# The Geography of Sexual Orientation: Structural Stigma and Sexual Attraction, Behavior, and Identity Among Men Who Have Sex with Men Across 38 European Countries

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## Competing interests

The authors declare that they have no competing interests.

## Authors' contributions

The survey was designed and executed by AJS, UM, and PW in association with The EMIS Network (see Acknowledgements). AJS coordinated the study, PW coordinated the survey promotion, UM initiated the study. Data were prepared and coded by FH and AJS. JP and MH designed the analysis with suggestions from MM and AJS. JP and MH conducted the statistical analyses. The manuscript was drafted by JP and MH and co-authored by all other authors. All authors approved the final manuscript.

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**Abstract**

While the sexual identity and behavior of men who have sex with men (MSM) varies across countries, no study has examined country-level structural stigma toward sexual minorities as a correlate of this variation. Drawing on emerging support for the context-dependent nature of MSM's open sexual self-identification cross-nationally, we examined country-level structural stigma as a key correlate of the geographic variation in MSM's sexual attraction, behavior, and identity, and concordance across these factors. Data come from the European MSM Internet Survey (EMIS), a multi-national dataset containing a multicomponent assessment of sexual orientation administered across 38 European countries (N=174,209). Country-level stigma was assessed using a combination of national laws and policies affecting sexual minorities and a measure of attitudes towards sexual minorities held by the citizens of each country. Results demonstrate that in more stigmatizing countries, MSM were significantly more likely to report bisexual/heterosexual attractions, behaviors, and identities, and significantly less likely to report concordance across these factors, than in less stigmatizing countries. Settlement size moderated associations between country-level structural stigma and odds of bisexual/heterosexual attraction and behavior, such that MSM living in sparsely populated locales within high structural stigma countries were the most likely to report bisexual or heterosexual behaviors and attractions. While previous research has demonstrated associations between structural stigma and adverse physical and mental health outcomes among sexual minorities, this study is the first to show that structural stigma is also a key correlate not only of sexual orientation identification, but also of MSM's sexual behavior and even attraction. Findings have implications for understanding the ontology of MSM's sexuality and suggest that a comprehensive picture of MSM's sexuality will

come from attending to the local contexts surrounding this important segment of the global population.

Keywords: sexual orientation; stigma; minority stress; men who have sex with men; male bisexuality

**The Geography of Sexual Orientation: Structural Stigma and Sexual Attraction, Behavior, and Identity Among Men Who Have Sex with Men Across 38 European Countries**

Operating through individuals and institutions, stigma represents a fundamental cause of population health inequalities, including inequalities related to sexual orientation (Hatzenbuehler, Phelan, & Link, 2013; Bränström, Pachankis, Hatzenbuehler, & Link, 2016). Accumulating research demonstrates that structural stigma, in particular, serves as a key driver of poor health among sexual minority populations—i.e., those who identify as lesbian, gay, or bisexual (LGB); engage in same-sex sexual behavior; or experience persistent same-sex attractions (Hatzenbuehler, Bellatorre, Lee, Finch, Muennig, & Fiscella, 2014). Structural stigma refers to societal conditions, norms, or policies that compromise the opportunities, resources, and wellbeing of a socially marginalized group such as sexual minorities (Hatzenbuehler & Link, 2014). For example, sexual minorities living in U.S. states without legal protections against hate crimes and employment discrimination experience substantially more internalizing mental health disorders than sexual minorities living in states with such protections (Hatzenbuehler, Keyes, & Hasin, 2009). Sexual minority youth who live in highly stigmatizing communities experience a greater risk of suicidality than those who live in low-stigma communities (Hatzenbuehler, 2011). A growing body of research also demonstrates that among men who have sex with men (MSM), structural stigma predicts wide geographic variation in sexual health outcomes, including access to HIV-prevention education and associated services (Oldenburg et al. 2014; Pachankis et al., 2015). Thus, the health of sexual minorities depends substantially on the degree of structural stigma present in the locations in which they live.

Despite consistent evidence that structural stigma is a major determinant of sexual minority health, few studies to date have investigated the possibility that manifestations of male sexual orientation are also shaped, in part, by structural stigma. On the one hand, men's sexual orientation is assumed to be relatively impervious to sociocultural influences, especially compared to women's sexual orientation (e.g., Baumeister, 2000; Savin-Williams, 1990; Savin-Williams & Diamond, 2000). In fact, compared to same-sex sexuality among women, same-sex sexuality among men is less likely to be described by men as chosen or under their personal control (Rosenbluth, 1997; Savin-Williams, 1990) and is less likely to depend on lifespan or historical context (Baumeister, 2000; Savin-Williams & Diamond, 2000; Twenge, Sherman, & Wells, 2016). On the other hand, a large body of literature points to variation across cultures and time in manifestations of male sexuality (Herdt, 1996; Risman & Schwartz, 1988; Troiden, 1988), suggesting the contextual nature of men's sexuality. For example, across the globe, the reported prevalence of MSM's bisexual behaviors and identities varies depending on country (Amirkhanian, Kelly, & Issayev, 2001; Colby, 2003; Choi, Gibson, Han, & Guo, 2004; Micheals & Lhomond, 2006; Wade et al., 2005).

Recent evidence suggests that, in addition to explaining the wide geographic variation in sexual minority health, structural stigma might also serve as one potential explanation for the wide variation in the proportion of MSM who openly disclose their gay/homosexual sexual orientation. Specifically, Pachankis and colleagues (2015) found that MSM living in countries with homophobic laws, policies, and community attitudes (e.g., Russia, Ukraine) were significantly more likely to completely conceal their sexual orientation from all others than were MSM living in countries with low levels of structural stigma (e.g., Norway, Spain). Further, recent data collected from online searches and social networks indicate that many fewer

adolescents and adult men openly disclose their sexual orientation (e.g., listing themselves as "interested in men" on Facebook) in U.S states with high degrees of structural stigma toward sexual minorities (e.g., Mississippi) than in low structural stigma states (e.g., California), despite a similar proportion of online search activity for both male pornography (e.g., searching Google for male pornographic websites) and casual male sex (e.g., searching for "casual encounters" on Craigslist.com) in both types of locales (Stephens-Davidowitz, 2014). There are several factors that might explain this relationship between structural stigma and disclosure of a gay/homosexual sexual orientation. MSM living in high-structural stigma locales might avoid discrimination by reporting attractions, behavior, or identity as heterosexual, as opposed to gay or homosexual. Additionally, MSM who report attractions as, behave as, and identify as bisexual or heterosexual might also expand sexual opportunities, with women in this case, in the face of environmental or attitudinal constraints against identifying and meeting same-sex partners. In high-stigma locales, therefore, MSM might perceive, and receive, more benefit from reporting attractions as, behaving as, or identifying as bisexual or heterosexual, as opposed to gay or homosexual.

Drawing on emerging support for the context-dependent nature of sexual orientation disclosure (Pachankis et al., 2015), we sought to investigate the degree to which structural stigma at the country level might also predict MSM's sexual attraction, behavior, and self-identification. While the prevalence of MSM's bisexual and heterosexual identification and behavior varies across countries (Amirkhanian, Kelly, & Issayev, 2001; Colby, 2003; Choi, Gibson, Han, & Guo, 2004; Wade et al., 2005), no study has examined country-level structural stigma as a correlate of this variation. Significant barriers have previously impeded testing this possibility. For example, few data structures capture wide variation in structural stigma, for example across

supportive and homophobic countries. Further, while sexual orientation represents a multifaceted construct composed of at least sexual attraction, behavior, and identity (Savin-Williams, 2006), few large, multinational datasets assess sexual orientation as a function of all three of these components.

