# 1. Introduction:

Health researchers know that "place" matters for health, but many of our studies of the health of lesbian, gay, and bisexual populations do not control for place (i.e., neighborhood effects). It's possible that the health disparities that we estimate between sexual minorities and straights would be different, maybe aggravated, maybe attenuated, if we were able to control for these contextual factors. There is ample evidence that the neighborhoods in which sexual minorities reside are distinct from those in which heterosexuals reside, which could give rise to differential neighborhood effects. The evaluation of whether such a differential exists is important because it may help to explain existing disparities in health behaviors and health outcomes between sexual minorities and heterosexuals, and because it may lead to better estimates of the effects of individual-level or behavioral characteristics on sexual minority health.

The absence of neighborhood effects analysis in sexual minority health research is likely due to information about the neighborhood of residence of sexual minority individuals rarely being available. For example, the neighborhood identifiers necessary to add this contextual information to individual survey respondents in the National Health Interview Survey (NHIS), which includes large samples of sexual minorities, are not publicly available. However, these restricted variables are available through a Federal Statistical Research Data Center (RDC), and this project is currently ongoing at the RDC at the University of Kentucky.

This research aims to assess how place affects the health of sexual minorities through the following research questions:

1. Do neighborhood effects (demographic, socioeconomic, or housing) explain any or all of the disparity in health outcomes between sexual minority and heterosexual populations?
2. Do neighborhood effects influence the health behaviors of sexual minority populations, thus contributing to disparities in health outcomes?
3. Do the observed neighborhood effects mediate or moderate the effects of other sociodemographic, economic, or insurance variables in explaining sexual minority health disparities?

# 2. Background:

Studies have shown that lesbian, gay, and bisexual populations exhibit disparities in health outcomes and access to care, relative to heterosexual populations (Conron et al. 2010; Dahlhamer et al. 2016). Bisexual men and women in particular are disadvantaged in multiple aspects of health (Gorman et al. 2015). The health disparities between sexual minority and straight populations remain even after controlling for demographic and socioeconomic differences between the groups. Part of these disparities are attributable to differences in health behaviors between the two groups, with sexual minorities exhibiting, on average, higher rates of smoking, binge drinking, and obesity (Hsieh and Ruther 2016). However, little is known about how place effects influence these health behaviors themselves, thus indirectly contributing to sexual minority health disparities.

Uninsurance rates for partnered lesbians and gay men are more than double those of married heterosexuals, a disparity that is likely attributable to historical differences in both marriage laws and domestic partnership benefits (Ponce et al. 2010). Recent evidence shows that differences in insurance rates have declined in light of marriage equality legislation and the Affordable Care Act, although sexual minority populations remain more disadvantaged in other aspects of access to care (Skopec and Long 2015; Hsieh and Ruther, forthcoming).

There is a sizable literature that details how place or neighborhood effects may impact the health of individuals (see, for example, Cagney et al. 2005), and there are various ways in which neighborhood effects are operationalized. Most of these operationalizations pertain to the level of economic or resource disadvantage, residential stability, and collective efficacy in the community (Krieger et al. 2003). However, regardless of the way neighborhood effects are measured, differences in the residential locations of sexual minorities and heterosexuals, and differences within the sexual minority groups themselves (Madden and Ruther 2015), leave it unclear whether and how these population-based neighborhood effect measures specifically pertain to sexual minorities. It may also be the case that the inclusion of neighborhood effects in sexual minority health analysis

mediates or moderates the effects of other covariates.  The goal of this research is to identify the importance of neighborhood effects in sexual minority health research.

The effect of place on the health of sexual minorities has important implications for policies and practices surrounding this population.  It's easy to imagine a scenario in which LGBT folks in more conservative areas eschew primary or preventive care to avoid questions about their sexual orientation, or in which LGBT individuals in some areas might feel more isolated and thus be more vulnerable to the risks of drug or alcohol abuse or self-harm.  The positive identification of such areas – in a general (e.g., urban areas) rather than a specific (e.g., Kansas City) sense – might encourage practitioners in these areas to more determinedly reach out to sexual minority communities.  Policies aimed at reducing suicide or substance abuse in the LGBT community might be made more effective through the targeting of LGBT individuals in particular areas.  In addition, evidence of the mechanism through which neighborhood affects LGBT health would inform future studies of the impact of policies or programs on sexual minority individuals.

### 3. Data and Methods:

This research will rely on individual-level restricted-use data from the NHIS.  In addition to the demographic characteristics, health behaviors, health outcomes, and limited general neighborhood information about each survey respondent, the RDC data also includes her or his census tract of residence.  The NHIS records can thus be augmented with tract-level contextual variables from the 2011-2015 (or 2012-2016) American Community Survey (ACS).  The ACS data contains neighborhood indicators that have been used to measure neighborhood effects in prior research, including the poverty rate, unemployment rate, Gini coefficient, vacancy rate, index of residential stability, and an urban/rural indicator.

