON SO;
ES ON SO;
SA ON ES;
SA ON AS;
SA ON OI;
SA ON SO;
MODEL INDIRECT:
SA IND SO;