Using a unique multi-national dataset with large variation in structural stigma as well as a multicomponent assessment of sexual orientation allowed us to examine structural stigma as a key correlate of the geographic variation in MSM's sexual attraction, behavior, and identity. Specifically, we used data from the European MSM Internet Survey (EMIS; The EMIS Network, 2013), the largest study of MSM, spanning 38 countries. We hypothesized that MSM living in high structural stigma countries in Europe would evidence higher odds of reporting bisexual and heterosexual attraction, behavior, and identity than MSM living in low structural stigma countries, whom we expected would be comparatively more likely to identify as gay and to report exclusively same-sex attraction and behavior. We expected these associations to be robust when controlling for individual-level (e.g., immigration status) and country-level (e.g., income inequality) variables. We also expected that structural stigma would interact with the population size of one's current city or town to predict sexual attraction, behavior, and identity among MSM. Given that sparsely populated areas often contain low community support for sexual minorities (Pachankis, Hatzenbuehler, & Starks, 2014), as well as numeric and attitudinal barriers to identifying and meeting same-sex partners, we expected that MSM who live outside of urban areas within high structural stigma countries would be the most likely to report bisexual or heterosexual attractions, behaviors, and identities. Finally, given that high-stigma countries place constraints on adopting a same-sex sexual identity and engaging in same-sex sexual behavior, but not necessarily on experiencing same-sex attraction, we hypothesized that sexual

identity and behavior would be more strongly influenced by country-level stigma than would sexual attraction, which is not necessarily inherently expressive (Savin-Williams, 2006; Stein, 1999). Thus, we also expected lower odds of concordance among attraction, behavior, and identity for MSM reporting any form of bisexuality or heterosexuality in high-stigma, compared to low-stigma, countries.

While the empirical evidence reviewed above supports our hypotheses that contextual factors can strongly influence manifestations of sexual orientation, this evidence does not necessarily suggest that contextual influences alone drive these manifestations or determine sexual orientation itself. In fact, our hypotheses are consistent with (but cannot fully test) hybrid sociocultural-biological theories of sexuality (Tolman & Diamond, 2001), which recognize that both sociocultural and biological, or innate, factors work in tandem to influence sexuality and its expression. In the present study, we focus on the largely overlooked influence of one potential sociocultural driver of MSM's sexual attraction, behavior, and identity, namely structural stigma toward sexual minorities.

## Method

We used data from the European MSM Internet Survey (EMIS), administered in 25 languages between June and August 2010 across the 38 European countries that yielded viable data (i.e., over 100 participants). Over 235 local, national, and international sexual minority websites recruited participants online through instant messages or banner advertising and national EMIS network partners recruited offline through posters, cards, and face-to-face communication. Eligibility criteria included: male identification, European residence, at or above the age of homosexual consent in the country of residence (ranging from age 13 for Spain to age 18 for Bulgaria and Turkey), and sexual attraction to and/or sexual experience with men.

Eligible participants had to indicate understanding the study's purpose and provide consent. Typical completion time was 21 minutes. No material inducement was offered. EMIS items were generated through consultation with NGOs, pilot testing for comprehension and length with MSM in 21 countries, and cognitive interviewing to ensure accurate interpretation. The survey development and methods are described in detail elsewhere (EMIS Network, 2013; Weatherburn et al., 2013).

**Participants**

The survey received 184,469 submissions. Three cases were lost to data corruption. Cases were removed for participants who: (a) did not specify a home country or indicated a country outside the study area ($n$ = 2,427); (b) were from a country that did not reach 100 qualifying cases ($n$ = 291); (c) indicated being women, having no same-sex attraction or experience, or being under the age of homosexual consent in their country of residence or providing no age ($n$ = 544); and (d) submitted a major inconsistent response ($n$ = 6,995), resulting in a final sample size of 174,209 MSM (Weatherburn et al., 2013). The per-country range was between 117 participants in both Macedonia and Moldova and 54,387 in Germany.

**Measures**

**Explanatory variables.** Following previous analyses of EMIS data (Berg et al., 2013; Pachankis et al., 2015; Ross et al., 2013), we assessed *country-level stigma* using a combination of national legislation and general population attitudes toward sexual minorities. We derived legislation from the International Lesbian, Gay, Bisexual, Trans, and Intersexual Association-Europe (ILGA-Europe) Rainbow Index 2010 (ILGA, 2010), an aggregate of the presence of 10 supportive legislative policies (e.g., same-sex marriage, employment non-discrimination legislation), which were given positive scores, and 4 discriminatory practices and legislative

policies (e.g., violation of freedom of assembly), which were given negative scores, creating a theoretical range of -4 to +10. The actual data range was from -2 (unsupportive) (i.e., Russia, Ukraine) to +10 (supportive) (i.e., Sweden) ($M$ = 3.18, SD = 3.34). We derived country-level attitudes toward sexual minorities from the 2008 wave of the European Values Survey, a cross-national survey of social attitudes that randomly sampled approximately 1,500 residents per European country. We included the proportion of respondents in each country who: (1) thought homosexuality could be justified; (2) agreed that homosexual couples should be able to adopt children; and (3) did not indicate not wanting to have homosexuals as neighbors. We calculated the standardized mean of these three items. We then combined this standardized mean with the standardized policy index to create a country-level index of support toward sexual minorities in each country. This index was the mean of these two variables – attitudes and policies. The inverse standardized score of this index was used in all analyses to facilitate interpretation as standard deviation units of stigma (i.e., higher scores indicated greater structural stigma).

To assess *settlement size*, participants were asked, "How would you describe the place you live in?" with response options: 1 (*A very big city or town [a million or more people]*), 2 (*A big city or town [500,000-999,999 people]*), 3 (*A medium-sized city or town [100,000-499,999 people]*), 4 (*A small city or town [10,000-99,999 people]*), and 5 (*A village / the countryside [less than 10,000 people]*). To facilitate interpretation of the results, responses were dichotomized at 100,000 and over to indicate living in a small town/city (=1) compared to living in a large town/city (=0).

**Outcome variables.** *Sexual attraction* was assessed with the question, "Who are you sexually attracted to?" with response options 1 (*Only to men*), 2 (*Mostly to men and sometimes to women*), 3 (*Both to men and women equally*), 4 (*Mostly to women and sometimes to men*), and 5

(*Only to women*). Participants who selected any of the last three options were classified as reporting either bisexual or heterosexual attraction (=1); participants who selected either of the first two options were classified as exclusively/mostly homosexual attraction (=0).

*Sexual behavior* was assessed with the item, "When did you last have any kind of sex with a woman?" Participants who indicated having any sex with a woman in the past 12 months were classified as engaging in any heterosexual behavior (=1) versus exclusively homosexual behavior (=0). Participants who indicated having no sex with either men or women in the past 12 months ($n$ =8,668) were excluded from analyses examining sexual behavior.

*Sexual identity* was assessed with the item, "Which of the following options best describes how you think of yourself?" with response options 1 (*Gay or homosexual*), 2 (*Bisexual*), 3 (*Straight or heterosexual*), 4 (*Any other term*), and 5 (*I don't usually use a term*). Participants were classified as bisexual/heterosexual (=1) or gay/homosexual (=0). Participants who selected "I don't usually use a term" ($n$ = 12,195; 7.0%) or "any other term" ($n$ = 1,497; 0.8%) in response to the sexual identity item were excluded from analyses examining sexual identity.

*Sexual attraction, behavior, and identity concordance* was calculated for the subsample of MSM reporting any form of bisexual or heterosexual attraction, behavior, or identity. Participants who reported bisexual/heterosexual attractions, behavior, *and* identity were coded as concordant (=1). Participants who reported bisexual/heterosexual attractions, behavior, *or* identity, but not all three, were coded as non-concordant (=0).

**Covariates**. Respondents who reported bisexual or heterosexual attraction, behavior, or identity were significantly older, less likely to be in a relationship, to have been diagnosed with HIV, to have attained a high educational status – but also more likely to be unemployed – and to

be immigrants than were respondents who reported exclusive same-sex attractions or behaviors, or a gay/homosexual identity, respectively. Therefore, we controlled for these demographic covariates in all analyses. Individual-level covariates included age, relationship status, HIV status, education, employment status, and immigration status. To control for the possibility that general structural inequality, rather than sexual orientation inequality specifically, is responsible for associations between structural stigma and sexual orientation attractions, behavior, and identity, we also included each country's 2009 Gini coefficient, an index of income inequality, as a country-level covariate. The association of the Gini index with country-level stigma was moderate ($r = 0.34$, $p < 0.05$), consistent with previous research showing associations between income inequality and stigmatizing attitudes toward homosexuality (Andersen & Fetner, 2008).

