Is Neighborhood Safety Associated with Depression Symptoms, Anxiety Symptoms, and Psychological Distress among Gay, Bisexual, and Other Men Who Have Sex with Men?

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Journal:	*Journal of Gay & Lesbian Mental Health*
Manuscript ID	WGLM-2017-0038.R1
Manuscript Type:	Original Research
Keywords:	bisexual < Sexual Identity, gay < Sexual Identity, depression < Mental Illness

Suggested Running Head: Neighborhood Safety and Mental Health in MSM

Abstract

The purpose of this study was to examine associations between perceived neighborhood safety and mental health burdens among gay, bisexual, and other men who have sex with men (MSM) in Paris, France. Participants were recruited through a geosocial networking application (*n*=580) and completed a web-based cross-sectional survey. Modified Poisson models were used to estimate risk ratios and 95% confidence intervals for the associations between perceived neighborhood safety and the following: 1) depression symptoms, 2) anxiety symptoms, and 3) psychological distress. Perceived lack of neighborhood safety was associated with depression symptoms, anxiety symptoms, and psychological distress in our sample of MSM.

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Introduction

Neighborhood contexts can influence health outcomes and behaviors (Duncan & Kawachi, 2018). For instance, recent studies have connected perceived neighborhood safety and violence with mental health burdens (Cromley, Wilson-Genderson, & Pruchno, 2012; Goldman-Mellor, Margerison-Zilko, Allen, & Cerda, 2016; Hale et al., 2013; Kim, 2008; Wilson-Genderson & Pruchno, 2013; Won, Lee, Forjuoh, & Ory, 2016). One such study, examining the association between perceived neighborhood safety and depressive symptoms in a sample of older adults (*n*=5688) from New Jersey, found that people who felt their neighborhood was unsafe had higher levels of depressive symptoms (Wilson-Genderson & Pruchno, 2013). Another study that surveyed adolescents (*n*=4616) in California, examining perceptions of neighborhood safety and psychological distress, found that people residing in neighborhoods felt to be unsafe were more likely to indicate severe levels of anxiety and depression, and this perception was more significant than objective measures of local violence or safety for these associations (Goldman-Mellor et al., 2016).

The majority of this work on neighborhood safety and health outcomes has focused on the United States. For instance, in a recent review by Won and colleagues examining neighborhood safety and general health outcomes for older adults, every study connecting neighborhood safety with mental health outcomes concentrated on Americans, and this substantial lack of non-US evidence tying mental health to neighborhood safety applies to populations of all ages (Won et al., 2016). In addition, little research has examined associations between neighborhood safety, depression symptoms, anxiety symptoms, and psychological distress among a sample of gay, bisexual and other men who have sex with men (MSM) (Cerda et al., 2017), despite the high prevalence of mental health burdens in this population (Plöderl & Tremblay, 2015). Furthermore, the mechanisms connecting neighborhood safety to mental health conditions in general have not been fully elucidated.

As previously mentioned, MSM experience a high prevalence of mental health burdens. While estimates of the prevalence of anxiety and depression in MSM vary globally, research has consistently shown elevated rates of both burdens among MSM across geographic contexts (Burns, Ryan, Garofalo, Newcomb, & Mustanski, 2015; Cochran, Sullivan, & Mays, 2003; King et al., 2008; Reisner et al., 2009; Sivasubramanian et al., 2011; Stoloff et al., 2013). In Western Europe, MSM have been found to exhibit a greater risk of depression, anxiety and psychological

distress, and in general, demonstrate poorer mental health than their heterosexual counterparts (King et al., 2003; Lhomond, Saurel-Cubizolles, & Michaels, 2014; Sandfort, Bakker, Schellevis, & Vanwesenbeeck, 2006; Sandfort, de Graaf, Bijl, & Schnabel, 2001). In a representative sample of adults in the Netherlands (n = 7,076), for example, MSM were nearly three times more likely to meet diagnostic criteria for mood and anxiety burdens compared to their heterosexual counterparts (Sandfort et al., 2001). In France, one study examining a multidimensional measure of sexual orientation and its associations with psychoactive substance use and depression determined the 12 month prevalence of depression in MSM to be 33.3% (Lhomond et al., 2014).

Importantly, mental health burdens can influence other health outcomes. Among MSM, anxiety and depression have been associated with elevated likelihood of engaging in risky sexual behaviors, such as condomless anal intercourse, which place MSM at risk for HIV and other sexually transmitted infections (Li, Li, Wang, & Lau, 2015; Reisner et al., 2009). Since MSM continue to face substantial risk of contracting HIV, there is a particularly strong need to understand the factors that might contribute to this health burden (Beyrer et al., 2012). Neighborhood safety may be particularly important for this population, as sexual minority individuals may face homophobic victimization that would make them feel especially unsafe in their neighborhood of residence, leading to sexual risk-taking and risky behavior as a means of coping (Martin, Pryce, & Leeper, 2005; Otis, 2007).

The objective of this study was to examine associations between perceived neighborhood safety, depression symptoms, anxiety symptoms, and psychological distress among a sample of MSM in the Paris, France metropolitan area. Prior research has articulated the significant prevalence of mental health symptoms in MSM in France (Lhomond et al., 2014), which warrants concentrating on this country. This choice in geographic location is also dependent on the relevant social context, particularly as it pertains to sexual minority populations. While discrimination protections and hate crime legislation do exist on the basis of sexual identity, this does not eliminate the dangerous realities of living as MSM in France. In terms of sexual minority hate-motivated incidents of violence in France, 15% of lesbian, gay, bisexual and transgender (LGBT) individuals faced hate-motivated harassment, and 48% of violent incidents included an attack as opposed to only threats of physical or sexual violence, which is a higher rate than any other European country and surely informs the extent to which sexual minority populations can consider their neighborhood to be safe (European Union Agency for

Fundamental Rights, 2013). Furthermore, recent work has explicitly recommended prioritizing research on neighborhood safety for sexual minority populations (Lunn et al., 2017).

