

**Structural Stigma and Sexual Minority Men’s Depression and Suicidality: A Multi-Level Examination of Mechanisms and Mobility Across 48 Countries**

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**Abstract**

Sexual minority men are at greater risk of depression and suicidality than heterosexuals. Stigma, the most frequently hypothesized risk factor for this disparity, operates across socioecological levels—structural (e.g., laws), interpersonal (e.g., discrimination), and individual (e.g., self-stigma). Although the literature on stigma and mental health has focused on interpersonal and individual forms of stigma, emerging research has shown that structural stigma is also associated with adverse mental health outcomes. However, there is limited data on whether changes in structural stigma, such as when a stigmatized person moves to a lower stigma context, affect mental health, and on the mechanisms underlying this association. To address these questions, we use data from the 2017/18 European Men-who-have-sex-with-men Internet Survey ( $n=123,428$ ), which assessed mental health (i.e., Patient Health Questionnaire) and psychosocial mediators (i.e., sexual orientation concealment, internalized homonegativity, and social isolation). We linked these data to an objective indicator of structural stigma related to sexual orientation—including 15 laws and policies as well as aggregated social attitudes—in respondents' countries of origin ( $N=178$ ) and receiving ( $N=48$ ) countries. Among respondents who moved from higher-to-lower structural stigma countries ( $n=11,831$ ), longer exposure to the lower structural stigma environments of their receiving countries was associated with a significantly: 1) lower risk of depression and suicidality; 2) lower odds of concealment, internalized homonegativity, and social isolation; and 3) smaller indirect effect of structural stigma on mental health through these mediators. This study provides additional evidence that stigma is a sociocultural determinant of mental health.

**Key words:** structural stigma, mental health, sexual minorities, sociocultural risk factors for psychopathology

**General Scientific Summary**

Using a large international dataset, this study finds that sexual minority men's risk of depression and suicidality is associated with the legal protections and social attitudes toward sexual minorities (i.e., structural stigma) in the countries in which they live. Among sexual minority men who still live in their country of birth, structural stigma is related to depression and suicidality via two psychosocial risk factors: internalized homonegativity and social isolation. Sexual minority men who moved from higher- to lower-stigma countries, and who had longer exposure to these low-stigma contexts (i.e.,  $\geq 5$  years), experienced significantly less depression and suicidality as well as lower levels of psychosocial risk factors for psychopathology.

### **Structural Stigma and Sexual Minority Men's Depression and Suicidality: A Multi-Level Examination of Mechanisms and Mobility Across 48 Countries**

Sexual minority men (e.g., individuals who identify as gay or bisexual and/or engage in same-sex sexual behaviors) represent one of the highest-risk groups for depression and suicidality, with meta-analytic evidence consistently indicating that they are between 1.5-4 times more likely to experience internalizing psychopathology and associated comorbidity (i.e., suicidality) compared to heterosexuals (e.g., King et al., 2008; Meyer, 2003a; Ross et al., 2018). Recent evidence suggests that depression and suicide may have even surpassed HIV as a burden to sexual minority men's health in North America (Bromberg et al., 2020; Hottes et al., 2015). Stigma—which occurs when labeling, stereotyping, status loss, and discrimination exist within a context of unequal power—compromises the mental health of disenfranchised groups worldwide (Hatzenbuehler, Link, & Phelan, 2013), including sexual minorities (Meyer, 2003a).

Although stigma manifests at structural (e.g., laws), interpersonal (e.g., victimization), and individual (e.g., self-stigma) levels (Link & Phelan, 2001), most research documents the mental health effects of interpersonal and individual stigma (Major & O'Brien, 2005). For instance, interpersonal stigma, such as discrimination and other forms of status-based rejection, are consistently associated with poor mental health among sexual minority populations (e.g., Bostwick, Boyd, Hughes, West, & McCabe, 2014; Everett, Saint Onge, & Mollborn, 2016). Individual stigma manifests as the internalization of negative societal attitudes (i.e., self-stigma) and chronic, anxious expectations of rejection. Sexual minorities who report more self-stigma (e.g., Newcomb & Mustanski, 2010) and expectations of rejection (e.g., Feinstein, Goldfried, & Davila, 2012) have higher levels of adverse mental health outcomes. The dearth of research on the mental health consequences of structural stigma—defined as societal-level conditions, cultural norms, and institutional policies and practices that constrain the lives of the stigmatized

(Hatzenbuehler & Link, 2014)—is partly due to methodological challenges. In particular, few datasets contain sufficient variation in structural stigma across geographical units from which to predict mental health.