**Analytic Strategy**

Given the nested structure of our data (i.e., respondents within cities/towns within countries), we specified three-level random intercept models using HLM v. 6 (Raudenbush & Bryk, 2002). Given the binary nature of our sexual orientation outcomes, we specified a Bernoulli distribution. This yielded an odds ratio of heterosexual/bisexual attraction, behavior, and identity (vs. gay/homosexual attraction, behavior, and identity) conditional on the explanatory variables. Fixed effects were estimated for each explanatory variable by means of full information maximum likelihood. Individual-level factors (e.g., demographic covariates) were modeled at Level 1, settlement size was modeled at Level 2, and country-level factors (i.e., Gini coefficient, structural stigma) were modeled at Level 3.

Missing data for explanatory variables ranged from 0 (0.0%) for age to 4,307 (2.3%) for settlement size. Missing data for outcomes ranged from 396 (0.2%) for sexual identity to 583 (0.3%) for sexual attraction to 1,898 (1.1%) for sexual behavior. Thus, the sample size for each

model depended on the amount of missing data for the outcome variable examined in that model.

Separate models were examined for each of the three sexual orientation outcomes in the full sample (i.e., attraction, behavior, identity), as well as for concordance among attraction, behavior, and identity in the subsample of MSM reporting any form of bisexual or heterosexual attraction, behavior, or identity. For each outcome (i.e., attraction, behavior, identity, and concordance), we examined associations between structural stigma and settlement size. Then, we examined the interaction between structural stigma and settlement size in predicting each outcome. Finally, given that these analyses combined heterosexual and bisexual (versus homosexual/gay) attraction, behavior, and identity, we ran sensitivity analyses in which we separately predicted only bisexual and then only heterosexual (versus homosexual/gay) attraction, behavior, and identity from our set of explanatory variables.

## Results

Table 1 reports descriptive statistics of the full sample. The majority of the sample identified as gay/homosexual, had been sexually active only with men in the past 12 months, and was primarily attracted to other men. About half of the respondents were in a relationship and had completed primary and secondary education; about one-third lived in a locale with fewer than 100,000 inhabitants. The majority reported an HIV-negative last test result (or not being tested), currently living in the country in which they were born, and being employed. About three-quarters lived in a low-stigma country, defined in this case as a country that fell below the median score of our country-level structural stigma index.

### Country-level Stigma and Sexual Attraction, Behavior, and Identity: Main Effects

Country-level prevalence of bisexual/heterosexual attraction ranged from 1.68% (Malta) to 22.29% (Slovenia). Bisexual/heterosexual behavior prevalence ranged from 8.38% (Belgium)

to 30.37% (Bosnia/Herzegovina). Bisexual/heterosexual identity ranged from 9.43% (Netherlands) to 38.58% (Bosnia/Herzegovina). Using a median split of our structural stigma index to illustrate the distinction between high-stigma and low-stigma countries, the mean country-level prevalence of bisexual/heterosexual attraction was similar in both high-stigma (11.18%, *SD* = 5.19) and low-stigma (9.79%, *SD* = 4.06) countries, $t = 0.91$, $p = .367$. However, the mean country-level prevalence of bisexual/heterosexual behavior was higher in high-stigma (19.53%, *SD* = 5.68%) compared to low-stigma (13.86%, *SD* = 4.08%) countries, $t = 3.53$, $p < .001$. The mean country-level prevalence of bisexual/heterosexual identity was also higher in high-stigma (24.23%, *SD* = 8.69%) compared to low-stigma (17.44%, *SD* = 5.57%) countries, $t = 2.87$, $p < .01$.

Country-level stigma, examined as a continuous variable in all models, predicted all measured manifestations of sexual orientation (Table 2). Specifically, MSM living in high-stigma countries were more likely to (1) report bisexual or heterosexual attraction compared to reporting mostly or exclusively homosexual attraction (AOR=1.18, 95% CI: 1.04–1.35) (Figure 1); (2) report having sex with women or both men and women, as compared to reporting sex only with men, in the past 12 months (AOR=1.33, 95% CI: 1.20–1.47) (Figure 2); and (3) identify as bisexual or heterosexual than as gay/homosexual (AOR=1.35, 95% CI: 1.19–1.54) (Figure 3). That is, for every one standard deviation increase in our structural stigma index, MSM reported 18%, 33%, and 35% higher odds of bisexual or heterosexual attraction, behavior, and identity, respectively, all small effect sizes.

Somewhat inconsistent with our hypothesis that same-sex sexual identity and behavior would be more strongly related to structural stigma than same-sex attraction, we found that although country-level stigma was more strongly related to sexual behavior and identity than

sexual attraction, the effect sizes were not significantly different from each other (identity vs. attraction: $z = .50$, $p = .62$; behavior vs. attraction: $z = .39$, $p = .66$). Consistent with our hypothesis regarding concordance across the three components of sexual orientation, concordance was significantly lower in high-stigma countries than in low-stigma countries (AOR = 0.87, 95% CI: 0.79 – 0.97), a small effect size. That is, bisexually or heterosexually attracted, behavioral, or identified MSM in high-stigma countries were 13% less likely to report concordance across their attraction, behavior, and identity than their peers in low-stigma countries.

**Country-level Stigma and Sexual Attraction, Behavior, and Identity: Interaction with Settlement Size**

Settlement size significantly predicted odds of bisexual/heterosexual attraction, behavior, and identity, such that in sparsely populated locales, MSM were 62%, 49%, and 50% more likely to report bisexual/heterosexual attractions, behaviors, and identities, respectively, compared to MSM in densely populated locales, all small effect sizes (Table 2). Settlement size significantly interacted with country-level stigma to predict sexual attraction and sexual behavior, such that MSM living in sparsely populated locales within high structural stigma countries were the most likely to report bisexual or heterosexual behaviors and attractions, although the slope of the association between country-level stigma and odds of bisexual or heterosexual attraction and behavior was steeper for large towns/cities than for small towns/cities (See Figures 4 and 5). Country-level stigma did not significantly interact with settlement size to predict either sexual identity or concordance across attraction, behavior, and identity.

**Sensitivity Analyses**

Because our outcomes in the above analyses combined bisexual and heterosexual identity, behavior, and attraction, we conducted sensitivity analyses in which we limited analyses to predicting only *bisexual* – versus gay/homosexual – attraction, behavior, and identity. The direction and significance of main and interaction effects remained the same as in analyses that combined bisexual and heterosexual attraction, behavior, and identity. The one exception was for the interaction of country-level stigma and settlement size in predicting heterosexual (versus homosexual) behavior, which became non-significant (AOR = 0.96, 95% CI: 0.86 – 1.08), $p$ = 0.50, unlike in the model that predicted bisexual and heterosexual behavior combined. We then limited analyses to predicting *heterosexual* – versus gay/homosexual – attraction, behavior, and identity; the direction and significance of main and interaction effects remained the same. The one exception was the main effect from country-level stigma to heterosexual (versus homosexual) attraction, which became non-significant (AOR = 1.05, 95% CI: 0.89 – 1.24), $p$ = 0.56, unlike in the model that predicted bisexual and heterosexual attraction combined. This lack of association could potentially be explained by reduced power as only 236 participants reported exclusive attraction to women.

## Discussion

Using a unique multinational dataset of MSM spanning 38 countries containing wide variation in objectively measured structural stigma toward sexual minorities, as well as a comprehensive assessment of sexual orientation, we predicted variation in MSM's sexual identity, attraction, and behavior as a function of country-level structural stigma. Consistent with our hypotheses, the wide variation in country-level structural stigma toward sexual minorities predicted significant variation in the odds of bisexual/heterosexual attraction, behavior, and identity among MSM across countries. Specifically, in more stigmatizing countries, MSM were

significantly more likely to report bisexual/heterosexual attractions, behaviors, and identities than in less stigmatizing countries. Although country-level stigma was more strongly related to sexual behavior and identity than sexual attraction, the effect sizes were not significantly different from each other. Nonetheless, MSM who reported any bisexual/heterosexual attractions, identity, and behaviors were less likely to report concordance across these manifestations of sexual orientation in high-stigma, compared to low-stigma, countries. Finally, settlement size significantly predicted odds of bisexual/heterosexual attraction, identity, and behavior and moderated associations between country-level structural stigma and odds of bisexual/heterosexual attraction and behavior. The association between country-level structural stigma and odds of bisexual/heterosexual attraction and behavior was stronger for MSM residing in large, compared to small, towns/cities, while MSM residing in small towns/cities within high structural stigma countries were the most likely to report bisexual or heterosexual attractions and behaviors.