It was hypothesized that MSM who perceive their neighborhoods as unsafe would be more likely to exhibit depression symptoms, anxiety symptoms, and higher levels of psychological distress. This builds on previous literature connecting neighborhood safety and mental health outcomes while recognizing the particular dangers that exist for sexual minority populations in terms of safety. The minority stress theory argues that in a heterosexist society, sexual minority individuals occupy disadvantaged positions and are subjected to discrimination and prejudice in various forms, leading to exposure to higher levels of stress, fewer coping resources, and worse mental health (Meyer, 1995). This cumulative stress resulting from stigma and discriminatory experiences, such as the ever-present threat of violence and lack of safety due to one's status as a sexual minority, sustains the disparities between sexual minority individuals and their peers. Recent work has suggested that updated, novel research on the subject is needed to capture the dynamics of minority stress in the present moment, and to reflect a changing, more accepting society, with a focus on international populations who may still face prejudice (Meyer, 2016). Thus, this study on the experience of perceived neighborhood safety, which is tied to stigma, discrimination, and violence in Parisian MSM, helps to address this pressing theoretical concern.

In addition, the role of stress as a mediator in the associations of perceived neighborhood safety with these mental health outcomes was assessed. Stress was hypothesized to mediate the association between perceived neighborhood safety and mental health burdens based on past theoretical and empirical research (Cutrona, Wallace, & Wesner, 2006; Furr-Holden, Milam, Young, Macpherson, & Lejuez, 2011; Galea, Ahern, Rudenstine, Wallace, & Vlahov, 2005). This mediation follows the reasoning of the minority stress theory, as well as the psychological mediation framework, which both address the pathway that connects stressful experiences of stigma as a sexual minority and adverse mental health outcomes (Hatzenbuehler, 2009). According to the psychological mediation framework, stigma leads to increased stress in sexual minorities, which leads to elevations in emotional dysregulation and psychological risk factors associated with mental health outcomes such as depression and anxiety (Hatzenbuehler, 2009; Schwartz, Stratton, & Hart, 2016). This explains how the mediation structure may connect the experiences of stigma tied to neighborhood factors and the outcomes of depression symptoms, anxiety symptoms, and psychological distress.

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Methods

Sample Recruitment

In this investigation, researchers implemented a 52-item survey that was accessible via a broadcast advertisement on a popular geosocial networking application (app) for MSM in Paris, France. The survey was composed in English and translated to French using the translate, review, adjudicate, pretest, document (TRAPD) model (Harkness, Van de Vijver, & Mohler, 2003). Three native French speakers carried out individual forward translations of the English version of the survey, and these translations were then compared and integrated into a single version by a fourth native French speaker. Finally, a fifth French speaker carried out a back translation of the survey to test it for accuracy.

Researchers sought to use the most popular app for MSM in Paris at the time of the study to host the advertisement to the survey. Researchers determined which application was most appropriate by using AppAnnie (appannie.com), a website that allows users to search for the most frequently downloaded apps at a particular location over a specified period of time. The most frequently downloaded app for MSM in Paris at the time of the study was selected to host the advertisement to the survey.

The study utilized a broadcast advertisement shown for three consecutive 24-hour periods in October 2016. In English, the ad read, “Looking to improve your health, and the health of those in your community? Share your thoughts with us on gay and bisexual men's health and have a chance to win € 65! Click more to get started!” Users encountered the ad upon logging into the application for the first time in a 24-hour period, and those who chose to participate were redirected to a website that included the survey. Informed consent was attained following full explanation of the study procedure, prior to participants accessing the survey. Measures were taken to avoid duplicate responses, such as using the “Prevent Ballot Box Stuffing” feature on Qualtrics.

Of the 5,206 users that clicked on the advertisement and reached the landing page of the survey, 580 went on to complete the survey, representing a response rate of 11.1%. The survey was presented in both English and French; 94.3% of respondents took the survey in French. The survey took 11.4 minutes (SD=4.0) to complete on average. All protocols were approved by

the New York University School of Medicine Institutional Review Board prior to data collection. All respondents reported being at least 18 years old at the time of survey administration.

Perceived Neighborhood Safety

Researchers assessed a global perception of neighborhood safety with the following two questions: “In general, how safe do you feel walking alone in your neighborhood during the day?” (henceforth referred to as daytime neighborhood safety) and “In general, how safe do you feel walking alone in your neighborhood at night?” (henceforth referred to as nighttime neighborhood safety) (Bennett, 2007). Response options for both questions were: “Very safe”, “Somewhat safe”, “Somewhat unsafe”, and “Very unsafe”. For analytical purposes, “Somewhat unsafe” and “Very unsafe” were combined due to the small number of responses in those categories, and the researchers created two alternative explanatory variables. Researchers first created a dichotomous exposure variable: Safe (“Very safe” and “Somewhat safe”) vs. unsafe (“Somewhat unsafe” and “Very unsafe”), and then created an additional trichotomous variable: Very safe, Somewhat safe and Unsafe (“Somewhat unsafe” and “Very unsafe”). These analytical methods of answer consolidation and the trichotomous and dichotomous examination of perceived neighborhood safety have been utilized in prior research (Bennett, 2007; Duncan et al., 2017).

Depression Symptoms, Anxiety Symptoms, and Psychological Distress

The 4-item Patient Health Questionnaire (PHQ-4) was used to measure depression symptoms, anxiety symptoms, and psychological distress (Kroenke, Spitzer, Williams, & Lowe, 2009). The PHQ-4 consists of two subscales: the Patient Health Questionnaire-2 (PHQ-2) for depression and Generalized Anxiety Disorder Scale (GAD-2) for anxiety. Participants were asked the following question: “Over the last two weeks, how often have you been bothered by the following problems?” The problems for anxiety were: “Feeling nervous, anxious, or on edge” and “Not being able to stop or control worrying”. The problems for depression were: “Feeling down, depressed, or hopeless” and “Little interest or pleasure in doing things”. Response options for all were: “Not at all”; “Several days”; “More than half the days”; and “Nearly every day”, which are rated on a 4-point scale from 0 to 3 (PHQ-4 scores range from 0 to 12 with a range of 0-6 for each of the two subscales). The PHQ-2 and GAD-2 scores were each dichotomized using cut off scores of ≥3 for the depression and anxiety sections (Kroenke et al., 2009; Kroenke, Spitzer, Williams, & Löwe, 2010).

