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Neighborhood determinants of mood and anxiety disorders among men who have sex with men in New York City

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Abstract

Conflict of interest

The authors declare that they have no conflict of interest.

Ethical standards

The New York Blood Center Institutional Review Board first approved this study and provided on-going oversight. Subsequently, institutional review boards at co-investigator institutions also reviewed the study. All participants provided informed consent prior to their inclusion in the study.

Purpose—We examined the relationship between economic, physical, and social characteristics of neighborhoods where men who have sex with men (MSM) lived and socialized, and symptom scores of depression and generalized anxiety disorder (GAD).

Methods—Participants came from a cross-sectional study of a population-based sample of New York City MSM recruited in 2010–2012 (n=1126). Archival and survey-based data were obtained on neighborhoods where the men lived and where they socialized most often.

Results—MSM who socialized in neighborhoods with more economic deprivation and greater general neighborhood attachment experienced higher GAD symptoms. The relationship between general attachment to neighborhoods where MSM socialized and mental health depended on the level of gay community attachment: in neighborhoods characterized by greater gay community attachment, general neighborhood attachment was negatively associated with GAD symptoms, while in low gay community attachment neighborhoods, general neighborhood attachment had a positive association with GAD symptoms.

Conclusions—This study illustrates the downsides of having deep ties to social neighborhoods when they occur in the absence of broader access to ties with the community of one's sexual identity. Interventions that help MSM cross the spatial boundaries of their social neighborhoods and promote integration of MSM into the broader gay community may contribute to the reduction of elevated rates of depression and anxiety in this population.

Keywords

depression; anxiety; neighborhood environment; men who have sex with men; New York City

INTRODUCTION

Mental health problems are more prevalent among sexual minorities such as men who have sex with men (MSM) than among heterosexuals [1]. The lifetime prevalence of depression and anxiety disorders is at least 1.5 times higher among lesbians, gays, and bisexuals than among heterosexuals [2]. Identifying the drivers of mental illness in this vulnerable population is a public health priority.

The neighborhood environment can play an important role in the mental health of MSM [3]. Minority stress theory hypothesizes that stigma, prejudice, and discrimination associated with sexual minority status can create a hostile and stressful social environment that creates mental health problems such as depression and anxiety [1]. Consistent with this hypothesis, living in neighborhoods with characteristics that increase the risk for homophobia may increase exposure to homophobic attitudes and risk of victimization, which will in turn affect mental health [4]. A small study of 90 same-sex couples found that those who perceived their neighborhood as less gay-friendly experienced more depressive symptoms at the time of transition to parenthood [5]. Further, a study of school-based sexual minority youth in Boston found that sexual minority youth living in neighborhoods with higher rates of LGBT assault hate crimes were more likely to report suicidal ideation and suicide attempts [6]. A national study of sexual minority young adults found that moving to a less politically conservative neighborhood was associated with fewer depressive symptoms [7]. To our knowledge, the few studies, such as these, that examine the impact that neighborhood

characteristics have on mental health among sexual minorities have not specifically focused on MSM.

At a broader level, multiple studies have found that neighborhood characteristics are associated with mental health in the general population [8,3,9]. Neighborhood characteristics such as economic deprivation; physical dilapidation of the built environment; social disorder such as graffiti, vandalism and public intoxication; and crime can generate stress that triggers or worsens symptoms of depression and anxiety [8,10]. Further, such stressors can interfere with the formation of connections between people, increasing the risk for depression [11]. At the same time, neighborhoods can provide the social resources to cope with stressors and to manage negative affect, including opportunities for neighborhood involvement and participation, and a sense of attachment to the local community [12,13].

The impact that such neighborhood conditions have on MSM is poorly understood. In particular, it is unclear whether the benefits of neighborhood social resources depend on the degree to which MSM are socially integrated into the local context. In a context of homophobia and social isolation from a broader gay community, neighborhoods with a high degree of resident involvement and cohesion may produce a more apparent sense of social isolation among MSM, thus increasing the risk of mental illness [14]. Alternatively, a highly cohesive community may buffer the negative effects of homophobia that may occur in the areas where MSM live and socialize.