Our results add to a body of research showing contextual influences on sexual orientation (e.g., Baumeister, 2004; Diamond, 2008; Herdt, 1996; Risman & Schwartz, 1988; Troiden, 1988). While prior research has demonstrated cultural and historical determinants of sexual orientation (Herdt, 1996; Twenge, Sherman, & Wells, 2016) and life course fluctuations across sexual minority women's sexual attraction, behavior, and identity (Diamond, 2008; Mock & Eibach, 2012; Savin-Williams & Ream, 2007), our study suggests that stigmatizing environments at the country level can also influence various manifestations of men's sexuality. Country-level sociocultural contexts have previously demonstrated theoretically meaningful associations with other aspects of human sexuality (e.g., willingness to have casual sex; sexting behavior), explaining wide variation between country populations in these motivations and

behaviors (Baumgartner, Sumter, Peter, Valkenburg, & Livingstone, 2014; Schmitt, 2005). The present study demonstrates the influence of country-level sociocultural contexts on manifestations of MSM's sexual orientation, which previous research has found to be more impervious to social contexts than manifestations of women's sexual orientation (e.g., Baumeister, 2000; Baumeister & Twenge, 2002; Mock & Eibach, 2012; Twenge et al., 2016).

Our findings suggest that sociocultural factors might influence manifestations of MSM's sexual orientation with implications for understanding the ontology of male homosexuality. On the one hand, our results suggest that stigmatizing environments might constrain MSM from publicly expressing their biologically determined same-sex attractions through their identities and sexual behaviors. Because sexual attraction often developmentally precedes, and shows less lifespan fluctuation, than sexual behavior and identity (Calzo, Antonucci, Mays, & Cochran, 2011; Diamond, 2008), sexual attraction could be argued to be more biologically determined than sexual identity and behavior, which are potentially more strongly influenced by sociocultural influences (DeLamater, 1981; Gagnon & Simon, 2011; McClintock & Herdt, 1996; Udry, 1988). In fact, biological factors are known to more weakly determine sexual behavior, such as the initiation of coitus, when social constraints are high (e.g., Udry & Billy, 1987). Our finding that MSM living in high-stigma, compared to low-stigma, countries experience lower odds of concordance among their sexual attraction, behavior, and identity potentially suggests that stigma might discourage MSM from enacting their attraction to men through congruent identities and behaviors.

On the other hand, structural stigma might not so much constrain the expression of an innate sexuality as it does shape the actual experience of one's sexual attractions. Sociocultural factors can produce distinct experiences of sexuality inseparable from their local context (e.g.,

Brown-Saracino, 2015). For example, patriarchal gender hierarchies, perpetuated through cultural institutions such as sexual education, have been argued to fundamentally shape women's experience of sexual desire, even outside their conscious awareness (e.g., Fine, 1988). Thus, rather than suggesting a dysfunctional incoherence across sexuality components, our findings regarding sexuality discordance might reflect local experiences of sexuality that adaptively fit a surrounding sociocultural milieu. However, without having measured sociocultural features other than stigma, we are unable to test the influence of other potential influences.

Importantly, we caution against interpreting our results as implying that structural stigma is the predominant cause of bisexuality or that all bisexually or heterosexually attracted, behavioral, or identified MSM are hiding an innate homosexuality because of social pressure and personal shame. Instead, our results only suggest that geographic variation in structural stigma can be understood as a strong correlate of manifestations of men's sexual orientation. The extent to which those manifestations are yoked to any innate sexual orientation or represent a locally derived and understood form of sexuality remains to be determined.

Consistent with our overall hypothesis that structural stigma is associated with geographic variation in MSM's sexuality, results suggest that MSM living in areas with smaller populations are particularly likely to report attractions as, behave as, and identify as bisexual or heterosexual. Previous research shows inverse associations between local population size and structural stigma toward sexual minorities (Pachankis, Hatzenbuehler, & Starks, 2014). Less densely populated areas might contain less visible gay communities, or gay-related infrastructure, thereby perpetuating stigma toward MSM as well as providing fewer opportunities for MSM to locate and meet same-sex partners (Keene, Eldahan, White Hughto, & Pachankis, 2016; Weeks, 1985). In smaller towns/cities, therefore, identifying as heterosexual or bisexual

and having sex with women might not only protect against discrimination but might also maximize sexual opportunities against a backdrop of constrained options. The finding that population size was a stronger predictor of bisexual or heterosexual attraction, behavior, and identity in low-stigma, as compared to high-stigma, countries suggests that MSM in low-stigma countries might perceive more freedom to maximize sexual opportunities when population size limits same-sex opportunities by reporting attractions as, behaving as, or identifying as bisexual or heterosexual. However, this possibility warrants future investigation.

Results of the present study have implications for MSM's physical and mental health. While previous research has found that structural stigma consistently predicts adverse mental and physical health among sexual minorities (e.g., Hatzenbuehler et al., 2014; Oldenburg et al. 2014; Pachankis et al., 2015), the present study suggests that structural stigma is also a correlate of sexual orientation itself. Social structures differentially expose people to health-promoting or health-impairing resources (Diez-Roux, 2001). One way that social structures might compromise health is by shaping the identities that stigmatized populations adopt and the health-relevant knowledge, behaviors, and services associated with those identities (Oyserman, Smith, & Elmore, 2014). To the extent that MSM in high-stigma countries adopt identities and behaviors, including bisexual and heterosexual, that are not typically targeted by sexual health-promotion services and information, the health of MSM in these countries may be compromised (Pachankis et al., 2015). Future research is needed to determine the exact mechanisms through which structural stigma might compromise the health of MSM across countries.

Despite this study's strengths, results must be interpreted in light of several limitations. Given the cross-sectional design, we infer, but cannot test, causal relationships. Although a significant strength of utilizing an objective stigma index is that our outcomes cannot cause the

predictor, it is possible that an unmeasured common factor, such as cultural variations in the form and meaning of men's sexuality across countries (e.g., Lambevski, 1999), could still underlie the observed associations. Given that wide variations in the measured forms of sexuality nonetheless existed within low and high stigma countries even upon controlling for country-level income inequality, future research ought to consider additional country-level influences on these outcomes. Because of the infeasibility of creating an MSM sampling frame across countries, it was not possible to create a probability sample of MSM, which limits generalizability of the results. The extent to which MSM might have differentially selected into the EMIS based on sexual orientation across countries is unknown. For example, stigmatizing countries may have been less successful in recruiting exclusively homosexual men, perhaps because of a lack of recruitment organizations that specifically cater to exclusively homosexual men. At the same time, however, we note that the vast majority of participants (95.3%) accessed the survey directly from a website or email invite, rather than typing the survey web address into a browser and that nearly three-quarters of the recruitment was conducted via the six largest dating sites via the internet. Thus in-person recruitment via organizations was fairly minimal in this study. Further, because we relied on self-reported measures of sexuality, it is also possible that our results reflect systematic reporting biases across countries, although the nature of that bias is uncertain given that all eligible cases reported same-sex attraction or behavior. We assessed identity as how participants "think of" themselves, rather than how they publicly identify. Yet the proportion of individuals who think of themselves as sexual minorities is likely larger than the proportion who publicly identifies as a sexual minority (Pachankis, Cochran, & Mays, 2015) and our estimates should be considered in light of the possibility that some participants who indicated a sexual minority identity (e.g., bisexual) in the present study might publicly identify as

heterosexual. Finally, this study captures stigma at the country level, which may obscure important within-country variation. Because of this potential limitation, our results are particularly noteworthy, given that country-level factors are distal determinants of health; thus, our results are likely conservative estimates of the association between structural stigma and manifestations of sexual orientation.