Psychological distress was measured using PHQ-4 total score (Cronbach's alpha=0.87) with scores as follows: None 0-2; Mild 3-5; Moderate 6-8; Severe 9-12 (Kroenke et al., 2009; Löwe et al., 2010). Similarly, the psychological distress score was dichotomized: none or mild (score 0-5) and moderate or severe (6-12). This dichotomous approach to psychological distress follows the score guidelines for the PHQ-2 and GAD-2 combined and allows for analysis patterned after the analysis of each subscale as dichotomous. Other research has examined psychological distress, measured by the PHQ-4, dichotomously, including a study where this distress moderated the association between sexual partner concurrency intentions and behavior among adults (McGarrity et al., 2017). While psychological distress can be conceptualized as a general sense of psychological discomfort with multiple components, and researchers may be hesitant to operationalize it using a combined measure of depression and anxiety symptoms, this composite scale "serves as a general marker of psychological distress" based on psychometric analysis by the creators of the scale, and so distress falls within the methodological purview of this measure incorporating both anxious and depressive symptoms (Kroenke et al., 2009). This scale has been used in this manner elsewhere (Beutel et al., 2016; Häuser et al., 2013; Mills et al., 2015; Pirl et al., 2014).

Stress

Stress was measured with a single item (Elo, Leppänen, & Jahkola, 2003). After reading the statement "Stress means a situation in which a person feels tense, restless, nervous or anxious or is unable to sleep at night because his/her mind is troubled all the time" Participants responded to the question "Do you feel this kind of stress?" Response options: "Never (0)" "Rarely (1)", "Sometimes (2)", "Often (3)", and "Always (4)". Even though this is a single item, there is evidence to justify its use in this context. This is a close adaptation of an item that has undergone thorough examination of its validity, particularly as it converged with longer, more elaborate measures of stress and exhibited theoretically grounded associations with various health outcomes, to the point where researchers explicitly recommended the substitution of longer survey measures of stress with this item (Elo et al., 2003).

Socio-Demographic Covariates

Participants were asked to report their age (in years), and age was categorized into five groups: 18-24, 25-29, 30-39, 40-49, 50 years and older. Participants also reported whether or not they were born in France (yes, no), their sexual orientation (gay, bisexual, straight, other),

employment status (employed, unemployed, student, retired), and current relationship status (single, relationship with a man, relationship with a woman).

Statistical Analyses

Participants' characteristics and perceived (daytime and nighttime) neighborhood safety were analyzed descriptively. Modified Poisson regression model (i.e. Poisson regression with a robust error variance) was conducted to assess the association between perceived neighborhood safety and depression symptoms, anxiety symptoms and psychological distress. Risk ratios (RRs) and 95% confidence intervals (CI) are presented. For the adjusted model, socio-demographic variables were included as covariates. Tests for trends were calculated by using univariate and multivariate logistic regression models with the trichotomous neighborhood safety variable. Next, mediation analyses were conducted. Mediation analysis was performed to assess whether the relationship between perceived neighborhood safety and mental health conditions was mediated by stress using the approach of Valeri & VanderWeele. The Stata command –paramed- was used based on the SAS and SPSS macros by Valeri & VanderWeele which allows calculating indirect effects and bootstrapped bias-corrected 95% confidence intervals (1000 bootstrap replications were performed) (Emsley & Liu, 2013; Valeri & VanderWeele, 2013) The controlled direct effect (CDE), natural indirect effect (NIE), and total effect (TE) were estimated. All statistical analyses were performed using Stata 14 (Stata Corp, College Station, TX).

Results

Sample characteristics

Table 1 presents socio-demographic characteristics and perceived neighborhood safety by mental health burdens. The mean age of participants was 35.2 (SD=9.9). The majority (84%) of participants identified their sexual orientation as gay, and 11.9% of participants identified as bisexual. Most of the participants (77.6%) were born in France. Approximately 67% of participants were employed. Over half of participants reported feeling very safe in daytime, and 36.2% reported feeling very safe at night. Few (4.3%) respondents reported feeling somewhat unsafe or very unsafe during the daytime, and 11.7% of participants reported feeling somewhat unsafe and very unsafe in their neighborhood at night. About 20% of participants exhibited depression symptoms, and a similar percentage exhibited anxiety symptoms. According to the

PHQ-4 scores, 21.8% of participants had moderate to severe psychological distress (PHQ≥6), and 75.0% of participants had no psychological distress or mild psychological distress (PHQ<6).

Association between perceived neighborhood safety, depression and anxiety symptoms, and psychological distress

Table 2 presents the unadjusted and adjusted associations between perceived neighborhood safety and depression symptoms, anxiety symptoms, and psychological distress among MSM. After adjusting for sociodemographic variables, a significant relationship was found between perceptions of feeling unsafe (vs. safe) during the daytime in the neighborhood and symptoms of depression, as well as reporting higher levels of psychological distress (aRR = 1.93; 95% CI = 1.13, 3.29, aRR = 1.75; 95% CI = 1.01, 3.03, respectively). When researchers trichotomized perceived neighborhood safety (divided into three levels: safe, somewhat safe, unsafe), perception of feeling unsafe during daytime was significantly associated with depression symptoms (aRR = 2.10; 95% CI = 1.21, 3.67), anxiety symptoms (aRR = 1.91; 95% CI = 1.10, 3.33), and elevated levels of psychological distress (aRR = 2.20; 95% CI = 1.23, 3.93).

A perception of feeling unsafe (vs. safe) at night in the neighborhood was associated with depression symptoms (aRR = 1.72; 95% CI = 1.20, 2.46), anxiety symptoms (aRR = 1.67; 95% CI = 1.17, 2.37), and psychological distress (aRR = 1.98; 95% CI = 1.40, 2.80). The results were similar when looking at perceived neighborhood safety as a trichotomous variable, with higher risk ratios. Moreover, trend tests identified a dose-response relationship between neighborhood safety and all the mental health outcomes (p for trend <0.05) in the unadjusted and adjusted models.

Mediation by stress

As expected, mediation analyses revealed that there were statistically significant mediating effects for stress in the association between perceived neighborhood safety (both daytime and nighttime) and all mental health burdens (Table 3). For example, natural indirect effect of perceived daytime and nighttime neighborhood safety on psychological distress through stress were found to be significant in the mediation analysis (Estimate=1.26; bootstrapped bias corrected 95% CI=1.09, 1.45, Estimate; 1.33; bootstrapped bias corrected 95% CI=1.13, 1.57, respectively)

Discussion

This is the first study to examine perceived neighborhood safety, depression and anxiety symptoms, and psychological distress in a sample of MSM outside of the United States. Similar to past research conducted among other populations (Kim, 2008; Wilson-Genderson & Pruchno, 2013; Won et al., 2016), this study provides evidence that associations between perceptions of neighborhood safety and these mental health outcomes exist among MSM in the Paris, France metropolitan area. Among the sample, those living in a neighborhood perceived as being unsafe during the night were more likely to exhibit symptoms of depression and anxiety symptoms and report high levels of psychological distress. Living in a neighborhood perceived as unsafe during the daytime was associated with exhibiting symptoms of depression and reporting elevated levels of psychological distress. Also noteworthy is the high prevalence of each of mental health outcome in this sample. Over 20% of the sample demonstrated significant symptoms for each condition.