Information on neighborhood conditions and mental health has focused on the role of residential neighborhoods. Hence, we have little information on the influence that other important contexts, including social and workplace environments, have on mental health. This is a particularly important concern for MSM, who often live and socialize in very different types of neighborhoods [15]. In prior work, we found that only one in five MSM sampled from New York City reported living and socializing in the same neighborhoods [15].

In an effort to fill gaps in our understanding of neighborhood influences on mental health among MSM, we investigate the role that the neighborhood level of economic deprivation, disorder (i.e., physical decay and perceived social disorder), safety (i.e., perceived safety and homicide rate), and neighborhood and community engagement and experiences (i.e., neighborhood involvement and participation, general neighborhood attachment, gay community attachment, homophobia), play in shaping symptoms of depression and generalized anxiety disorder (GAD) among a population-based sample of urban MSM. We examine the influence of two types of neighborhood contexts: the residential neighborhood and the neighborhood where study participants socialize most frequently (i.e., the “social” neighborhood). We also examine whether the relationship between neighborhood social resources (i.e., neighborhood involvement and participation and general neighborhood attachment) and depression and anxiety varied by the level of gay community attachment and homophobia in the neighborhood.

MATERIALS AND METHODS

NYCM2M is a cross-sectional study designed to investigate the influence that urban neighborhood characteristics have on sexual risk behaviors, substance use, and mental health among MSM in New York City (NYC). Men were recruited in 2010–2012 using a modified venue-based sampling strategy: recruitment occurred through face-to-face outreach and mobile apps, to obtain a sample from a diverse range of NYC neighborhoods. Study inclusion criteria were: biologically male at birth; at least 18 years of age; current residence in a NYC borough; anal sex with a man in the past 3 months' ability to speak in English and/or Spanish; and willingness to provide informed consent. The study sample included 1,493 men; of these, 1,126 men responded to the mental health questions introduced in August 2011. Details of the NYC M2M study are provided elsewhere [16].

Eligible study participants recruited through street or mobile intercepts were interviewed in one of two NYC locations. At the interview, participants responded to the Neighborhood Location Questionnaire, which asked them to identify, using a pin drop in the Google Earth desktop application, their home neighborhood, the neighborhood where they socialized most often, and the neighborhoods where they last and most frequently had sex[16]). Neighborhood locations were geocoded and neighborhood measures were created through geoprocessing using ArcGIS 10.1 [17]. Participants also responded to an ACASI questionnaire and received HIV counseling and testing. They received \$50 and a round trip Metrocard to compensate them for participating in the study. The New York Blood Center Institutional Review Board first approved this study and provided on-going oversight. Subsequently, institutional review boards at co-investigator institutions also reviewed the study.

Measures

Outcomes

Depression: The depressive symptoms score in the past two weeks was derived using the Patient Health Questionnaire (PHQ)-9 (range of 0 to 27) [16]. The PHQ-9 had high sensitivity and specificity in meta-analytic reviews of prior studies [18]. In our study, the instrument was highly reliable ($\alpha=0.86$).

Generalized anxiety disorder: The GAD symptoms score was derived using the 7-item Generalized Anxiety Disorder-7 instrument (range of 0 to 21).[19,20] This scale has shown good reliability and validity in the general population [21] and in our sample ($\alpha=0.85$).

Neighborhood-level characteristics—The 2010 Neighborhood Tabulation Area (NTA) was used as the study definition of neighborhood. The NTAs aggregate multiple 2010 census tracts, have a minimum population of 100,000, and approximate NYC Community Districts. They offer a good compromise between the very detailed data available for census tracts ($n=2,168$ in New York City), and the potential for spatial misclassification that arises with large community districts ($n=59$). In this study, NTAs, with a median of 9 observations (ranging from 5–46 observations in home neighborhoods and 5–204 observations in social neighborhoods) offered a statistically reliable alternative to census tracts, which had a

median of 1 observation per tract (ranging from 1 to 13 observations). To be able to estimate reliable measures of neighborhood features, our study restricted the analytic sample to respondents in the 87 NTAs where more than five participants responded to survey-based measures of neighborhood characteristics.

In the case of measures obtained from city sources or the American Community Survey, we aggregated census tract information to the NTA to create NTA-level measures. In the case of survey measures, individual scores for residents of each NTA were averaged to create a NTA-specific score for this variable. All neighborhood-level variables consist of NTA-level aggregates of administrative data or NTA-level aggregates of individual-level responses to survey data.