The present study adds to a growing body of research highlighting the importance of structural stigma to the lives of sexual minority individuals. While previous research has demonstrated associations between structural stigma and adverse physical and mental health outcomes among sexual minorities (e.g., Hatzenbuehler et al., 2014), this study shows that structural stigma is also a key correlate of manifestations of MSM's sexual orientation itself. The fact that the country-level variation found in MSM's sexual attraction, behavior, and identity closely hews to the wide variation in structural stigma toward sexual minorities in those countries strongly suggests that manifestations of MSM's sexual orientation are context-dependent. Specifically, the country in which an MSM lives affects the ways in which he views his sexual self, forms sexual motivations, and pursues sexual opportunities. These findings suggest that appropriate understanding of MSM's sexuality and health will come from attending to the local contexts surrounding this important, although frequently overlooked, segment of the global population.

## References

Amirkhanian, Y. A., Kelly, J. A., & Issayev, D. D. (2001). AIDS knowledge, attitudes, behaviour in Russia: Results of a population-based, random-digit telephone survey in St Petersburg. *International Journal of STD & AIDS*, *12*(1), 50-57.

Andersen, R., & Fetner, T. (2008). Cohort differences in tolerance of homosexuality attitudinal change in Canada and the United States, 1981–2000. *Public Opinion Quarterly*, *72*(2), 311-330.

Baumeister, R. F. (2004). Gender and erotic plasticity: Sociocultural influences on the sex drive. *Sexual and Relationship Therapy*, *19*(2), 133-139.

Baumeister, R. F., Twenge, J. M., & Nuss, C. K. (2002). Effects of social exclusion on cognitive processes: anticipated aloneness reduces intelligent thought. *Journal of Personality and Social Psychology*, *83*(4), 817.

Baumgartner, S. E., Sumter, S. R., Peter, J., Valkenburg, P. M., & Livingstone, S. (2014). Does country context matter? Investigating the predictors of teen sexting across Europe. *Computers in Human Behavior*, *34*, 157-164.

Berg, R. C., Ross, M. W., Weatherburn, P., & Schmidt, A. J. (2013). Structural and environmental factors are associated with internalised homonegativity in men who have sex with men: Findings from the European MSM Internet Survey (EMIS) in 38 countries. *Social Science & Medicine*, *78*, 61-69.

Beyrer, C., Trapence, G., Motimedi, F., Umar, E., Iipinge, S., Dausab, F., & Baral, S. (2010). Bisexual concurrency, bisexual partnerships, and HIV among Southern African men who have sex with men (MSM). *Sexually Transmitted Infections*, *86*, 323-327

Bränström, R., Pachankis, J. E., Hatzenbuehler, M. L., & Link, B. (2016). Sexual

orientation disparities in preventable morbidity: A fundamental cause perspective. Unpublished manuscript. Karolinska Institute, Stockholm, Sweden.

Brown-Saracino, J. (2015). How Places Shape Identity: The Origins of Distinctive LBQ Identities in Four Small US Cities. *American Journal of Sociology*, *121*(1), 1-63.

Calzo, J. P., Antonucci, T. C., Mays, V. M., & Cochran, S. D. (2011). Retrospective recall of sexual orientation identity development among gay, lesbian, and bisexual adults. *Developmental Psychology*, *47*(6), 1658-1673.

Choi, K. H., Gibson, D. R., Han, L., & Guo, Y. (2004). High levels of unprotected sex with men and women among men who have sex with men: a potential bridge of HIV transmission in Beijing, China. *AIDS education and Prevention*, *16*(1), 19-30.

Colby, D. J. (2003). HIV knowledge and risk factors among men who have sex with men in Ho Chi Minh City, Vietnam. *JAIDS Journal of Acquired Immune Deficiency Syndromes*, *32*(1), 80-85.

DeLamater, J. (1981). The social control of sexuality. *Annual Review of Sociology*, 263-290.

Diamond, L. M. (2008). Female bisexuality from adolescence to adulthood: results from a 10-year longitudinal study. *Developmental Psychology*, *44*(1), 5-14.

Diez Roux, A. V. (2001). Investigating neighborhood and area effects on health. *American Journal of Public Health*, *91*(11), 1783-1789.

EMIS Network. *EMIS 2010: The European Men-Who-Have-Sex-With-Men Internet Survey. Findings from 38 countries.* Stockholm: European Centre for Disease Prevention and Control; 2013, http://www.emis-project.eu.

Fine, M. (1988). Sexuality, schooling, and adolescent females: The missing discourse of desire. *Harvard Educational Review*, *58*(1), 29-54.

Gagnon, J. H., & Simon, W. (2011). *Sexual conduct: The social sources of human sexuality*.

Transaction Publishers.

Hatzenbuehler, M. L. (2011). The social environment and suicide attempts in lesbian, gay, and bisexual youth. *Pediatrics, 127*(5), 896-903.

Hatzenbuehler, M. L., & Link, B. G. (2014). Introduction to the special issue on structural stigma and health. *Social Science & Medicine*, (103), 1-6.

Hatzenbuehler, M. L., Bellatorre, A., Lee, Y., Finch, B. K., Muennig, P., & Fiscella, K. (2014). Structural stigma and all-cause mortality in sexual minority populations. *Social Science & Medicine, 103*, 33-41.

Hatzenbuehler, M. L., Keyes, K. M., & Hasin, D. S. (2009). State-level policies and psychiatric morbidity in lesbian, gay, and bisexual populations. *American Journal of Public Health*, *99*(12), 2275-2281.

Hatzenbuehler, M. L., Phelan, J. C., & Link, B. G. (2013). Stigma as a fundamental cause of population health inequalities. *American Journal of Public Health*, *103*(5), 813-821.

Herdt, G. (1996). Third sex, third gender. *Beyond sexual dimorphism in culture and history. New York.*

International Lesbian, Gay, Bisexual, Trans, and Intersex Association Europe. Rainbow Europe Map and Country Index (May 2010). http://www.ilga-europe.org/home publications/reports_and_other_materialsrainbow_europe_map_and_country_index_may _2010. Accessed September 7, 2014.

Keene, D. M., Eldahan, A. I., White-Hughto, J. M., & Pachankis, J. E. (2016). Sexual minority stigma, mobility, and health: The experiences of gay and bisexual men in two small cities. Unpublished manuscript. Yale University, New Haven, CT.

Lambevski, S. A. (1999). Suck my nation: Masculinity, ethnicity and the politics of (homo) sex. *Sexualities, 2*(4), 397-419.

McClintock, M. K., & Herdt, G. (1996). Rethinking puberty: The development of sexual attraction. *Current Directions in Psychological Science*, 178-183.

Michaels, S., & Lhomond, B. (2006). Conceptualization and measurement of homosexuality in sex surveys: a critical review. *Cadernos de Saúde Pública*, *22*(7), 1365-1374.

Mock, S. E., & Eibach, R. P. (2012). Stability and change in sexual orientation identity over a 10-year period in adulthood. *Archives of Sexual Behavior*, *41*(3), 641-648.

Oldenburg, C., Perez-Brumer, A., Hatzenbuehler, M., Krakower, D., Novak, D., Mimiaga, M., & Mayer, K. (2014). Structural Stigma affects access to pre-and post-exposure prophylaxis and hiv risk among men who have sex with men (MSM) in the United States. *AIDS Research and Human Retroviruses*, *30*(S1), A22-A23.

Oyserman, D., Smith, G. C., & Elmore, K. (2014). Identity- based motivation: Implications for health and health disparities. *Journal of Social Issues*,*70*(2), 206-225.

Pachankis, J. E., Cochran, S. D., & Mays, V. M. (2015). The mental health of sexual minority adults in and out of the closet: A population-based study. *Journal of Consulting and Clinical Psychology*, *83*(5), 890-901.

Pachankis, J. E., Hatzenbuehler, M. L., & Starks, T. J. (2014). The influence of structural stigma and rejection sensitivity on young sexual minority men's daily tobacco and alcohol use. *Social Science & Medicine*, *103*, 67-75.

Pachankis, J. E., Hatzenbuehler, M. L., Hickson, F., Weatherburn, P., Berg, R. C., Marcus, U., & Schmidt, A. J. (2015). Hidden from health: structural stigma, sexual orientation concealment, and HIV across 38 countries in the European MSM Internet Survey. *AIDS*, *29*(10), 1239-1246.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (Vol. 1). Sage.