Stress mediated the relationship between perceived neighborhood safety and every mental health outcome examined, for both daytime and nighttime perceived neighborhood safety. Thus, this connection between perceived neighborhood safety and mental health outcomes may reflect the impact of minority stress, wherein social discrimination and hostility related to identifying as gay, bisexual, or queer, or engaging in same-sex behaviors creates a stressful social environment that harms overall health, including mental health (Hatzenbuehler & Pachankis, 2016; Meyer, 2003). As discussed earlier, harassment and violence are real dangers for MSM, not only in France, but globally. Thus, neighborhood safety is inherently tied to the risk of discrimination and confrontation that happen even in a nation like France with strong legal protections for sexual minority populations. This ongoing experience of potential danger lingers as a stressful factor in the life of MSM and may thereby contribute to depressive and anxious symptoms in this population.

Future Research

While the measure used to screen for depression and anxiety symptoms, the Patient Health Questionnaire-4 (PHQ-4), has been validated among large Western samples, it is a very brief measure (Löwe et al., 2010). Using more thorough screening tools, such as the full Patient Health Questionnaire (PHQ-9) or the Center for Epidemiologic Studies Depression Scale Revised (CESD-R) for depression and the Generalized Anxiety Disorder 7-item scale (GAD-7) for anxiety, will allow for greater specificity in assessing these burdens, limiting any inflation of

the prevalence of depression or anxiety symptoms (Nease & Maloin, 2003; Plummer, Manea, Trepel, & McMillan, 2016; Whooley, Avins, Miranda, & Browner, 1997). Additionally, these more elaborate scales can help examine the nuances of anxiety and depression by expanding outside of the broad components assessed by the PHQ-4, as would the Beck Depression Inventory II assessment. This 21-item inventory assesses a wide array of feelings, behaviors, and cognitions related to depression, such as crying, loss of interest, and suicidal thoughts or wishes (Beck, Steer, & Brown, 1996). This inventory also demonstrates strong reliability, sensitivity, and specificity in diverse samples, and is readily available in French, making it ideal for Parisian MSM (Wang & Gorenstein, 2013). This inventory and the GAD-7, which has been assessed for use in samples of general European populations (Hinz et al., 2017; Sousa et al., 2015) and populations of French Speakers (Bindt et al., 2012; Micoulaud-Franchi et al., 2016), would be strong candidates for further work on the mental health of MSM in France, and perhaps other European nations.

Further research should examine the mediation between perceived neighborhood safety and mental health outcomes with a more nuanced assessment of stress. Future studies could use more comprehensive measures of stress, such as the Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983). There are a wide array of biological measures of stress that allow for direct quantification of stress levels in individuals; these methods are increasingly being used in sociological research (Burton, Bonanno, & Hatzenbuehler, 2014; Cook, Juster, Calebs, Heinze, & Miller, 2017). Many of these methods are non-invasive and thus limit any additional stress that could skew results, including salivary diurnal cortisol, salivary alpha amylase (sAA), and C-reactive protein (CRP) (Hapuarachchi, Chalmers, Winefield, & Blake-Mortimer, 2003; Rohleder, Nater, Wolf, Ehlert, & Kirschbaum, 2004). Among the most commonly used non-invasive bioindicators is salivary diurnal cortisol, which has been used previously in a small number of studies including MSM and other sexual minority populations (Austin et al., 2016; Burton et al., 2014; Cook et al., 2017). Future research could assess resilience and coping strategies in the face of stressful situations to further understand the pathways between perceived neighborhood safety and adverse health outcomes. Additionally, future research can assess nuanced forms of stress relevant to the minority stress model and psychological mediation framework, such as stress due to perceived sexual stigma, victimization, and micro-aggression experience in order to further articulate the specific mechanisms in operation. Lastly, future studies can employ objective measures of neighborhood safety, such as data from newspapers on homophobia and victimization or

geocoded crime data from local police departments. For studies that do intend to examine perceptions of safety, qualitative assessment of which factors influence perceptions of neighborhood safety would benefit both further research and interventions.

Study Limitations

This study is not without limitations. First, the cross-sectional nature of this study means that causal links cannot be identified with certainty, and the direction of these associations is still uncertain. For example, it may be that those who report symptoms of psychological distress perceive their neighborhood as less safe, but it may also be the case that neighborhood safety directly impacts mental wellbeing for MSM. Still, this study puts forth associations worth investigating further in order to articulate the specific mechanisms involved. Objective measures of neighborhood safety, as discussed previously, would help to reduce this limitation moving forward. Second, the assessment of mental health here relied on a brief screening tool, potentially leading to misclassification of the presence or absence of symptoms of depression and anxiety. Without the use of comprehensive diagnostic tools or formal diagnoses by trained clinicians, the association between perceived neighborhood safety and poor mental health cannot be extended to formal diagnoses of anxiety and depression.

It is likely that these findings are subject to same-source bias, as the exposure, mediator, and outcomes were all measured via self-report (Diez Roux, 2007). Future research should also include a broader range of potential covariates. Given the brevity of the survey, the range of measured covariates was limited. Therefore, residual confounding is possible. This study only examined the residential neighborhood, even though emerging research on spatial polygamy suggests that MSM experience and interact with multiple neighborhoods in any given day (Duncan, Kapadia, & Halkitis, 2014). Using advanced methods, such as global positioning system (GPS) technology, to define neighborhoods of MSM, and comparing these with objective measures of neighborhood safety may provide a clearer understanding of the connections between variables (Duncan et al., 2016). In addition, these findings may not be generalizable to MSM outside of urban settings in Western Europe. Future research should measure these associations in larger samples of MSM in diverse geographic settings, both in and outside of Western Europe. The participants also came from the same source, a popular geo-social networking application, and so these results may differ for MSM who do not use these applications.

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Conclusions

Among this sample of MSM in Paris, perceived neighborhood safety was associated with mental health burdens, as people who perceived their neighborhood as unsafe were more likely to exhibit significant depression and anxiety symptoms, and to report high levels of psychological distress. Additionally, these associations were mediated by stress. These findings not only follow the structure of minority stress, but provide further evidence of the continued need to improve safety for international populations of sexual minorities.