Study participants were separately asked about perceived disorder, safety and social characteristics for their home and social neighborhoods.

Neighborhood-level economic conditions—*Economic deprivation* was measured by creating a deprivation index. Z scores for NTA percent poverty, percent vacancy and percent not owner-occupied were summed to create this index.

Neighborhood-level objective and perceived disorder measures

Neighborhood-level physical decay: Measures of objective physical disorder [22,23] were taken from the 2011 NYC Housing and Vacancy Survey (HVS) [24] and the 2010 NYC Department of Sanitation Survey [25]. Variables derived from HVS include: the proportion of houses/buildings with visible broken, rotten or boarded-up windows; and the proportion of houses/buildings in dilapidated/deteriorated conditions. Filthy sidewalks/streets (number of streets or sidewalks assessed as filthy over total number of sidewalks and streets) are based on a scorecard rating generated by the New York City Mayor's Office of Operations to measure the cleanliness of NYC streets and sidewalks. These indicators were separated into quartiles.

Neighborhood-level perceived disorder: Perceived social and physical disorder was measured through the survey, using a 9-item Likert scale [26]. Participants were asked about perceptions of social and physical disorder in their home and social neighborhoods, including graffiti, noise, vandalism, abandoned buildings, cleanliness, care of homes, people hanging out in the streets, public drug and alcohol use. The scale was highly reliable (reliability in the home neighborhood $\alpha=0.89$; social neighborhood $\alpha=0.84$).

Neighborhood-level homicide and perceived safety measures

Homicide: Point data on homicides occurring in 2010 were obtained from the public, NY Times Homicides Map (projects.nytimes.com/crime/homicides/map/). Homicide rates were determined per 100,000 persons using underlying population totals from Census Tract 2008–2012 American Community Survey (ACS) 5-Year Estimate, area-weighted data (variable B01001001) [27–29]. For the purposes of these analyses, homicide rate was separated into quintiles.

Perceived safety: Respondents were asked about perceptions of safety in their home and social neighborhoods, including trouble with neighbors, crime in the neighborhood, and adequacy of police protection [26]. The scale had adequate reliability (home neighborhood $\alpha = 0.72$; social neighborhood $\alpha = 0.68$).

Neighborhood-level social characteristics

Homophobia: Perceived homophobia was based on the proportion of respondents in a neighborhood who endorsed the question: “Have you experienced discrimination, been prevented from doing something, or been hassled or made to feel inferior in your (asked of each home and social) neighborhood because of your sexual orientation?”

Gay community attachment: A 7-item scale was used to measure attachment to the NYC gay community, including feeling part of the gay community, feeling a bond with other men who are gay or bisexual, pride in the NYC gay community, and working with the community to solve problems. While this measure was not specific to neighborhoods, we estimated the mean level of gay community attachment reported by study participants living within each neighborhood. Responses were on a 4-point Likert scale, and the scales had adequate reliability (home neighborhood $\alpha = 0.81$; social neighborhood $\alpha = 0.81$).

General neighborhood attachment: This was a 12-item scale that assessed whether respondents felt that the neighborhood was a part of who they were, that if the neighborhood no longer existed, they would feel they had lost a part of themselves, that the neighborhood reflected their personal values, and that they felt an emotional attachment to the neighborhood [30]. Responses were on a 4-point Likert scale, and the scales had high reliability (home neighborhood $\alpha = 0.96$; social neighborhood $\alpha = 0.97$).

Neighborhood involvement and participation: Respondents were asked about membership in the following types of neighborhood organizations: neighborhood watch program; block group, tenant association, or community group; business or civic group; Lesbian, Gay, Bisexual, Transgender organization/club.

Individual-level Covariates—Our analyses adjusted for the following individual-level socio-demographic characteristics: age; race/ethnicity (Non-Hispanic Black, Hispanic, Non-Hispanic White, Mixed/Other); education (High school/GED or less vs. Some college or more); employment (working full-time, working part-time, not working/not looking/temporarily laid off/retired, working off the books/other); annual personal income (<10,000, 10–40,000; 40–<60,000; 60,000+); and sexual identity (Bisexual, Homosexual/gay, Straight/other).