Risman, B., & Schwartz, P. (1988). Sociological research on male and female homosexuality. *Annual Review of Sociology*, 125-147.

Rosenbluth, S. (1997). Is sexual orientation a matter of choice? *Psychology of Women Quarterly*, *21*(4), 595-610.

Ross, M. W., Berg, R. C., Schmidt, A. J., Hospers, H. J., Breveglieri, M., Furegato, M., & Weatherburn, P. (2013). Internalised homonegativity predicts HIV-associated risk behavior in European men who have sex with men in a 38-country cross-sectional study: some public health implications of homophobia. *BMJ Open*, *3*(2), e001928.

Savin-Williams, R. C. (1990). *Gay and lesbian youth: Expressions of identity*. Hemisphere Publishing Corp.

Savin-Williams, R. C. (2006). Who's gay? Does it matter? *Current Directions in Psychological Science*, *15*(1), 40-44.

Savin-Williams, R. C., & Diamond, L. M. (2000). Sexual identity trajectories among sexual minority youths: Gender comparisons. *Archives Of Sexual Behavior*, *29*(6), 607-627.

Savin-Williams, R. C., & Ream, G. L. (2007). Prevalence and stability of sexual orientation components during adolescence and young adulthood. *Archives of Sexual Behavior*, *36*(3), 385-394.

Schmitt, D. P. (2005). Sociosexuality from Argentina to Zimbabwe: A 48-nation study of sex, culture, and strategies of human mating. *Behavioral and Brain Sciences*, *28*(02), 247-275.

Stein, E. (2001). *The mismeasure of desire: The science, theory, and ethics of sexual orientation*. New York, NY: Oxford University Press.

Stephens-Davidowitz, S. (2014). Estimating the closeted gay male population. Future Perfect? Social Sciences in Public Health conference. Columbia University, New York, NY.

Tolman, D. L., & Diamond, L. M. (2001). Desegregating sexuality research: Cultural and

biological perspectives on gender and desire. *Annual Review of Sex Research*, *12*(1), 33-74.

Troiden, R. R. (1988). *Gay and lesbian identity: A sociological analysis*. Rowman & Littlefield.

Twenge, J. M., Sherman, R. A., & Wells, B. E. (2016). "Changes in American adults' reported same-sex sexual experiences and attitudes, 1973–2014." *Archives of Sexual Behavior*, 1-18.

Udry, J. R., & Billy, J. O. (1987). Initiation of coitus in early adolescence. *American Sociological Review*, 841-855.

Udry, J. R. (1988). Biological predispositions and social control in adolescent sexual behavior. *American Sociological Review*, 709-722.

Wade, A. S., Kane, C. T., Diallo, P. A. N., Diop, A. K., Gueye, K., Mboup, S., ... & Lagarde, E. (2005). HIV infection and sexually transmitted infections among men who have sex with men in Senegal. *AIDS*, *19*(18), 2133-2140.

Weatherburn, P., Schmidt, A. J., Hickson, F., Reid, D., Berg, R. C., Hospers, H. J., & Marcus, U. (2013). The European Men-who-have-sex-with-men internet survey (EMIS): design and methods. *Sexuality Research and Social Policy*, *10*(4), 243-257.

Weeks, J. (1985). Sexuality and its discontents: Myths, meanings, and modern sexualities. London: Routledge & Kegan Paul.

Whitam, F. L., Diamond, M., & Martin, J. (1993). Homosexual orientation in twins: A report on 61 pairs and three triplet sets. *Archives of Sexual Behavior*, *22*(3), 187-206.

Yun, K., Xu, J. J., Reilly, K. H., Zhang, J., Jiang, Y. J., Wang, N., & Shang, H. (2011). Prevalence of bisexual behaviour among bridge population of men who have sex with men in China: a meta-analysis of observational studies. *Sexually Transmitted Infections*, 87(7), 563 – 570.

Table 1. Characteristics of Study Respondents in the European MSM Internet Survey (N = 174,209) [a]

| Demographic Characteristics | *n* | % | | *n* | % |
|---|---|---|---|---|---|
| Sexual attraction | | | Settlement size | | |
| Only to men | 123,974 | 71.2 | ≥ 1 million | 52,016 | 29.9 |
| Mostly to men and sometimes to women | 33,237 | 19.1 | 500,000-999,999 | 25,523 | 14.7 |
| Both to men and women equally | 9,213 | 5.3 | 100,000-499,999 | 36,776 | 21.1 |
| Mostly to women and sometimes to men | 6,966 | 4.0 | 10,000-99,999 | 33,755 | 19.4 |
| Only to women | 236 | 0.1 | <10,000 | 21,832 | 12.5 |
| Sexual behavior (past 12 months) | | | HIV diagnosis | | |
| Only men | 141,435 | 82.1 | Diagnosed positive | 13,353 | 7.7 |
| Men and women | 19,478 | 11.2 | Last test negative or untested | 159,633 | 91.6 |
| Only women | 2,730 | 1.6 | Immigration status | | |
| No sex in the past 12 months | 8,668 | 5.0 | Not born in current country | 23,371 | 13.4 |
| Sexual orientation identity | | | Born in current country | 146,311 | 84.0 |
| Gay or homosexual | 132,498 | 76.1 | Employment status | | |
| Bisexual | 26,292 | 15.1 | Employed/student/retired/sick leave | 163,752 | 94.0 |
| Straight or heterosexual | 1,331 | 0.8 | Unemployed | 10,457 | 6.0 |
| Any other term | 1,497 | 0.9 | Country-level stigma | | |
| I don't usually use a term | 12,195 | 7.0 | High (above median) | 38,316 | 22.0 |
| Relationship status | | | Low (below median) | 135,893 | 78.0 |
| Single | 93,635 | 53.7 | | | |
| Steady relationship | 80,097 | 45.9 | | | |
| Education (ISCED levels [b]) | | | | **Mean** | **SD** |
| Low (ISCED 1,2) | 14,000 | 8.0 | Age | 34.06 | 11.27 |
| Mid (ISCED 3,4) | 72,599 | 41.7 | | Median = 32 | |
| High (ISCED 5,6) | 86,269 | 49.5 | | Interquartile range = 25-42 | |

[a] Percentages may not equal 100 due to missing data. [b] ISCED: 1997 International Standardized Classification of Educational Degrees.

Table 2. Associations between structural stigma, population size, and sexual minority men's odds of bisexual or heterosexual attraction, behavior, and identity: European MSM Internet Survey (EMIS)

| **Odds of bisexual or heterosexual identity (vs. gay/homosexual identity), *n* = 150,539** | | | | | | |
|---|---|---|---|---|---|---|
| | **Model 1** | | | **Model 2** | | |
| **Variable** | **AOR** | **95% CI** | ***p*** | **AOR** | **95% CI** | ***p*** |
| Structural stigma | 1.35 | 1.19, 1.54 | < .001 | 1.39 | 1.22, 1.58 | < .001 |
| Small settlement size | 1.62 | 1.51, 1.74 | < .001 | 1.59 | 1.49, 1.71 | < .001 |
| Structural stigma * small town | -- | -- | -- | 0.94 | 0.87, 1.02 | .160 |
| **Odds of bisexual or heterosexual behavior (vs. exclusively homosexual behavior) (past 12 months), n = 154,250** | | | | | | |
| | **Model 1** | | | **Model 2** | | |
| **Variable** | **AOR** | **95% CI** | ***p*** | **AOR** | **95% CI** | ***p*** |
| Structural stigma | 1.33 | 1.20, 1.47 | < .001 | 1.37 | 1.24, 1.52 | < .001 |
| Small settlement size | 1.49 | 1.39, 1.60 | < .001 | 1.45 | 1.36, 1.55 | < .001 |
| Structural stigma * small town | -- | -- | -- | 0.92 | 0.84, 0.99 | .043 |
| **Odds of bisexual or heterosexual attraction (vs. exclusively/mostly homosexual attraction), n = 163,108** | | | | | | |
| | **Model 1** | | | **Model 2** | | |
| **Variable** | **AOR** | **95% CI** | ***p*** | **AOR** | **95% CI** | ***p*** |
| Structural stigma | 1.18 | 1.04, 1.35 | .015 | 1.26 | 1.11, 1.44 | .001 |
| Small settlement size | 1.50 | 1.37, 1.65 | < .001 | 1.45 | 1.34, 1.57 | < .001 |
| Structural stigma * small town | -- | -- | -- | 0.86 | 0.79, 0.93 | .001 |