We have performed similar analyses using the public-use NHIS data for the period 2013-2015.  The self-rated health outcome – which varies from 1 to 5 – is modeled using an ordered logistic regression and the functional limitation outcome – which is binary – is modeled using standard logistic regression.  For both models the primary explanatory variable is the sexual identity-gender-race of the individual, broken into 12 categories (Straight/Gay/Bisexual, Male/Female, White/Non-White).  Other covariates include age (continuous), educational attainment (no high school diploma, high school diploma, some college, Bachelor's degree or higher), marital status (married, never married, separated/divorced, widowed), Hispanic ethnicity (yes, no), foreign born status (yes, no), survey year, employment status (working, looking for work, retired, disabled, not working for other reasons), household income (imputed), perceived financial strain, alcohol drinking status (lifetime abstainer, former drinker, light drinker, moderate/heavy drinker), BMI (normal weight, underweight, overweight, obese), current smoking status (yes, no), exercise status (yes, no), trouble sleeping status (yes, no), and access to care indicators (have health insurance, have delayed medical care, have unmet medical care, can't afford health services, save prescriptions).  The contextual neighborhood variables will be added as additional covariates in these models, to assess their independent effects on the health outcomes and their mediation or moderation of other explanatory variables.

In addition to serving as independent variables in the models for health outcomes, the health behavior variables will serve as dependent variables in separate models of the effect of sexual minority status on health behaviors.  Although much work has been done in this arena, the primary focus is, as above, the effects that the additional contextual neighborhood variables have in these models.

In addition to the more commonly used measures of neighborhood socioeconomic status and physical landscape, our characterization of neighborhood effects will also incorporate measures of the mobility of the respondent and neighborhood collective efficacy.  Although the public-use NHIS data do not include the neighborhood of residence of the respondent – or much substantive information about the neighborhood – they do include some general measures of these additional effects.  In particular, the public-use data include a variable indicating neighborhood tenure, as well as several variables that are commonly used as proxies for collective efficacy.  Conceptually, collective efficacy is the "community spirit" in a neighborhood, or the ability of community members to work together to accomplish goals.  In this research, collective efficacy is a composite index ($\alpha$ = 0.89) of four perceptions that respondents have about their neighborhoods: (1) whether people in the
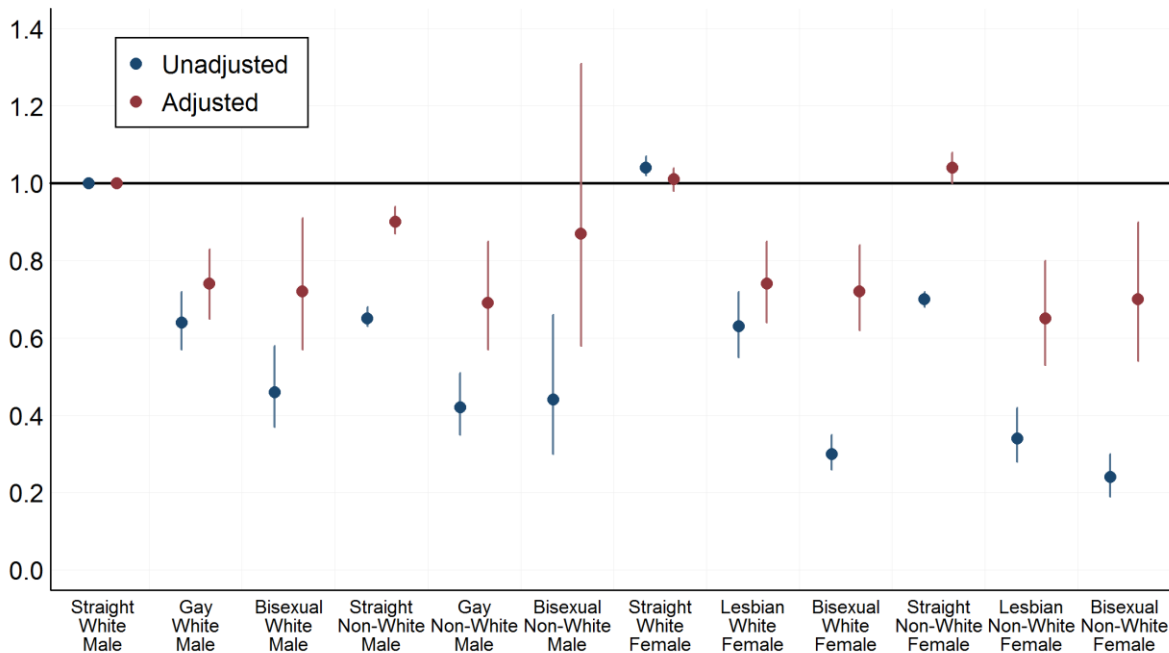
neighborhood help each other, (2) whether there are people in the neighborhood that the respondent can count on, (3) whether the people in the neighborhood can be trusted, and (4) whether the neighborhood is close-knit. The collective efficacy index ranges from one to four, which lower values indicative of greater collective efficacy.