Neighborhood-level Covariates—We also used 5-year (2008–2012) estimates from the American Community Survey [31] to account for the following neighborhood-level covariates: racial/ethnic composition (i.e., percent Hispanic, percent Black), percent households living in poverty, residential stability (a composite of percent owner-occupied households and percent of the population in the same house one year ago), and percent of male-male partner households.

Statistical Analysis

Analyses were conducted using SAS version 9.4 2012 (SAS Institute Inc., Cary, NC, USA) and the multiple imputation method was used to account for measures with missing data. For each outcome and each neighborhood, five datasets were generated using the single chain, Markov Chain Monte Carlo method. Missing data values were imputed for personal income, current employment status, perceived social disorder, perceived safety, general neighborhood attachment, neighborhood involvement and participation, and gay community attachment. We then estimated regression models for the five imputed datasets and used the standard multiple imputation variance formula to generate the multiply imputed estimates of the regression coefficients and the covariance estimates [32,33].

Participants were classified to home and social neighborhoods based on respondents manually dropping pins in the Google Earth desktop application. The location of pin drop responses were spatially assigned to the census tract they fell within and census tracts were aggregated into the 2010 Neighborhood Tabulation Areas (NTAs).

Generalized estimating equations (GEE) were used to assess relations between characteristics of home and social neighborhoods and depression and GAD symptoms scores. The GEE models had Poisson outcome distributions with a log link function, and NTA as the cluster factor and an exchangeable working correlation structure. Since some of the measures varied within the neighborhoods, the models were fit using both independent and exchangeable working correlation structures. As the results were nearly identical, data from the exchangeable working correlation model are reported.

For each neighborhood characteristic of interest (i.e., neighborhood disorder, level of safety, social processes, and demographic characteristics), we estimated the association between the exposure of interest in the home and the social neighborhoods and the relative frequency of depression and GAD symptoms. Due to the high level of correlation between many neighborhood characteristics (Online Resource 1), separate regression models were estimated for each neighborhood characteristic of interest. Each model also adjusted for age, race, education, sexual identity, employment, racial/ethnic neighborhood composition, percent of residents in poverty, percent of owner-occupied residences, residential mobility, and percent of male-partner households. However, models examining the relationship between economic deprivation and depression or GAD symptoms did not adjust for percent of residents in poverty or percent of owner-occupied residences, since these measures were included in the economic deprivation measure. Given the large number of models estimated, and out of a concern about type I error arising from multiple comparisons, we used the false discovery rate approach in PROC MULTTEST in SAS to adjust p-values [34]. Finally, we estimated the two-way interactions between neighborhood social resources that apply to the general population (i.e., neighborhood involvement and participation and sense of community) that were significantly associated with symptoms of GAD or depression, and the level of gay community attachment and homophobia in the neighborhood. Quasi-likelihood under the Independence Model Criterion (QICu) results were used to determine better fitting models between the continuous and the ordinal version of the exposure measures [35].

RESULTS

The NYCM2M sample of 1493 was configured such that we excluded observations that had missing data for home or social neighborhood, depression and GAD symptoms scores, and observations that had NTAs with fewer than 5 participants. This resulted in a home neighborhood analytical dataset of 920 participants and a social neighborhood analytical dataset of 976 participants. There were 74 home NTAs and 38 social NTAs in the sample, suggesting greater diffusion in where respondents live as compared to where they socialize (see spatial distribution of study participants across home and social neighborhoods in Online Resource 2). Respondents in our final sample were more likely to be White, college-educated, and of higher income than those excluded from the final sample; no difference was found in depressive or GAD symptoms scores.

Table 1 presents the median score and interquartile range of depressive and anxiety symptoms scores, as well as individual and neighborhood characteristics in our final sample of home and social neighborhoods. On average across the two samples, the median depressive and GAD symptoms scores were 1 (interquartile range 0,4) and 1 (IQR=0, 4), respectively. The mean respondent age was 31.8 years old; 25% were Black, 28–29% were Hispanic, and 32–33% were White race/ethnicity; 87–88% self-identified as homosexual/gay; 86–87% had an education beyond high school; 40–42% worked full-time; and 25% reported a personal annual income of less than \$10,000. The median percent Black residents in the home neighborhoods was 24.5%, while it was 9.3% in the social neighborhoods. Home and social neighborhoods had similar rates of poverty: the median rate of poverty was 22.9% in the home neighborhood and 20.6% in the social neighborhood. The level of homophobia was also comparable across home and social neighborhoods: 4.4% of neighborhood residents, on average, had reported homophobia in the last 3 months, and 11–12% in their lifetime. An illustration of the spatial distribution of depressive and GAD symptom scores and of selected neighborhood characteristics (economic deprivation, gay community attachment, and general neighborhood attachment) are presented in Online Resource 2, Figures 2–5.