Note: All models were adjusted for age, relationship status, HIV status, education, employment status, immigration status, and country-level income inequality. Model 2 includes interaction term, structural stigma*settlement size. AOR = adjusted odds ratio, CI = confidence interval

Figure 1. *Proportion of MSM identifying as heterosexual or bisexual by country-level structural stigma.*

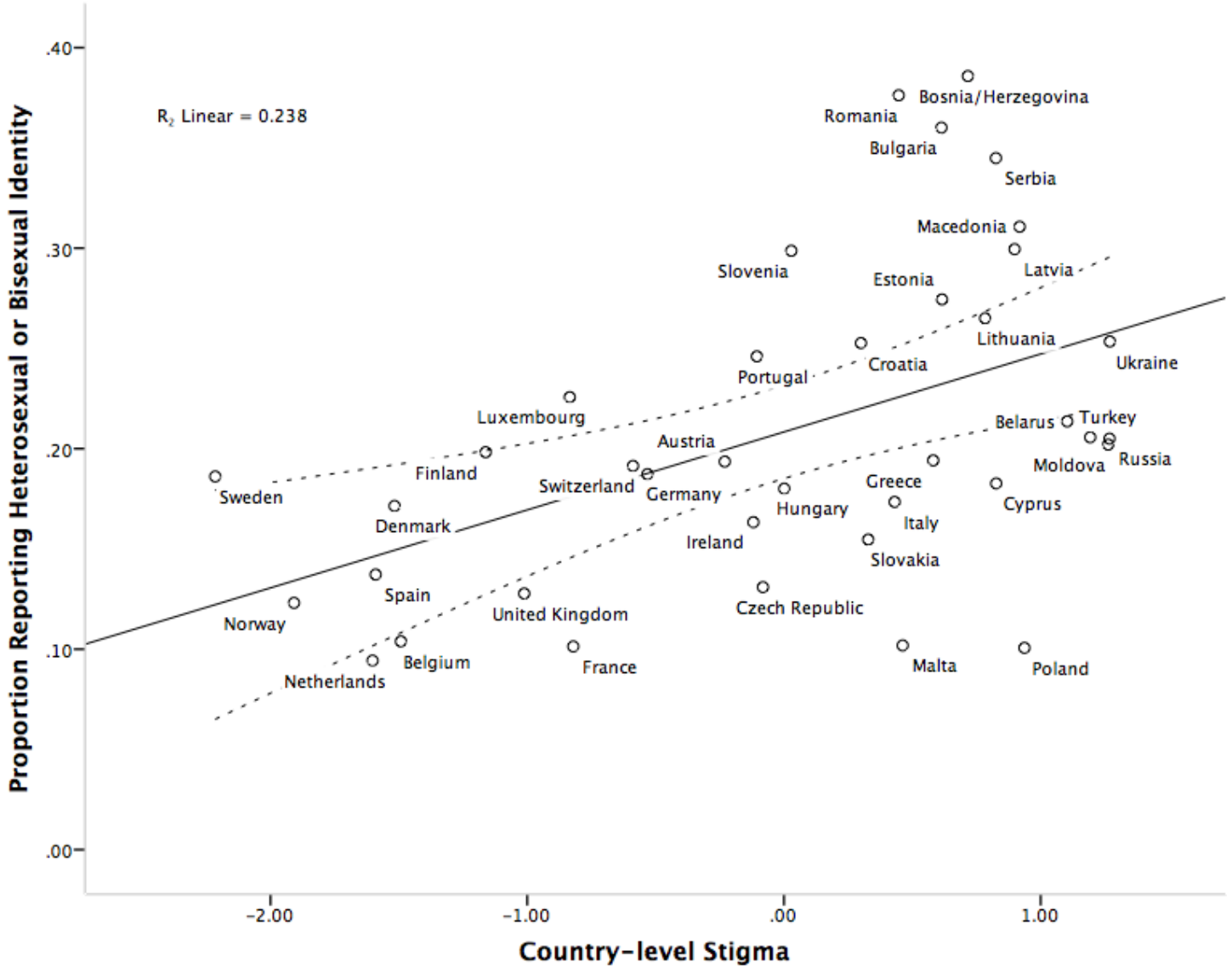

Figure 2. *Proportion of MSM reporting sex with women by country-level structural stigma.*

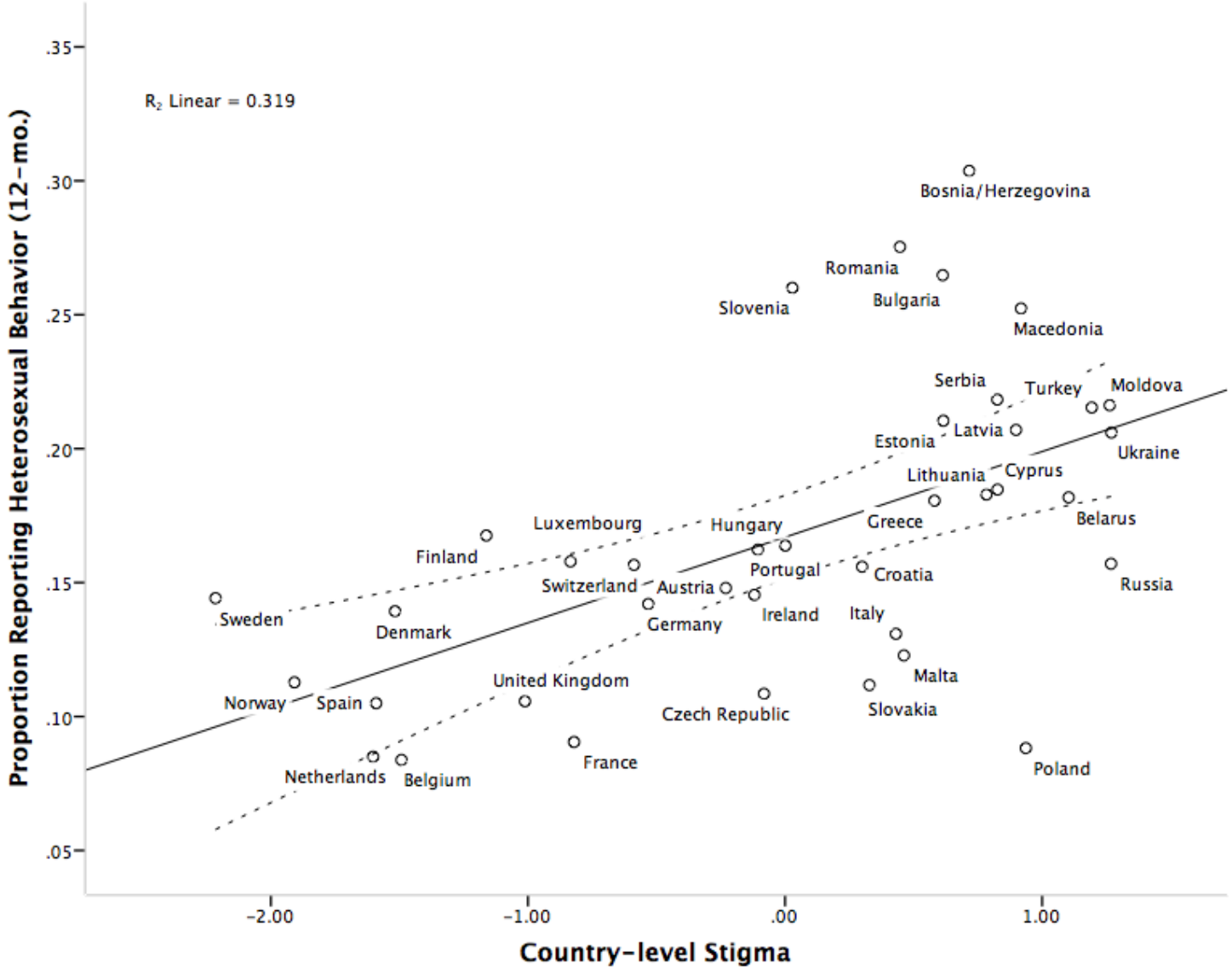

Figure 3. *Proportion of MSM reporting attraction to women by country-level structural stigma.*