## 5. Preliminary Results:

Early analytical results show some interesting differences between the LGB and straight populations on the neighborhood tenure and collective efficacy variables. Figure 1 below shows the effect of sexual identity on the tenure variable, measured on a 1-5 scale with higher values indicating longer neighborhood tenure. The figure shows the odds ratios, relative to straight white men, from an ordered logistic regression of this tenure variable on the 12 race-gender-sexual minority groups only (unadjusted) and on the 12 race-gender-sexual minority groups and additional sociodemographic and economic characteristics. In the unadjusted model, all sexual minority groups exhibit lower odds of being in a higher tenure group – that is, less stability and more mobility – than do corresponding heterosexuals of the same race and gender. The addition of the sociodemographic controls reduces this difference, although, except for bisexual non-white men, all sexual minority groups still exhibit less residential stability.



Note: Survey-weighted ordered logistic regression odd ratios and 95% confidence intervals from 2013-2016 National Health Interview Survey. Dependent variable is the number of years the respondent has lived in their current neighborhood: 1 = 0-1 years, 2 = 1-3 years, 3 = 4-10 years, 4 = 11-20 years, 5 = 20+ years. Adjusted model controls for age, educational attainment, marital status, employment status, and financial worry. n=120,910.
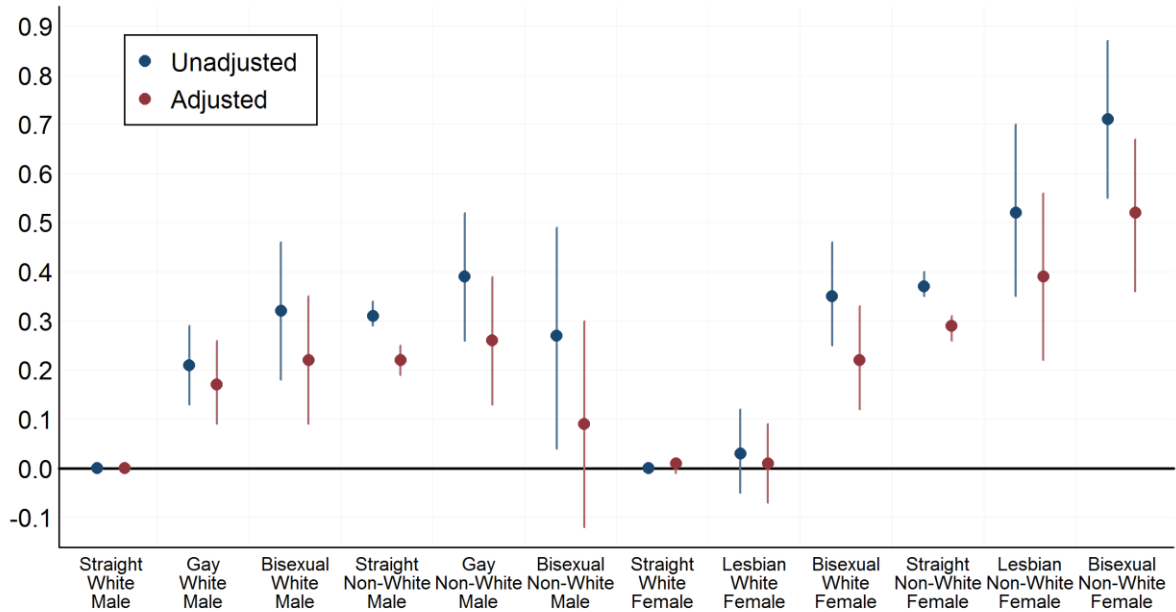
**Figure 1**

There are similar differences between the LGB individuals and straight individuals on the perceived level of collective efficacy in their corresponding neighborhoods – these results are shown in Figure 2. Collective efficacy is a continuous variable, with higher values indicating *lower* collective efficacy, so Figure 2 displays the coefficients from ordinary least squares models. These models exhibit a similar structure as those in Figure 1, with the unadjusted results showing the effect of sexual minority status with no covariates, and the adjusted results including sociodemographic and economic covariates. In addition, the adjusted model includes neighborhood tenure as an explanatory variable, to control for the fact that perceived efficacy is likely to be correlated with time in the neighborhood. The unadjusted model results show lower levels of perceived

collective efficacy among the sexual minority population, except for bisexual non-white males and white lesbians.  The addition of the other individual-level variables attenuates this difference somewhat, although all sexual minorities (except the two noted above) still exhibit lower perceived efficacy.  Notably, all of the non-white groups, except gay non-white males, also have lower levels of trust in their neighbors.