Table 2 displays associations of neighborhood-level characteristics with depression and anxiety symptoms scores, after adjusting for age, race, education, income, sexual identity, employment, percent Hispanic, percent black, percent poverty, percent owner-occupied, and residential mobility. In the social neighborhood, general neighborhood attachment was positively associated with depression symptom scores (PFR = 2.00; 95% CI = 1.13, 3.54) and GAD symptom scores (PFR = 2.37; 95% CI = 1.24, 4.51). Further, higher levels of deprivation in the social neighborhood were also associated with greater depression (PFR = 1.14; 95% CI = 1.02, 1.28) and GAD symptom scores (PFR = 1.17; 95% CI = 1.05, 1.30). In contrast, greater levels of gay community attachment in the home neighborhood were associated with lower depression symptom scores (PFR = 0.53; 95% CI = 0.29, 0.95). After adjusting for the false discovery rate, only general neighborhood attachment and deprivation in the social neighborhood remained associated with GAD symptom scores; no associations with depression symptom scores remained significant.

The relationship between general attachment to the social neighborhood and GAD symptom scores varied by levels of gay community attachment (p-value for interaction terms between general attachment and gay community attachment: $GAD = 0.01$). Figure 1 displays the relationship between general attachment to the social neighborhood and predicted symptoms scores of GAD, stratified by low gay community attachment (75th percentile) and high gay community attachment (top 25th percentile). In the high gay community attachment neighborhoods, general attachment to the social neighborhood had a negative association (FPR: 0.69; 95% CI: 0.20, 2.41) with GAD symptoms score, while in the low gay community attachment neighborhoods, general neighborhood attachment had a positive association (FPR: 2.34; 95% CI: 1.14, 4.79) with the GAD symptoms score (Figure 1).

CONCLUSION

MSM are disproportionately affected by common mental health problems such as depression and GAD. This study suggests that the level of economic deprivation and attachment to urban neighborhoods where MSM socialize may have an impact on the mental health of MSM. Study participants who socialized in neighborhoods with higher levels of economic deprivation, experienced higher GAD symptom scores. The impact of high levels of attachment to neighborhoods where MSM socialized on mental health depended on the level of gay community attachment in the neighborhood: the protective effect of general neighborhood attachment on GAD scores was restricted to study participants who socialized in neighborhoods where respondents reported high levels of gay community attachment. The same patterns were observed for depression as for GAD, although the relationships between neighborhood deprivation, neighborhood attachment, and depression were not significant once we accounted for multiple comparisons.

This study extends our understanding of the impact that neighborhoods have on mental illness among urban MSM in three ways. First, the study shifts away from an isolated focus on the residential neighborhood to examine the contribution that multiple neighborhoods environments, notably where they live and where they socialize most often, make to MSM mental illness. Our study suggests that, among urban MSM, the places where they socialize, rather than those they inhabit, have a particularly important influence on anxiety (and potentially their levels of depression). The salience of social neighborhoods for MSM may be due to the lack of congruence between the places where MSM choose to live and socialize—this may lead MSM to spend relatively little time in their home neighborhoods [15]. This may reflect a broader issue that affects sexual minorities, who choose to socialize away from home when the neighborhood they inhabit is not supportive of sexual minorities or they are not out about their sexuality[36].

Second, the study finds that, as has been found for the general population [37–39], neighborhood disadvantage is associated with increased symptoms of anxiety among MSM. More economically disadvantaged neighborhoods simultaneously expose people to multiple stressors, including crime and violence, more social disorder, physical dilapidation of the built environment, and social isolation, which interact to increase the level of fear and lack of perceived control, thus worsening symptoms of anxiety [40,41,26,42–44]. Further, neighborhoods with more economic, physical and social stressors constrain the ability of

individuals to cope with their own stressors and life events, thus putting them at greater risk for anxiety disorders [45].