Despite these challenges, researchers have begun evaluating associations between structural stigma and mental health (Hatzenbuehler, 2016). This research has focused on sexual minorities, which represent one of the few stigmatized groups for whom structural stigma is heterogeneous and rapidly changing across geographies. This work has shown, for example, that lesbian, gay, and bisexual (LGB) populations have lower life satisfaction, an indicator of mental health, if they live in European countries with high (vs. low) levels of structural stigma, measured as LGB-specific discriminatory country-level policies and population attitudes (Pachankis & Bränström, 2018). Studies in the U.S. have similarly found that the sexual orientation disparity in psychiatric morbidity is significantly larger in high-structural stigma states, defined as states whose hate crime laws and employment non-discrimination acts lack protections based on sexual orientation (Hatzenbuehler et al., 2009). These observational studies have been complemented by quasi-experimental evidence showing that LGB populations' rates of psychological distress increase following increases in structural stigma (e.g., laws denying services to same-sex couples; Raifman et al., 2018), and decrease following decreases in structural stigma (e.g., reductions in discriminatory laws and prejudicial attitudes; Hatzenbuehler et al., 2018).

This research has provided important insights, but a number of important questions remain. First, because most population-based mental health surveys do not measure respondents' geographic mobility, previous research has not been able to account for the possibility of differential mobility by mental health status, whereby people with better mental health are more likely to move in general or more likely to move to certain types of structural stigma

environments, particularly to lower-stigma contexts. Differential mobility would confound associations between structural stigma and mental health. However, limiting analyses to non-movers would rule out this confound and thereby strengthen evidence for the association between structural stigma and mental health.

Second, with the exception of some quasi-experimental studies (Everett et al., 2016; Hatzenbuehler et al., 2010; Raifman et al., 2018), most research treats exposure to structural stigma as a static experience. Thus, there is limited data on whether changes in structural stigma affect mental health. One way to approach this question is through studying stigmatized individuals who move to a different structural-stigma context. Such an opportunity would allow researchers to examine whether changes in exposure to environments diverse in terms of structural stigma are related to mental health, a particularly relevant question in light of widespread global geographic mobility (International Organization for Migration, 2019). However, examining whether this change in the structural stigma context is associated with mental health requires a novel data structure that includes: 1) a large sample of respondents who have moved; 2) linkage to objective indicators of structural stigma in countries of origin and receiving countries; and 3) data on length of exposure to the receiving country and on mental health. Until recently, the lack of such data has precluded researchers from leveraging mobility patterns to examine life-course variations in structural stigma exposure as a predictor of mental health.

Third, despite growing evidence that structural stigma is a risk indicator for adverse mental health outcomes (Hatzenbuehler, 2016), few studies have identified mediating pathways, given the relative lack of datasets spanning structurally diverse contexts that also include measures of potential psychosocial mechanisms. Minority stress theory (Meyer, 2003) and existing research on structural stigma (Hatzenbuehler, 2016) suggest that several stigma-related

psychosocial processes might explain the association between structural stigma and sexual minority mental health.

Sexual orientation concealment represents one potential mechanism linking structural stigma to poor mental health. In fact, psychological theories of identity concealment suggest that concealment is context-dependent and largely a function of one's environment, with some environments being particularly threatening, and thereby strongly motivating concealment (Pachankis, 2007). However, most research into environmental determinants of concealment has focused on interpersonal stigma within the immediate social environment, such as from family (Rosario, Schrimshaw, & Hunter, 2009), rather than on structural stigma. Nonetheless, a few studies have shown that individuals are more likely to conceal their stigmatized identities in more structurally stigmatizing environments (Miller et al., 2011; Pachankis et al., 2015; Pachankis & Bränström, 2018). Yet, whether sexual orientation concealment mediates the association between structural stigma and poor mental health remains unknown.

Internalized homonegativity refers to the incorporation of heteronormative societal bias into one's self concept and represents a second potential mechanism linking structural stigma to poor mental health (Newcomb & Mustanski, 2010). Inherent to the definition of internalized homonegativity is its primary source in structural stigma, including the assumption that internalized homonegativity "stem[s] from negative stereotypes and myths about homosexuality that permeate mainstream society and are absorbed from one's culture(s)" (Shidlo, 1994; p. 178). Still, most research has examined internalized homonegativity as a function of interpersonal factors, such as daily discrimination (e.g., Feinstein, Goldfried, & Davila, 2012). Similar to the state of research on structural stigma and concealment, a few studies have found associations between structural stigma and internalized homonegativity (e.g., Berg et al., 2013; Ross et al.,

2013), but none have examined whether internalized homonegativity mediates the association between structural stigma and poor mental health.