These findings can shape the practices of clinicians, therapists, policy makers, researchers, and any number of professionals involved in addressing mental health issues among MSM. For clinicians and therapists, these associations may inform the diagnosis and treatment of depression, anxiety, and psychological distress. By recognizing the ways in which feeling unsafe in one's neighborhood may contribute to these outcomes, or the ways in which these perceptions of feeling unsafe may be part of the experience of these mental health issues for MSM, clinicians and therapists can contextualize and improve their diagnosis and treatment, better understanding a person's experience. For policy makers, interventions and approaches towards improving neighborhood safety, such as better lighting in these neighborhoods, may improve mental health conditions, or at least improve the lives of MSM facing them. These interventions may even come from local organizations, equipped to meet the unique needs and wants of their own local community. Researchers can engage in qualitative work to better understand what would make MSM feel safer in their neighborhoods, and further quantitative work can assess these connections between neighborhood safety and mental health more thoroughly.

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Table 1. Sample characteristics and perceived neighborhood safety by mental health.

	Total, n(%)	Depression Symptoms, n=121 (20.9%)		Anxiety Symptoms, n=141 (24.3%)		Psychological Distress[a], n=126 (21.7%)	
		n	%	n	%	n	%
Age							
18-24	84 (14.5)	24	28.5	20	23.8	21	25.0
25-29	103 (17.8)	26	25.2	30	29.1	31	30.1
30-39	180 (31.0)	42	23.3	40	22.2	39	21.7
40-49	139 (24.0)	22	15.8	40	28.8	26	18.7
≥ 50	54 (9.3)	6	11.1	9	16.7	8	14.8
Sexual orientation							
Gay	487 (84.0)	106	21.8	122	25.1	107	22.0
Bisexual	69 (11.9)	12	17.4	17	24.6	16	23.2
Born in France							
Yes	450 (77.6)	94	20.9	113	25.1	99	22.0
No	113 (19.5)	27	23.9	28	24.8	27	23.9
Employment status							
Employed	388 (66.9)	63	16.2	89	22.9	75	19.3
Unemployed	84 (14.5)	32	38.1	26	31.0	24	28.6
Student	81 (14.0)	23	28.4	22	27.2	23	28.4
Relationship status							
Single	378 (65.2)	89	23.5	87	23.0	85	22.5
Relationship with a man	172 (29.7)	29	16.9	50	29.1	36	20.9
Stress							
Never	42 (7.2)	3	7.1	3	7.1	2	4.8
Rarely	133 (22.9)	12	9.0	3	2.3	7	5.3
Sometimes	217 (37.4)	31	14.3	30	13.8	28	12.9
Often	140 (24.1)	51	36.4	71	50.7	60	42.9
Always	34 (5.9)	24	70.6	34	100.0	29	85.3
Perceived daytime neighborhood safety							
Very safe	320 (55.2)	60	18.8	63	19.7	56	17.5
Somewhat safe	220 (37.9)	50	22.7	68	30.9	60	27.3
Somewhat unsafe	18 (3.1)	7	38.9	6	33.3	6	33.3
Very unsafe	7 (1.2)	4	57.1	4	57.1	4	57.1
Perceived nighttime neighborhood safety							
Very safe	210 (36.2)	32	15.2	38	18.1	33	15.7

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Somewhat safe	286 (49.3)	64	22.4	76	26.6	66	23.1
Somewhat unsafe	53 (9.1)	17	32.1	20	37.7	19	35.9
Very unsafe	15 (2.6)	8	53.3	7	46.7	8	53.3

[a]Cut-off points: PHQ-4≥6

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Table 2. Modified Poisson regression analyses of the association between perceived neighborhood safety (daytime and night) and mental health

	Depression Symptoms		Anxiety Symptoms		Psychological distress	
	Unadjusted	Adjusted[a]	Unadjusted	Adjusted[a]	Unadjusted	Adjusted[a]
	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)	RR (95% CI)
Daytime						
Model 1.						
Safe	Ref	Ref	Ref	Ref	Ref	Ref
Unsafe	2.14 (1.34, 3.44)**	1.93 (1.13, 3.29)*	1.64 (0.99, 2.72)	1.53 (0.91, 2.58)	1.84 (1.11, 3.06)*	1.75 (1.01, 3.03)*
Model 2.						
Very safe	Ref	Ref	Ref	Ref	Ref	Ref
Somewhat safe	1.21 (0.86, 1.68)	1.21 (0.87, 1.69)	1.56 (1.16, 2.10)**	1.61 (1.19, 2.18)**	1.55 (1.12, 2.13)**	1.63 (1.17, 2.26)**
Unsafe	2.32 (1.41, 3.82)**	2.10 (1.21, 3.67)**	2.02 (1.19, 3.43)**	1.91 (1.10, 3.33)*	2.26 (1.32, 3.86)**	2.20 (1.23, 3.93)**
Test for trend	*0.014*	*0.023*	*0.001*	*0.001*	*0.001*	*0.001*
Night						
Model 1.						
Safe	Ref	Ref	Ref	Ref	Ref	Ref
Unsafe	1.92 (1.34, 2.74)**	1.72 (1.20, 2.46)**	1.72 (1.23, 2.40)**	1.67 (1.17, 2.37)**	2.00 (1.42, 2.82)**	1.98 (1.40, 2.80)**
Model 2.						
Very safe	Ref	Ref	Ref	Ref	Ref	Ref
Somewhat safe	1.47 (1.00, 2.16)*	1.39 (0.94, 2.06)	1.47 (1.04, 2.07)*	1.53 (1.07, 2.19)*	1.46 (1.00, 2.14)*	1.51 (1.01, 2.27)*
Unsafe	2.44 (1.56, 3.80)**	2.12 (1.35, 3.33)**	2.18 (1.45, 3.29)**	2.18 (1.41, 3.37)**	2.54 (1.66, 3.90)**	2.57 (1.64, 4.05)**
Test for trend	*<0.0001*	*0.002*	*<0.0001*	*<0.0001*	*<0.0001*	*<0.0001*

RR=Risk Ratio

*p<0.05 **p<0.01;

[a]Adjusted for age, sexual orientation, origin (born in France), employment and relationship status

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Table 3. Mediation analysis[a] of stress on anxiety and depression symptoms, psychological distress and neighborhood safety