Third, this study suggests that the impact of attachment to the social neighborhood on anxiety may depend on the level of gay community attachment present in the same neighborhood. General neighborhood attachment refers to the cognitive and social aspects of bonding that arises between individuals and the places they frequent, and includes a sense of place as an extension of one's self-concept, a sense of fitting into a place, a sense that the place matches the values and personality of the individual, and an emotional link to a place [30,46–48]. We found that a greater general attachment to the social neighborhood was associated with higher GAD scores. However, this association was specific to neighborhoods with low gay community attachment. In social neighborhoods with high gay community attachment, a general sense of neighborhood attachment was associated with lower GAD scores. These findings are consistent with two prior studies, which found that the relationship between community attachment and mental health varied by levels of neighborhood economic deprivation, and that more economically deprived neighborhoods experienced a negative effect of community attachment on mental health [49,50]. The contrasting relationships may reflect the distinction between neighborhoods rich in social bonding but poor in “bridging social capital” – that is, missing links to social networks outside the neighborhood, and neighborhoods that offer both social bonding and access to networks outside the neighborhood [51,52]. In neighborhoods characterized by a high sense of neighborhood attachment but low gay community attachment, MSM may feel constrained in their social space and unable to establish connections with the gay community. Indeed, in prior qualitative work with urban MSM, we found that some MSM felt trapped by social boundaries that kept them from accessing local gay communities or spaces [36]. In neighborhoods characterized by high general neighborhood attachment and high gay community attachment, the two social processes may complement each other to create an environment where MSM feel accepted and can benefit from broader social support networks, thus lowering symptoms of distress and anxiety [5,7,53–56].

The study has a number of limitations. First, due to the cross-sectional study design, we cannot conclusively establish directionality of the association between neighborhood conditions and symptom scores of mental illness. Second, the study may exhibit same-source bias, as the same people reported on their neighborhood conditions and their psychiatric symptoms. Third, time location sampling and self-selection of participants into the study likely affected the composition of the sample. We included a wide range of public and virtual spaces in our sampling scheme, but we may have missed certain types of men who were not present in the recruitment venues. Fourth, men were required to have had anal sex with other men within the past three months, which limits the generalizability of the sample. Fifth, the need to use NTAs rather than census tracts due to insufficient sample size at the census tract level may have led to spatial misclassification. Future studies should examine the influence of neighborhood characteristics in smaller, socially- and historically-bounded definitions of neighborhoods. Sixth, we were limited in our ability to detect neighborhood influences on depression—future studies should further investigate the impact that social neighborhoods make on depression among urban MSM.

PUBLIC HEALTH IMPLICATIONS

These results suggest that spaces where urban MSM socialize are related to their mental health. Interventions to bridge links of MSM with a gay community that crosses social spatial boundaries and to promote integration and acceptance of MSM into the broader community may contribute to the reduction of elevated rates of depression and anxiety in this population. Future studies need to investigate these questions further with longitudinal data to examine the impact that changing neighborhood physical, social, and economic conditions would have on the mental health of MSM.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Fig 1.
Flow chart of the sample selection process

Fig 2. Adjusted association between general neighborhood attachment and anxiety among men who have sex with men, by level of gay community attachment, NYCM2M Study, New York City, 2010–2012

Table 1

Descriptive characteristics of study participants in home and social neighborhoods, NYCM2M Study, New York City, 2010–2012