**Figure 2**

The final model analyzed here shows how the neighborhood tenure and collective efficacy variables affect disparities in self-rated health between LGB and straight populations.  Figure 3 displays the odds ratio from this model – an ordered logistic regression – in which higher values of the self-rated health outcome correspond with worse self-rated health.  In this figure, the unadjusted model includes the sociodemographic and economic covariates, and the adjusted model adds the tenure and collective efficacy variables.  These results are consistent with prior work that looks at self-rated health disparities in the sexual minority population (Hsieh and Ruther 2016).  Bisexuals exhibit worse self-rated health than do their straight counterparts, but white lesbians and gay men do not.  The addition of the tenure and collective efficacy variables has a very small effect on these results.  Although the odds ratios, in general, decline, the magnitude of this decline is negligible.

Although Figure 3 does not support the fact that that neighborhood effects – as measured in these two variables – are important contributors (or attenuators) to sexual minority health disparities, these is much that remains to be done.  In particular, we will analyze the effects of the other neighborhood indicators in the restricted-use data, and we will look at outcomes other than self-rated health (e.g., functional limitation).  In addition, we'll consider the effect of the neighborhood of residence on the health behaviors of individuals in the neighborhood, to identify whether place might affect the sexual minority health disparity through this indirect mechanism.

## Odd Ratios for Effect of Neighborhood Tenure and Collective Efficacy on Self Rated Health

Reference = Straight White Males
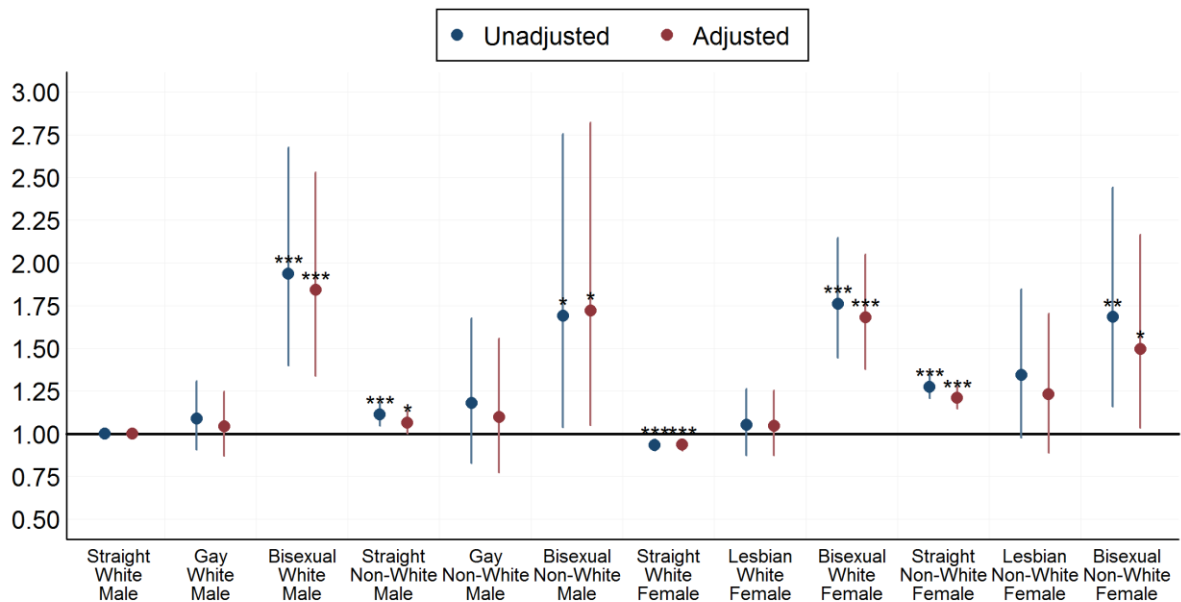
Note: Survey-weighted ordered logistic regression odd ratios and 95% confidence intervals from 2013-2016 National Health Interview Survey. Dependent variable is self rated health: 1 = Excellent, 2 = Very Good, 3 = Good, 4 = Fair, 5 = Poor. Both models control for age, educational attainment, marital status, employment status, and financial worry. Adjusted model includes additional controls for neighborhood tenure and collective efficacy. *** p<0.001, ** p<0.01, * p<0.05. n=120,871.

**Figure 3**

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