Independent variable[b]	Mediating variable	Dependent variable	CDE, Estimate (95% CI)	NIE, Estimate (95% CI)	MTE, Estimate (95% CI)
Perceived Neighborhood Safety					
Daytime	Stress	Depression Symptoms	0.85 (0.37, 2.04)	1.17 (1.07, 1.34)	1.27 (0.85, 1.88)
		Anxiety Symptoms	1.58 (0.67, 3.45)	1.31 (1.12, 1.55)	1.61 (1.17, 2.17)
		Psychological Distress	1.08 (0.45, 2.40)	1.26 (1.11, 1.48)	1.54 (1.08, 2.17)
Nighttime					
	Stress	Depression Symptoms	1.24 (0.62, 2.56)	1.21 (1.10, 1.39)	1.47 (1.02, 2.05)
		Anxiety Symptoms	1.59 (0.67, 3.41)	1.36 (1.17, 1.65)	1.66 (1.19, 2.29)
		Psychological Distress	1.79 (0.77, 3.90)	1.33 (1.16, 1.61)	1.78 (1.31, 2.60)

SE=standard error; CDE=Controlled Direct Effect; NIE=Natural Indirect Effect; MTE=Marginal Total Effect

[a]Models adjusted for age, sexual orientation, origin, employment and relationship status.

[b]Used as a trichotomous variable

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Competing interests

The authors have no competing interests to declare.

Ethical Standards

This study and all related documentation were approved by the Institutional Review Board of the [Researcher Institution] to comply with ethical standards for the safety and protection of all participants. These standards are in accordance with the 1964 Declaration of Helsinki and its later amendments.

Acknowledgements

[Researcher Name] is supported by grant 9K24DA040489. This work was supported by [Researcher Name and Institution] Start-Up Research Fund. We thank [Individual's name] for contributions to the editing of an early draft of the manuscript. We thank [Individual's name] for assistance with the finalization of this manuscript. We thank the translators and participants of this study who contributed to the project.

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References

Austin, S. B., Rosario, M., McLaughlin, K. A., Roberts, A. L., Gordon, A. R., Sarda, V., . . . Scherer, E. A. (2016). Sexual orientation and diurnal cortisol patterns in a cohort of US young adults. *Psychoneuroendocrinology, 69*, 197-208.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). Beck depression inventory-II. *San Antonio, 78*(2), 490-498.

Bennett, G. G. (2007). Safe To Walk? Neighborhood Safety and Physical Activity Among Public Housing Residents. *4*(10). doi:10.1371/journal.pmed.0040306

Beutel, M. E., Klein, E. M., Aufenanger, S., Brähler, E., Dreier, M., Müller, K. W., . . . Stark, B. (2016). Procrastination, distress and life satisfaction across the age range–a German representative community study. *PLoS ONE, 11*(2), e0148054.

Beyrer, C., Baral, S. D., van Griensven, F., Goodreau, S. M., Chariyalertsak, S., Wirtz, A. L., & Brookmeyer, R. (2012). Global epidemiology of HIV infection in men who have sex with men. *Lancet, 380*(9839), 367-377. doi:10.1016/s0140-6736(12)60821-6

Bindt, C., Appiah-Poku, J., Te Bonle, M., Schoppen, S., Feldt, T., Barkmann, C., . . . Tagbor, H. (2012). Antepartum depression and anxiety associated with disability in African women: cross-sectional results from the CDS study in Ghana and cote d'Ivoire. *PLoS ONE, 7*(10), e48396.

Burns, M. N., Ryan, D. T., Garofalo, R., Newcomb, M. E., & Mustanski, B. (2015). Mental health disorders in young urban sexual minority men. *J Adolesc Health, 56*(1), 52-58. doi:10.1016/j.jadohealth.2014.07.018

Burton, C. L., Bonanno, G., & Hatzenbuehler, M. (2014). Familial social support predicts a reduced cortisol response to stress in sexual minority young adults. *Psychoneuroendocrinology, 47*, 241-245.

Cerda, M., Nandi, V., Frye, V., Egan, J. E., Rundle, A., Quinn, J. W., . . . Koblin, B. (2017). Neighborhood determinants of mood and anxiety disorders among men who have sex with men in New York City. *Soc Psychiatry Psychiatr Epidemiol*. doi:10.1007/s00127-017-1379-8

Cochran, S. D., Sullivan, J. G., & Mays, V. M. (2003). Prevalence of Mental Disorders, Psychological Distress, and Mental Health Services Use Among Lesbian, Gay, and Bisexual Adults in the United States. *J Consult Clin Psychol, 71*(1), 53-61.

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of health and social behavior*, 385-396.

Cook, S. H., Juster, R.-P., Calebs, B. J., Heinze, J., & Miller, A. L. (2017). Cortisol profiles differ by race/ethnicity among young sexual minority men. *Psychoneuroendocrinology, 75*, 1-4.

Cromley, E. K., Wilson-Genderson, M., & Pruchno, R. A. (2012). Neighborhood characteristics and depressive symptoms of older people: local spatial analyses. *Soc Sci Med, 75*(12), 2307-2316. doi:10.1016/j.socscimed.2012.08.033

Cutrona, C. E., Wallace, G., & Wesner, K. A. (2006). Neighborhood Characteristics and Depression: An Examination of Stress Processes. *Curr Dir Psychol Sci, 15*(4), 188-192. doi:10.1111/j.1467-8721.2006.00433.x

Diez Roux, A. V. (2007). Neighborhoods and health: where are we and were do we go from here? *Rev Epidemiol Sante Publique, 55*(1), 13-21. doi:10.1016/j.respe.2006.12.003

Duncan, D. T., Kapadia, F., & Halkitis, P. N. (2014). Examination of Spatial Polygamy among Young Gay, Bisexual, and Other Men Who Have Sex with Men in New York City: The P18 Cohort Study. *Int J Environ Res Public Health, 11*(9), 8962-8983. doi:10.3390/ijerph110908962

Suggested Running Head: Neighborhood Safety and Mental Health in MSM

Duncan, D. T., Kapadia, F., Regan, S. D., Goedel, W. C., Levy, M. D., Barton, S. C., . . . Halkitis, P. N. (2016). Feasibility and acceptability of global positioning system (GPS) methods to study the spatial contexts of substance use and sexual risk behaviors among young men who have sex with men in New York City: A p18 cohort sub-study. *PloS one, 11*(2), e0147520.

Duncan, D. T., & Kawachi, I. (2018). *Neighborhoods and Health*: Oxford University Press.