	Home neighborhood participants (N=920)	Social neighborhood participants (N=976)
Mental health symptoms score	Median (IQR)	Median (IQR)
Depression score median (IQR)	1 (0, 4)	1 (0, 4)
Generalized anxiety score median (IQR)	0 (0, 3)	0 (0, 3)
Sociodemographic covariates	N (%)	N (%)
Mean age, years (Mean, SD)	31.8 (9.9)	31.8 (10.0)
<i>Sexual identity</i>		
Bisexual	86 (9.4)	82 (8.4)
Homosexual/Gay	800 (87.0)	860 (88.1)
Straight/Other	34 (3.7)	34 (3.5)
<i>Education beyond high school</i>	790 (85.9)	844 (86.5)
<i>Current Employment Status</i>		
Working full-time	366 (39.8)	407 (41.7)
Working part-time	210 (22.9)	221 (22.7)
Not working/looking/not looking/Temporarily laid off/Retired	271 (29.5)	271 (27.8)
Working off the book/Other	72 (7.8)	76 (7.8)
<i>Personal (annual) income</i>		
Less than \$10,000	227 (25.1)	236 (24.6)
\$10,000–<\$40,000	397 (43.8)	414 (43.1)
\$40,000–<\$60,000	142 (15.7)	157 (16.3)
\$60,000+	140 (15.5)	154 (16.0)
<i>Race/ethnicity</i>		
Black	231 (25.1)	241 (25.0)
Hispanic	264 (28.7)	277 (28.4)
Mixed	128 (13.9)	136 (13.9)
White	297 (32.3)	322 (33.0)
Neighborhood characteristics	Median (IQR)	Median (IQR)
<i>Racial/ethnic composition</i>		
% Black	24.5 (5.5, 43.3)	9.3 (4.9, 39.5)
% Latino	26.4 (15.5, 56.7)	19.3 (12.4, 37.8)
<i>% Poverty</i>	22.9 (15.4, 28.6)	20.6 (11.6, 27.5)
<i>Residential stability</i>		
% Owner-occupied homes	17.8 (9.2, 29.1)	17.0 (11.3, 28.7)
% in same house in past year	86.7 (83.5, 90.0)	85.1 (80.2, 88.4)
% male-male households	0.4 (0.1, 0.9)	0.6 (0.2, 1.4)
Primary independent variables		
<i>% Homophobia</i>		
Ever	11.8 (0.0, 22.2)	10.5 (0.0, 20.5)
Past 3 months	4.4 (0.0, 12.5)	4.4 (0.0, 6.7)

	Home neighborhood participants (N=920)	Social neighborhood participants (N=976)
<i>Disorder</i>		
<i>Neighborhood physical decay</i>		
% broken/rotten/boarded up windows	3.6 (1.8, 5.7)	3.6 (1.1, 5.7)
% dilapidated	3.9 (2.1, 5.6)	4.3 (2.1, 5.7)
% street/sidewalk filthy	0.71 (0.39, 1.13)	0.58 (0.39, 0.91)
Perceived social disorder	2.2 (1.9, 2.5)	2.2 (2.0, 2.4)
<i>Safety</i>		
Perceived safety	2.0 (1.8, 2.2)	2.0 (1.9, 2.1)
Homicide rate	3.2 (0.0, 7.6)	2.0 (0.0, 8.3)
<i>Social characteristics</i>		
Neighborhood involvement and participation	0.1 (0.0, 0.3)	n/a
General neighborhood attachment	2.3 (2.1, 2.5)	2.6 (2.5, 2.8)
Gay community attachment	3.1 (3.0, 3.2)	3.0 (2.9, 3.1)
<i>Socioeconomic characteristics</i>		
Deprivation index	0.3 (−0.9, 0.9)	0.3 (−0.9, 0.4)

Associations between characteristics of home and social neighborhoods and the relative prevalence of frequencies of depression and anxiety symptoms score, Poisson generalized estimating equation models, NYCM2M Study, New York City, 2010–2012^a