Social isolation represents a final plausible mediator of the association between structural stigma and poor mental health. Sexual minorities experience more social isolation than heterosexuals across the lifespan; in turn, social isolation is associated with poor mental health outcomes among sexual minorities (e.g., Bränström et al., 2020). Although stigma in the form of interpersonal discrimination is particularly likely to result in social isolation among sexual minorities, even more so than among racial/ethnic minorities (Hatzenbuehler et al., 2009), we are aware of only one study that has examined whether another source of social isolation among sexual minorities might lie in structural stigma (Perales & Todd, 2018). In that study, sexual minorities in Australia reported worse life satisfaction as well as poorer mental health in high structural stigma communities, which were defined as constituencies where the residents were more likely to have voted against same-sex marriage in a national plebiscite on proposed same-sex marriage legislation; a lack of perceived social support mediated the association between structural stigma and mental health (Perales & Todd, 2018). Like concealment and internalized homonegativity, social isolation represents a plausible mediator of the link between structural stigma and mental health because it captures the ways in which societal norms and attitudes become enacted by the individual to shape their day-to-day cognitive, affective, and behavioral experience. Finding support for these three psychosocial mediators linking structural stigma and mental health would not only strengthen causal inference regarding this association, but also suggest potential intervention targets for reducing negative mental health sequelae of structural stigma.

To address these outstanding questions in the emerging literature on structural stigma, we take advantage of a unique dataset called the European Men-who-have-sex-with-men Internet



Survey (EMIS-2017; Weatherburn, Hickson, Reid, Marcus, & Schmidt, 2019), which includes a large number of sexual minority men ( $n=127,792$ ) living in 48 European and nearby countries. EMIS-2017 permits several strong tests of our research questions. First, from its inception, it has sought to capture the diverse structural contexts surrounding sexual minorities across Europe (The EMIS Network, 2013) and includes valid mental health assessments. Because country-level structural stigma can be assessed objectively via laws, policies, and community attitudes, associations with mental health are not likely to be biased by self-reported stigma exposure (Meyer, 2003b). Second, EMIS-2017 includes measures of several plausible mechanisms linking structural stigma to mental health. Third, EMIS-2017 includes participants born in 179 countries; 11,831 of these participants had moved from higher-to-lower stigma contexts, thereby providing a unique opportunity to examine whether changes in exposure to structural stigma is associated with risk of poor mental health. Finally, EMIS-2017's assessment of movement away from one's country of birth allows us to rule out any influence of differential mobility by mental health by performing separate analyses for non-movers and movers.

The present study takes advantage of these methodological strengths to test the following four hypotheses. First, based on evidence from prior studies within a single country (Hatzenbuehler, 2016), we hypothesize that greater country-level structural stigma toward sexual minorities will be associated with depression and suicidality among sexual minority men who continue to live in their country of birth (i.e., non-movers). Second, we hypothesize that sexual orientation concealment, internalized homonegativity, and social isolation will mediate the association between structural stigma and depression and suicidality among non-movers. Third, among sexual minority men who have moved from higher-to-lower structural stigma countries, we predict that the association between country-of-origin structural stigma and mental health will be weaker with longer exposure to the lower-structural stigma receiving country, operationalized

as greater number of years living in the receiving country. Fourth, among movers, we hypothesize that the indirect effect of country-of-origin structural stigma on depression and suicidality will be significantly smaller among those with longer exposure to the lower-structural stigma environments of their receiving countries.

## Method

### Participants

Participants in the EMIS-2017 were recruited between October 2017 and January 2018 across the 28 European Union countries (at the time of the study), plus Norway, Iceland, Switzerland, Turkey, Lebanon, Israel, Moldova, Belarus, Ukraine, Russia, the Balkans, and European microstates. The EMIS-2017 represents a joint effort of European-wide government health institutes, academic programs, non-governmental organizations, and online media partners. Recruitment was conducted on local, national, and international sexual minority men's social-sexual networking apps and social media. Eligibility criteria included being old enough to have sex with men in the country of residence, male gender identity, having had sex with men and/or being sexually attracted to men, and providing informed consent (Weatherburn et al., 2019).

Across the 48 countries, 123,428 respondents completed all main study variables. Per-country samples ranged from 108 participants in Iceland to 22,317 in Germany. Most respondents ( $n=106,883$ ) were born in their current country of residence (i.e., non-movers). Of movers ( $n=16,545$ ), the majority (71.5%;  $n=11,831$ ) had moved to a country with lower levels of structural stigma than their country of origin, according to the structural stigma index described below. Because movers from lower-to-higher structural stigma countries ( $n=4,714$ ) differed from those who moved from higher-to-lower structural stigma countries ( $n=11,831$ ) in important respects (i.e., older, more likely to be partnered, less likely to live in a big city, more likely to

have moved for work, less likely to have moved to live openly as LGBT or to seek asylum, and more likely to have moved as young children or middle/older adults), we conducted the analyses for this group of movers separately, as detailed in the Online Supplement.