Duncan, D. T., Park, S. H., Goedel, W. C., Kreski, N. T., Morganstein, J. G., Hambrick, H. R., . . . Chaix, B. (2017). Perceived neighborhood safety is associated with poor sleep health among gay, bisexual, and other men who have sex with men in Paris, France. *Journal of Urban Health, 94*(3), 399-407.

Elo, A.-L., Leppänen, A., & Jahkola, A. (2003). Validity of a single-item measure of stress symptoms. *Scandinavian Journal of Work, Environment & Health*(6), 444-451. doi:10.5271/sjweh.752

Emsley, R., & Liu, H. (2013). PARAMED: Stata module to perform causal mediation analysis using parametric regression models. *Statistical Software Components*.

European Union Agency for Fundamental Rights. (2013). *European Union lesbian, gay, bisexual and transgender survey. Results at a glance.* (978-92-9239-175-1). Retrieved from http://fra.europa.eu/sites/default/files/eu-lgbt-survey-results-at-a-glance_en.pdf

Furr-Holden, C. D., Milam, A. J., Young, K. C., Macpherson, L., & Lejuez, C. W. (2011). Exposure to Hazardous Neighborhood Environments in Late Childhood and Anxiety. *J Community Psychol, 39*(7), 876-883. doi:10.1002/jcop.20461

Galea, S., Ahern, J., Rudenstine, S., Wallace, Z., & Vlahov, D. (2005). Urban built environment and depression: a multilevel analysis. *J Epidemiol Community Health, 59*(10), 822-827. doi:10.1136/jech.2005.033084

Goldman-Mellor, S., Margerison-Zilko, C., Allen, K., & Cerda, M. (2016). Perceived and Objectively-Measured Neighborhood Violence and Adolescent Psychological Distress. *J Urban Health, 93*(5), 758-769. doi:10.1007/s11524-016-0079-0

Hale, L., Hill, T. D., Friedman, E., Nieto, F. J., Galvao, L. W., Engelman, C. D., . . . Peppard, P. E. (2013). Perceived neighborhood quality, sleep quality, and health status: evidence from the Survey of the Health of Wisconsin. *Soc Sci Med, 79*, 16-22. doi:10.1016/j.socscimed.2012.07.021

Hapuarachchi, J. R., Chalmers, A. H., Winefield, A. H., & Blake-Mortimer, J. S. (2003). Changes in clinically relevant metabolites with psychological stress parameters. *Behavioral Medicine, 29*(2), 52-59.

Harkness, J. A., Van de Vijver, F. J., & Mohler, P. P. (2003). *Cross-cultural survey methods* (Vol. 325): Wiley-Interscience Hoboken.

Hatzenbuehler, M. L. (2009). How does sexual minority stigma “get under the skin”? A psychological mediation framework. *Psychological bulletin, 135*(5), 707.

Hatzenbuehler, M. L., & Pachankis, J. E. (2016). Stigma and Minority Stress as Social Determinants of Health Among Lesbian, Gay, Bisexual, and Transgender Youth: Research Evidence and Clinical Implications. *Pediatric Clinics of North America, 63*(6), 985-997.

Häuser, W., Galek, A., Erbslöh-Möller, B., Köllner, V., Kühn-Becker, H., Langhorst, J., . . . Schmutzer, G. (2013). Posttraumatic stress disorder in fibromyalgia syndrome: prevalence, temporal relationship between posttraumatic stress and fibromyalgia symptoms, and impact on clinical outcome. *PAIN®, 154*(8), 1216-1223.

Hinz, A., Klein, A. M., Brähler, E., Glaesmer, H., Luck, T., Riedel-Heller, S. G., . . . Hilbert, A. (2017). Psychometric evaluation of the Generalized Anxiety Disorder

Screener GAD-7, based on a large German general population sample. *Journal of affective disorders, 210*, 338-344.

Kim, D. (2008). Blues from the neighborhood? Neighborhood characteristics and depression. *Epidemiol Rev, 30*, 101-117. doi:10.1093/epirev/mxn009

King, M., McKeown, E., Warner, J., Ramsay, A., Johnson, K., Cort, C., . . . Davidson, O. (2003). Mental health and quality of life of gay men and lesbians in England and Wales: controlled, cross-sectional study. *Br J Psychiatry, 183*, 552-558.

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

Kroenke, K., Spitzer, R. L., Williams, J. B., & Lowe, B. (2009). An ultra-brief screening scale for anxiety and depression: the PHQ-4. *Psychosomatics, 50*(6), 613-621. doi:10.1176/appi.psy.50.6.613

Kroenke, K., Spitzer, R. L., Williams, J. B., & Löwe, B. (2010). The patient health questionnaire somatic, anxiety, and depressive symptom scales: a systematic review. *General hospital psychiatry, 32*(4), 345-359.

Lhomond, B., Saurel-Cubizolles, M. J., & Michaels, S. (2014). A multidimensional measure of sexual orientation, use of psychoactive substances, and depression: results of a national survey on sexual behavior in france. *Arch Sex Behav, 43*(3), 607-619. doi:10.1007/s10508-013-0124-y

Li, D., Li, C., Wang, Z., & Lau, J. T. F. (2015). Prevalence and Associated Factors of Unprotected Anal Intercourse with Regular Male Sex Partners among HIV Negative Men Who Have Sex with Men in China: A Cross-Sectional Survey. *PLoS ONE, 10*(3). doi:10.1371/journal.pone.0119977

Löwe, B., Wahl, I., Rose, M., Spitzer, C., Glaesmer, H., Wingenfeld, K., . . . Brähler, E. (2010). A 4-item measure of depression and anxiety: validation and standardization of the Patient Health Questionnaire-4 (PHQ-4) in the general population. *Journal of affective disorders, 122*(1), 86-95.

Lunn, M. R., Cui, W., Zack, M. M., Thompson, W. W., Blank, M. B., & Yehia, B. R. (2017). Sociodemographic characteristics and health outcomes among lesbian, gay, and bisexual US adults using Healthy People 2020 leading health indicators. *LGBT Health, 4*(4), 283-294.

Martin, J. I., Pryce, J. G., & Leeper, J. D. (2005). Avoidance coping and HIV risk behavior among gay men. *Health & Social Work, 30*(3), 193-201.

McGarrity, L. A., Senn, T. E., Walsh, J. L., Scott-Sheldon, L. A., Carey, K. B., & Carey, M. P. (2017). Psychological Distress Moderates the Intention–Behavior Association for Sexual Partner Concurrency Among Adults. *AIDS and behavior, 21*(6), 1567-1571.