Table 2

	Depression			GAD		
	Home	Social		Home	Social	
	PFR ^b (95%CI)	PFR (95%CI)		PFR (95%CI)	PFR (95%CI)	
Disorder						
Perceived social disorder	0.84(0.47,1.51)	0.84(0.38,1.87)		0.88(0.50,1.53)	0.75(0.44,1.28)	
% Broken/rotten/boarded up windows (10% increase)	1.18(0.86,1.60)	1.10(0.63, 1.92)		1.39(0.98, 1.95)	1.18(0.65,2.14)	
% Dilapidated (10% increase)	0.91(0.68,1.22)	0.96(0.79, 1.18)		0.86(0.65, 1.12)	0.89(0.70,1.14)	
Sidewalk/street filthy (10% increase)	0.75(0.19,2.97)	1.01(0.20,5.14)		1.72(0.38,7.75)	1.11(0.27,4.58)	
Lack of safety						
Perceived lack of safety	1.01(0.57,1.77)	0.79(0.30, 2.12)		1.06(0.61, 1.83)	0.77(0.32,1.86)	
Homicide rate (10-unit increase)	1.04(0.83, 1.29)	1.16 (0.98, 1.39)		1.00 (0.80, 1.23)	1.16(0.94,1.42)	
Social processes						
<i>Homophobia</i>						
Ever (10% increase)	1.01 (0.91, 1.12)	1.03(0.84, 1.27)		1.03(0.93, 1.14)	1.02(0.82,1.28)	
Past 3 months (10% increase)	1.06 (0.92, 1.22)	0.94(0.70, 1.27)		1.09(0.93, 1.26)	0.89(0.63,1.25)	
Neighborhood involvement and participation	1.33(0.74, 2.37)	n/a		1.20(0.67,2.16)	n/a	
General neighborhood attachment	0.66(0.39,1.11)	2.00(1.13,3.54)		0.72(0.39,1.32)	2.37(1.24,4.51)	
Gay community attachment	0.53(0.29,0.95)	1.63(0.49,5.41)		0.63(0.34,1.17)	1.05(0.24,4.67)	
Demographics						
Deprivation index ^c	0.99(0.91,1.08)	1.14(1.02,1.28)		0.96(0.89,1.04)	1.17(1.05,1.30)	

^a Adjusted for age, race, education, income, sexual identity, employment, % Hispanic, % Black, % of households living in poverty, residential stability (composite of % of owner-occupied households and % who lived in the neighborhood for more than 1 year), and % male-male households. Home neighborhood models degrees of freedom for imputed models (df)=900 and Social neighborhood models df=956.

^b PFR = Prevalence frequency ratios, estimated from Poisson regression models

^c These models were not adjusted for % of households living in poverty or % owner-occupied households, as these were included in the deprivation index. Home neighborhood models df = 902 and Social neighborhood models df = 958.

Table 3

False discovery rate results: raw and adjusted p-values

	Depression						Anxiety					
	Home			Social			Home			Social		
	Raw p-value	Adjusted p-value	Raw p-value	Adjusted p-value	Raw p-value	Adjusted p-value	Raw p-value	Adjusted p-value	Raw p-value	Adjusted p-value	Raw p-value	Adjusted p-value
Disorder												
Perceived social disorder	0.5666	0.9713	0.6670	0.8413	0.6451	0.7741	0.5774	0.8125	0.5774	0.8125	0.5774	0.8125
% Broken/rotten/boarded up windows	0.3053	0.9713	0.7349	0.8413	0.0614	0.5712	0.5909	0.8125	0.5909	0.8125	0.5909	0.8125
% Dilapidated	0.5131	0.9713	0.7190	0.8413	0.2584	0.5712	0.3520	0.8125	0.3520	0.8125	0.3520	0.8125
Sidewalk/street filthy	0.6782	0.9749	0.9891	0.9891	0.4781	0.7741	0.8854	0.9515	0.8854	0.9515	0.8854	0.9515
Lack of safety												
Perceived lack of safety	0.9749	0.9749	0.6436	0.8413	0.8405	0.9169	0.5585	0.8125	0.5585	0.8125	0.5585	0.8125
Homicide rate	0.7415	0.9749	0.0935	0.3428	0.9695	0.9695	0.1638	0.6006	0.1638	0.6006	0.1638	0.6006
Social processes												
<i>Homophobia</i>												
Ever	0.8133	0.9749	0.7648	0.8413	0.5888	0.7741	0.8357	0.9515	0.8357	0.9515	0.8357	0.9515
Past 3 months	0.4353	0.9713	0.6905	0.8413	0.2852	0.5712	0.4925	0.8125	0.4925	0.8125	0.4925	0.8125
Neighborhood involvement and participation	0.3395	0.9713	n/a	n/a	0.5356	0.7741	n/a	n/a	n/a	n/a	n/a	n/a
General neighborhood attachment	0.1183	0.7098	0.0173	0.0968	0.2856	0.5712	0.0088	0.0484	0.0088	0.0484	0.0088	0.0484
Gay community attachment	0.0328	0.3936	0.4216	0.8413	0.1464	0.5712	0.9515	0.9515	0.9515	0.9515	0.9515	0.9515
Demographics												
Deprivation index	0.9536	0.9749	0.0176	0.0968	0.2834	0.5712	0.0058	0.0484	0.0058	0.0484	0.0058	0.0484