## Measures

**Country-level structural stigma.** Consistent with prior research (Berg et al., 2013; Pachankis et al., 2015), structural stigma was measured via an indicator of 15 laws and policies related to sexual orientation (e.g., public accommodations protections) combined with country-level attitudes towards sexual minorities among each country's residents. Using this approach, we created a measure of structural stigma for the 48 current countries of residence represented in EMIS-2017 and the 178 countries of origin used in analyses restricted to movers.

The measure of laws and policies (International Lesbian, Gay, Bisexual, Trans and Intersex Association, 2017) included three areas of legislation: legal discrimination and criminalization; recognition; and protection (see Supplemental Table 1). To create the index, negative scores were assigned for each form of protection and positive scores for each form of discrimination (range: +15 to -13). The range across the 48 EMIS-2017 countries was +6 to -13 (mean: -9.89, SD: 3.03) and, across the 178 countries of origin, +13 to -13 (mean: -4.17, SD: 5.37).

The measure of population attitudes towards homosexuality was obtained from the Global Acceptance Index (GAI; Flores, 2019), which provides a country-aggregated score based on 5,236,837 responses to 67 questions about acceptance of LGBT people contained in 11 international surveys (e.g., Gallup World Poll, World Values Survey) from the years 2014-2017 (range: 1.60 to 8.90, mean=4.55, SD=1.72). For the 11 small-population countries not contained in the GAI, we imputed the score from the two most similar countries' score on the laws/policies

index. The direction and magnitude of results remained the same when these countries were excluded.

Because the index of laws and policies was highly correlated with the index of social attitudes ( $r=0.73$ ), we combined them into one index and weighted them equally, consistent with prior work on this topic (e.g., Pachankis et al., 2015). Our combination of these two measures of structural stigma is further supported by existing research showing that legal policies and social attitudes often co-occur and recursively influence each other (Tankard & Paluck, 2017).

Specifically, we combined these two measures (i.e., laws/policies and social attitudes) for each country by standardizing each, summing them to create one index, and linking the resulting index to the EMIS-2017 dataset. The  $z$ -standardized scores, which ranged from -1.64 to 2.11 across the 48 EMIS-2017 countries, and from -2.22 to 1.91 across the 178 countries of origin, were used in all analyses; higher scores indicate higher levels of structural stigma.

Supplementary Table 3 lists the score and rank of each country.

Supporting the construct validity of our measurement of structural stigma, previous research has found this composite approach of combining laws and aggregated norms to be associated with sexual orientation concealment (Pachankis et al., 2015), internalized homonegativity (Berg et al., 2013), life satisfaction (Pachankis & Bränström, 2018), and HIV prevention behaviors (Pachankis et al., 2015) in predicted directions among international samples of sexual minorities.

In addition to using these structural stigma indices as the primary study predictor, we also used them to characterize the sample of movers. Specifically, we classified movers from higher-to-lower structural stigma countries as those who were born in a country of origin with a relatively higher structural stigma score than that of their current country. By controlling for structural stigma in participants' country of origin, all analyses involving the sample of movers

adjusted for the magnitude of the difference between structural stigma in participants' country of origin and structural stigma in participants' current (i.e., receiving) country.

**Mental health outcomes.** Depression was assessed with the 2-item version of the Patient Health Questionnaire (PHQ-2) for depression, in which respondents indicate how often they had been bothered by depressed feelings and anhedonia during the past two weeks, with response options ranging from “not at all” (0) to “nearly every day” (3). Responses were summed for the primary analyses and were dichotomized at  $\geq 3$  to illustrate between-country differences in the proportion of respondents exceeding this valid cutoff (Kroenke et al., 2003). A meta-analysis of 100 studies (Levis et al., 2020) finds that the PHQ-2's sensitivity (0.72 [0.67-0.77]) and specificity (0.85 [0.83-0.87]) are comparable to the sensitivity (0.82 [0.76-0.86]) and specificity (0.87 [0.84-0.89]) of administering the PHQ-2 followed by the full PHQ-9, making the PHQ-2 suitable for use in studies such as the EMIS-2017 that seek to reduce participant burden. We use the term “depression” to refer to this outcome and are careful to note that the PHQ is not intended to diagnose major depressive disorder.