Meyer, I. H. (1995). Minority stress and mental health in gay men. *Journal of health and social behavior*, 38-56.

Meyer, I. H. (2003). Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: conceptual issues and research evidence. *Psychological bulletin, 129*(5), 674.

Meyer, I. H. (2016). Does an improved social environment for sexual and gender minorities have implications for a new minority stress research agenda? *Psychology of sexualities review, 7*(1), 81.

Micoulaud-Franchi, J.-A., Lagarde, S., Barkate, G., Dufournet, B., Besancon, C., Trébuchon-Da Fonseca, A., . . . McGonigal, A. (2016). Rapid detection of generalized anxiety disorder and major depression in epilepsy: validation of the

Suggested Running Head: Neighborhood Safety and Mental Health in MSM

GAD-7 as a complementary tool to the NDDI-E in a French sample. *Epilepsy & Behavior, 57*, 211-216.

Mills, S. D., Fox, R. S., Pan, T. M., Malcarne, V. L., Roesch, S. C., & Sadler, G. R. (2015). Psychometric Evaluation of the Patient Health Questionnaire–4 in Hispanic Americans. *Hispanic journal of behavioral sciences, 37*(4), 560-571.

Nease, D. E., Jr., & Maloin, J. M. (2003). Depression screening: a practical strategy. *J Fam Pract, 52*(2), 118-124.

Otis, M. D. (2007). Perceptions of victimization risk and fear of crime among lesbians and gay men. *J Interpers Violence, 22*(2), 198-217. doi:10.1177/0886260506295346

Pirl, W. F., Fann, J. R., Greer, J. A., Braun, I., Deshields, T., Fulcher, C., . . . Lazenby, M. (2014). Recommendations for the implementation of distress screening programs in cancer centers: report from the American Psychosocial Oncology Society (APOS), Association of Oncology Social Work (AOSW), and Oncology Nursing Society (ONS) joint task force. *Cancer, 120*(19), 2946-2954.

Plöderl, M., & Tremblay, P. (2015). Mental health of sexual minorities. A systematic review. *International Review of Psychiatry, 27*(5), 367-385. doi:10.3109/09540261.2015.1083949

Plummer, F., Manea, L., Trepel, D., & McMillan, D. (2016). Screening for anxiety disorders with the GAD-7 and GAD-2: a systematic review and diagnostic metaanalysis. *Gen Hosp Psychiatry, 39*, 24-31. doi:10.1016/j.genhosppsych.2015.11.005

Reisner, S. L., Mimiaga, M. J., Skeer, M., Bright, D., Cranston, K., Isenberg, D., . . . Mayer, K. H. (2009). Clinically Significant Depressive Symptoms as a Risk Factor for HIV Infection Among Black MSM in Massachusetts. *AIDS Behav, 13*(4), 798-810. doi:10.1007/s10461-009-9571-9

Rohleder, N., Nater, U. M., Wolf, J. M., Ehlert, U., & Kirschbaum, C. (2004). Psychosocial stress-induced activation of salivary alpha-amylase: an indicator of sympathetic activity? *Annals of the New York Academy of Sciences, 1032*(1), 258-263.

Sandfort, T. G., Bakker, F., Schellevis, F. G., & Vanwesenbeeck, I. (2006). Sexual orientation and mental and physical health status: findings from a Dutch population survey. *Am J Public Health, 96*(6), 1119-1125. doi:10.2105/ajph.2004.058891

Sandfort, T. G., de Graaf, R., Bijl, R. V., & Schnabel, P. (2001). Same-sex sexual behavior and psychiatric disorders: findings from the Netherlands Mental Health Survey and Incidence Study (NEMESIS). *Arch Gen Psychiatry, 58*(1), 85-91.

Schwartz, D. R., Stratton, N., & Hart, T. A. (2016). Minority stress and mental and sexual health: Examining the psychological mediation framework among gay and bisexual men. *Psychology of Sexual Orientation and Gender Diversity, 3*(3), 313.

Sivasubramanian, M., Mimiaga, M. J., Mayer, K. H., Anand, V. R., Johnson, C. V., Prabhugate, P., & Safren, S. A. (2011). Suicidality, clinical depression, and anxiety disorders are highly prevalent in men who have sex with men in Mumbai, India: findings from a community-recruited sample. *Psychol Health Med, 16*(4), 450-462. doi:10.1080/13548506.2011.554645

Sousa, T. V., Viveiros, V., Chai, M. V., Vicente, F. L., Jesus, G., Carnot, M. J., . . . Ferreira, P. L. (2015). Reliability and validity of the Portuguese version of the Generalized Anxiety Disorder (GAD-7) scale. *Health and quality of life outcomes, 13*(1), 50.

Stoloff, K., Joska, J. A., Feast, D., De Swardt, G., Hugo, J., Struthers, H., . . . Rebe, K. (2013). A description of common mental disorders in men who have sex with

Suggested Running Head: Neighborhood Safety and Mental Health in MSM

men (MSM) referred for assessment and intervention at an MSM clinic in Cape Town, South Africa. *AIDS Behav, 17 Suppl 1*, S77-81. doi:10.1007/s10461-013-0430-3

Valeri, L., & VanderWeele, T. J. (2013). Mediation analysis allowing for exposure–mediator interactions and causal interpretation: Theoretical assumptions and implementation with SAS and SPSS macros. *Psychological methods, 18*(2), 137.

Wang, Y. P., & Gorenstein, C. (2013). Psychometric properties of the Beck Depression Inventory-II: a comprehensive review. *Rev Bras Psiquiatr, 35*(4), 416-431. doi:10.1590/1516-4446-2012-1048

Whooley, M. A., Avins, A. L., Miranda, J., & Browner, W. S. (1997). Case-finding instruments for depression. Two questions are as good as many. *J Gen Intern Med, 12*(7), 439-445.

Wilson-Genderson, M., & Pruchno, R. (2013). Effects of neighborhood violence and perceptions of neighborhood safety on depressive symptoms of older adults. *Soc Sci Med, 85*, 43-49. doi:10.1016/j.socscimed.2013.02.028

Won, J., Lee, C., Forjuoh, S. N., & Ory, M. G. (2016). Neighborhood safety factors associated with older adults' health-related outcomes: A systematic literature review. *Soc Sci Med, 165*, 177-186. doi:10.1016/j.socscimed.2016.07.024