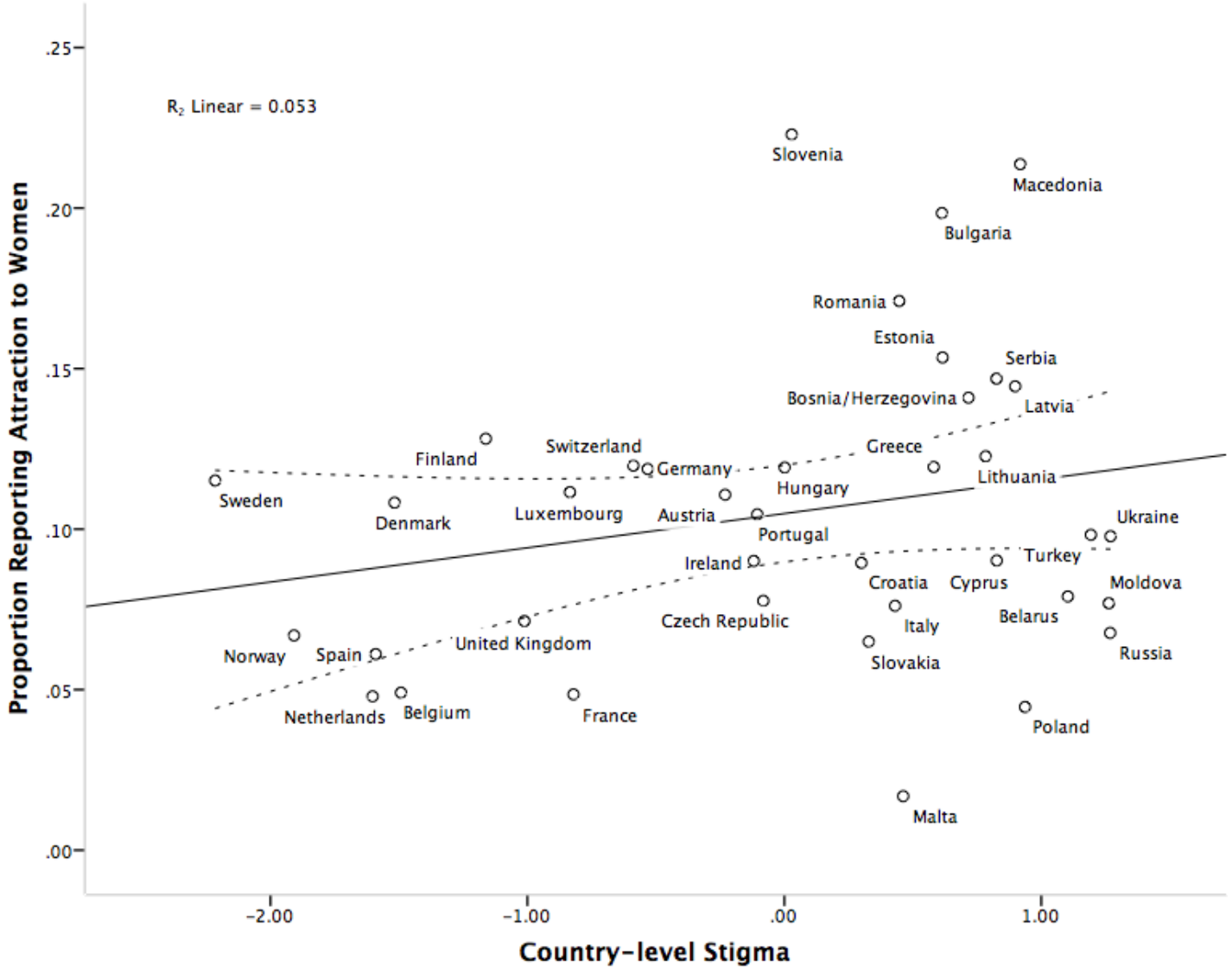

Figure 4. *Interaction between country-level structural stigma and settlement size in predicting odds of bisexual or heterosexual (compared to exclusively homosexual) attraction.*

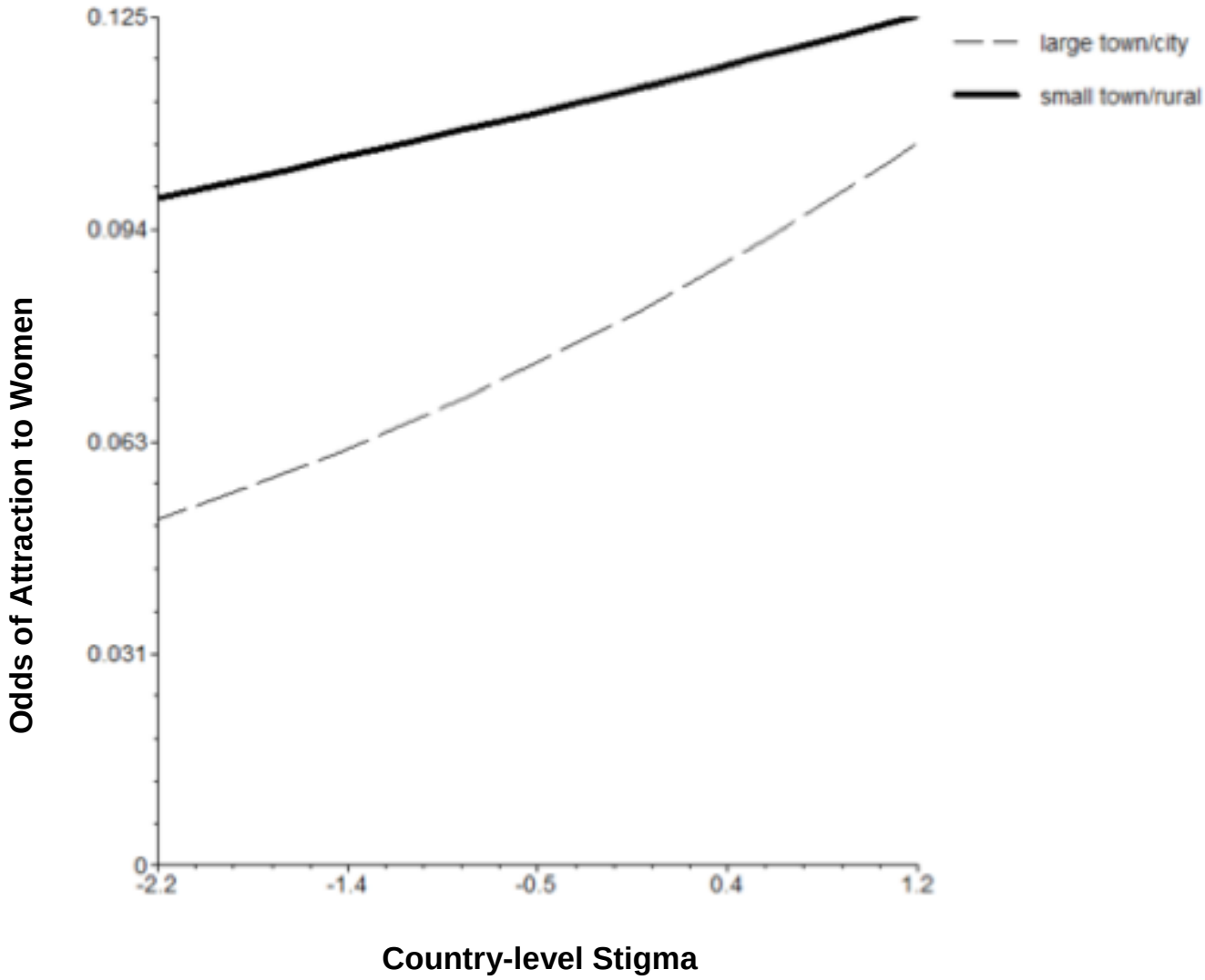

Figure 5. *Interaction between country-level structural stigma and settlement size in predicting odds of bisexual or heterosexual (compared to exclusively homosexual) behavior.*