Suicidality was measured by one item from the PHQ-9 (Kroenke, Spitzer, & Williams, 2001) concerning the frequency of experiencing “thoughts that you would be better off dead, or of hurting yourself in some way” during the past two weeks, with response options ranging from “not at all” (1) to “nearly every day (4).” This variable was treated continuously and also dichotomized at “not at all” to illustrate between-country differences in the proportion of respondents exceeding this valid cutoff (Simon et al., 2013).

**Psychosocial mediators.** We examined three mediators of the association between structural stigma and mental health: sexual orientation concealment, internalized homonegativity, and social isolation. Sexual orientation concealment was measured with the question: “Thinking about all the people who know you (including family, friends and work or

study colleagues), what proportion know that you are attracted to men?” (from “none” (1) to “all or almost all” (5)). Respondents indicated their internalized homonegativity in response to seven statements (e.g., “Social situations with gay men make me feel uncomfortable”) about one’s comfort with homosexuality assessed on a 7-point scale (from “strongly agree” to “strongly disagree”) (Tran, Ross, Diamond, Berg, Weatherburn, & Schmidt, 2018). Respondents indicated their perceived lack of access to tangible help from others in times of need (i.e., social isolation) in response to the 4-item “reliable alliance” subscale of the Social Provisions Scale (e.g., “There are people I can count on in an emergency”) using a 4-point scale (from “strongly agree” to “strongly disagree,” reverse scored; Cutrona & Russell, 1983). All mediators were examined continuously.

**Moderators.** Among movers, we used number of years living in the receiving country as a continuous indicator of length of exposure to structural stigma. To illustrate moderation, we categorized this variable in terms of living in the receiving country for  $\geq 15$  vs. 5-14 vs. 0-4 years, based on the distribution of this variable.

**Covariates.** We controlled for variables that could serve as confounders of the association between structural stigma and mental health and/or that improved model precision. At the individual level, we controlled for age, education, employment status, settlement size, and HIV diagnosis. Because some of these variables (e.g., employment) could conceivably be influenced by structural stigma (i.e., be a mediator), we additionally present results without control for these covariates in Supplemental Figure 2; the direction and magnitude remain similar in these supplemental analyses. At the country level, we controlled for each country’s gross domestic product (GDP) per capita to adjust for covariation between structural stigma and each country’s living standard ( $r=-0.25$ ). We also controlled for each country’s general mental health burden using each country’s DALYs (disability-adjusted life years; Institute for Health

Metrics and Evaluation, 2017) lost to mental disorders, which was also associated with structural stigma ( $r=-0.54$ ).

### **Statistical Analysis**

Analyses were performed using multilevel regression, supported by the nesting of participants within countries and the intraclass correlations across countries on the main study variables: depression (0.025), suicidality (0.013), identity concealment (0.222), internalized homonegativity (0.087), and social isolation (0.013). All multilevel models included random country-level intercepts. All predictors were modeled as fixed effects except when testing the moderating effect of time since moving among movers. For the moderation analyses, the associations between time since moving and the outcomes were allowed to vary by levels of structural stigma using random slopes. We used the maximum likelihood parameter estimates with standard errors robust to non-normality and non-independence of observations. Analyses were performed in MPlus, using complete cases and unweighted data (i.e., we allow countries represented by larger samples to contribute more heavily to the level 1 [i.e., person-level] coefficients, an approach that does not affect the level 2 [i.e., country-level] coefficients). Indirect effects were derived from bootstrapped estimates.

First, among non-movers, we examined the association between country-level structural stigma and mental health (i.e., depression and suicidality). Second, also among non-movers, we performed three multilevel mediation models to estimate the indirect effect of our proposed psychosocial mediators on the association between structural stigma and mental health. These models were conducted separately because in EMIS-2017, participants were randomly assigned to receive either the internalized homonegativity or social isolation scale. In order to facilitate comparisons of effect sizes across levels of structural stigma and to illustrate country-level differences in the proportion of sexual minority men who reported elevated depression and

suicidality, we also re-ran these models using the PHQ-2 cutoff. As a sensitivity analysis, we additionally re-ran these models removing all covariates that could be influenced by structural stigma (i.e., serve as a mediator—e.g., education) in these models. Third, among movers from higher-to-lower structural stigma countries, we ran multilevel moderation models to examine whether number of years living in the receiving country moderated the association between country-of-origin structural stigma and mental health. Finally, among these movers, we ran multilevel moderated mediation models to examine if the indirect effect of country-of-origin structural stigma on mental health through our proposed mediators would be significantly smaller among those with longer exposure to the structural stigma environments of their receiving countries.

## Results

### Descriptive Statistics

Table 1 presents sociodemographic characteristics by respondents' history of moving from their birth country. The majority of respondents were born in their current country of residence (86.6%) and identified as gay (78.4%). Respondents with a history of moving were more likely to self-identify as gay, be single, have a high level of education, live in a large city, and be diagnosed with HIV compared to non-movers.

### Association between structural stigma and depression and suicidality among non-movers

We first analyzed the association between country-level structural stigma and mental health among non-movers. Men who lived in countries with higher (vs. lower) levels of structural stigma had significantly higher levels of depression (adjusted  $\beta = 0.16$ , 95% confidence interval [CI]: 0.07, 0.25) and suicidality (adj.  $\beta = 0.03$ , 95% CI: 0.001, 0.07). Figure 1a-b presents the adjusted country-level proportions of depression and suicidality by county-level structural stigma.



**Psychosocial mechanisms linking structural stigma to depression and suicidality among non-movers**

Country-level structural stigma was strongly and positively associated with all three mediators (Figure 2). In turn, internalized homonegativity and social isolation (but not sexual orientation concealment) were associated with depression; all three mediators were associated with suicidality. There were significant indirect effects of the association between structural stigma and both depression and suicidality through internalized homonegativity and social isolation, and through sexual orientation concealment for suicidality.

When re-running these analyses using the PHQ-2 cutoff, we found a near-identical pattern of results as when using the continuous scores of the PHQ-2 items (see Figure 1a-b and Supplemental Figure 1). As a sensitivity analysis, we also re-ran analyses removing all covariates that could theoretically be associated with structural stigma. We found a near-identical pattern of results as with the fully adjusted analyses, with the exception that the indirect effect through concealment became significant for depression but non-significant for suicidality; further, the direct effects for depression and suicidality remained significant in the context of social isolation (see Supplemental Figure 2).

**Association between structural stigma and depression and suicidality among movers:****Moderation by length of exposure to lower-structural stigma receiving countries**

Among respondents who moved from higher-to-lower structural stigma countries, there was a significant association between country-of-origin structural stigma and risk of depression (adj.  $\beta=0.10$ , 95% CI: 0.05, 0.14) and suicidality (adj.  $\beta=0.026$ , 95% CI: 0.006, 0.045). However, as hypothesized, this main effect was significantly moderated by number of years living in the current country of residence (depression: adj.  $\beta=-0.33$ , 95% CI: -0.49, -0.17; suicidality: adj.  $\beta=-0.57$ , 95% CI: -0.96, -0.17).

This interaction demonstrated that those with longer exposure to lower-structural stigma environments in their receiving countries have lower risk of depression and suicidality. Country-of-origin structural stigma was associated with depression (adj.  $\beta=0.21$ , 95% CI: 0.13, 0.29) and suicidality (adj.  $\beta=0.07$ , 95% CI: 0.03, 0.11) only for those who had recently moved (within 0-4 years) from higher-to-lower structural stigma countries. There was no significant association between country-of-origin structural stigma and depression or suicidality among those who had lived in their lower-structural stigma receiving country for five years or more, and who thus had longer exposure to lower levels of structural stigma (Table 2; Supplemental Figure 3).

**Psychosocial mechanisms linking structural stigma to depression and suicidality among movers: Moderation by length of exposure to lower-structural stigma receiving countries**

We found significant indirect effects of all three mediators of the association between country-of-origin structural stigma and both depression (sexual orientation concealment: adj.  $\beta$ : 0.03, 95% CI: 0.01, 0.04; internalized homonegativity: adj.  $\beta$ : 0.08, 95% CI: 0.06, 0.11; social isolation: adj.  $\beta$ : 0.07, 95% CI: 0.04, 0.10) and suicidality (sexual orientation concealment: adj.  $\beta$ : 0.03, 95% CI: 0.01, 0.04; internalized homonegativity: adj.  $\beta$ : 0.07, 95% CI: 0.05, 0.09; social isolation: adj.  $\beta$ : 0.08, 95% CI: 0.04, 0.11). However, as hypothesized, the indirect effects of the association between structural stigma and both depression and suicidality were moderated by number of years since arriving to the lower-structural stigma receiving country (all significant at  $p < 0.05$ ). Thus, stratified mediation analyses were conducted (Table 3). These analyses show that the indirect effects of the association between country-of-origin structural stigma and mental health through the psychosocial mediators were smaller among those who have lived in their receiving country the longest (See Table 3). Supplemental Table 2 shows the associations between country-of-origin structural stigma and each mediator stratified by number of years since arriving to the lower-structural stigma receiving country. Associations between country-of-

origin structural stigma and each mediator were smaller with longer exposure to the lower structural stigma environment of their receiving country.

### **Discussion**

Stigma is increasingly recognized as a fundamental cause of poor mental health across stigmatized populations (Hatzenbuehler, Link, & Phelan, 2013). However, psychological research into the association between stigma and mental health has tended to conceptualize stigma as residing within the individual or as limited to interpersonal discriminatory encounters between individuals (Hatzenbuehler, 2016). As an alternative approach, our study locates the ultimate source of stigma in societal structures that in turn generate downstream influences on mental health through psychosocial stigma processes, including identity concealment, internalized stigma, and social isolation. Such an approach has potentially important theoretical implications for the etiology of psychopathology among stigmatized populations. Specifically, although individual and interpersonal manifestations of stigma are related to mental health across stigmatized populations (Pachankis et al., 2017), stigma is a multilevel phenomenon (Link & Phelan, 2001), and failure to examine its broadest societal manifestations potentially obscures the identification of sociocultural risk factors for psychopathology among the stigmatized. Further, in documenting interrelationships between structural and individual forms of stigma, our study begins to link structural stigma theory (Hatzenbuehler, 2016) to minority stress theory (Meyer, 2003), which have previously been examined in isolation (Frost, 2020). This integrative approach provides psychologists with a more comprehensive conceptual framework for understanding the multilevel influences on the mental health of sexual minorities.

This study advances research on structural stigma and mental health in three important respects. First, a growing body of evidence has established that structural stigma increases risk for adverse mental health outcomes among stigmatized populations (Hatzenbuehler, 2016), but

few studies have been able to rule out differential mobility by mental health status, which would confound this association. While two studies have found limited evidence of such differential selection by health among sexual minorities (Hatzenbuehler et al., 2017) and Black individuals (McKetta et al., 2017), both were conducted at the U.S. state level and used measures of self-rated health, rather than specific mental health indicators. We extend this literature by documenting associations between country-level structural stigma and depression as well as suicidality among non-movers, thereby ruling out differential selection by health as an explanation for this association.

Second, taking advantage of divergent geographic mobility patterns among EMIS-2017 respondents, this study explores whether changes in structural stigma exposures are related to mental health in ways that are consistent with structural stigma theory (Hatzenbuehler, 2016; Link & Phelan, 2001). We show that among movers from higher-to-lower structural stigma countries, those with longer exposure to lower-structural stigma environments in receiving countries—i.e., those who moved at least five years ago—have lower risk of depression and suicidality, and of experiencing the psychosocial mechanisms through which structural stigma might compromise mental health, compared to those who moved less than 5 years ago. This is one of the first studies, to our knowledge, to find support for structural stigma theory using differential mobility patterns, an approach that complements other methodological strategies employed to date, including quasi-experiments (Everett et al., 2016; Hatzenbuehler, et al., 2010; Raifman et al., 2018). The triangulation of evidence across different methods is an established procedure for causal inference (Campbell & Fiske, 1959).

Notably, although we found that length of exposure to destination-country structural stigma moderated the association between country-of-origin structural stigma and mental health for movers from higher-to-lower stigma countries, we did not find such an effect for movers

from lower-to-higher stigma countries, as reported in the Online Supplement. We suspect these divergent findings may be due, in part, to the fact that these two groups of movers differ in important respects that are likely related both to their timing of, and reasons for, moving. Specifically, movers from lower-to-higher structural stigma countries were more likely to have moved as adults and for opportunity (e.g., for work or to be with a partner) rather than duress owing to lack of opportunity in their country-of-origin (e.g., to live more openly as LGBT, to seek asylum). These findings call for additional research to understand the reasons that the influence of earlier exposure to lower stigma contexts might not wane with greater exposure to a higher stigma context, particularly among those who spent longer periods of time in lower-stigma environments before moving to higher-stigma contexts, as was the case with our sample of movers. This research might consider a developmental hypothesis whereby growing up in more protective structural environments buffers sexual minority men from mental health problems upon moving to more stigmatizing environments, regardless of the length of time they spend in the new, more stigmatizing environment. This hypothesis would be consistent with research showing that protections at the interpersonal (e.g., parental acceptance; Feinstein, Wadsworth, Davila, & Goldfried, 2014) and individual (e.g., low neuroticism; Livingston et al., 2015) levels can weaken the association between stigma exposure and mental health. By prospectively locating similarly protective features in the early structural environment that may buffer against later structural stigma exposure, this future research would begin to integrate structural stigma theory with developmental life course models of sexual minority mental health (Hammack, Frost, Meyer, & Pletta, 2018).

Third, we documented several theory-driven psychosocial mechanisms linking structural stigma and mental health, including sexual orientation concealment, internalized homonegativity, and social isolation (Meyer, 2003a). The identification of these mechanisms expands previous

research that has primarily focused on the role of discrimination as a mechanism linking structural stigma to mental health (e.g., Frost, 2020). Otherwise, very few studies have examined the ways in which structural stigma shapes the daily lives of sexual minorities. The present findings specifically suggest that hiding one's sexual orientation from others, internalizing negative societal messages about the inferiority of sexual minorities, and being isolated from reliable sources of social support represent ways in which structural stigma might "get under the skin" to generate adverse mental health. The percent reduction in the association between structural stigma and mental health was particularly strong in the context of internalized homonegativity and social isolation. These two pathways, therefore, represent potentially promising targets to address in structurally competent mental health care (Metzl & Hansen, 2014) and for consideration in culturally responsive adaptations of evidence-based psychotherapeutic interventions for this population (e.g. Pachankis, 2018), in the absence of structural reform. The identification of plausible pathways through which structural stigma influences mental health also improves causal inferences because it establishes empirical relationships that are consistent with theoretical predictions.

Effect sizes for the examined associations were small in magnitude, consistent with the fact that structural stigma represents a distal social factor that is expected to exert a smaller effect than more proximal factors, such as interpersonal discrimination, which have been the focus of most studies on sexual minority mental health (Mays & Cochran, 2001). However, even small effects can be substantively meaningful, especially when they are related to factors whose influence is hypothesized to exert impact over a large population (Greenwald et al., 2015; Prentice & Miller, 1992). For instance, we found that the odds of exceeding valid depression and suicidality cutoffs were approximately twice as high for sexual minority men living in the highest-stigma countries (e.g., Russia) compared to the lowest (e.g., Netherlands), which likely

represents a substantially elevated population burden of morbidity and mortality that could reasonably be expected to be reduced in high-stigma countries as the laws, policies, and national attitudes that inform our structural stigma index are improved.

Our study had several methodological strengths, including being the largest dataset of sexual minority men in the world and the only dataset capable of examining the association between country-level structural stigma and mental health. We also note its limitations. While we used a large, diverse sample of sexual minority men, the data come from a non-probability sample, potentially limiting generalizability, especially to those who are older, have lower education, have fewer LGBT community attachments, and are more likely to conceal their orientations (Hottes et al., 2016; Ferlatte et al., 2017; Prah et al., 2016). Yet, our analyses assume that the distribution of variables in the EMIS-2017 sample matches the distribution of these variables in the population. Further, non-probability sampling can also lead to higher estimates of mental health concerns among sexual minorities. These concerns are somewhat attenuated given that the present study was not focused on establishing population estimates of mental health conditions, but instead sought to examine associations among variables, for which non-probability sampling is more appropriate (Meyer & Wilson, 2009). Further, probability-based studies typically include relatively small numbers of sexual minorities in one country only, and thus would not have provided an adequate sample size across numerous countries with which to evaluate our research aims. Future efforts are needed to systematically assess sexual orientation in population-based research across countries (Bränström et al., 2019). Future inclusion of a heterosexual comparison sample would permit establishing specificity of the associations found here, as has been observed in prior research on structural stigma and sexual minority mental health (e.g., Hatzenbuehler et al., 2010; Raifman et al., 2018).

Further, the EMIS-2017 dataset was not focused on mental health, and thus used brief, self-report items to assess mental health. Although these items have established psychometric properties and are associated with major depression and risk of suicide (Kroenke et al., 2001; 2019; Levis et al., 2020; Simon et al., 2013), future research should determine whether similar results are obtained with the use of diagnostic mental health assessments. Additionally, the suicidality item imprecisely assesses thoughts of both death and self-harm. Given the disproportionate risk of both suicidality and self-harm among sexual minorities, future research is needed to disentangle these distinct, yet related constructs (Klonsky, May, & Glenn, 2013).

In addition, the data are cross-sectional. Because cross-sectional datasets can introduce the possibility that the outcome (mental health) causes the predictor (structural stigma), we take two steps to rule out this possibility. First, we innovatively assess structural stigma exposure using an objective index of legal policies and aggregated country-level attitudes toward sexual minorities. Because it is not influenced by subjective perception, an objective index cannot be caused by participants' mental health status (Meyer, 2003b). One condition under which participants' mental health status would influence their structural context is if mentally unhealthier individuals differentially migrate to higher structural stigma countries. Therefore, we take a second step to rule out the possibility of differential migration by only including those participants who were born in the country in which they currently reside. This innovation in the structural stigma literature further removes the possibility that poorer mental health causes higher structural stigma. Together, these two steps address two primary limitations of cross-sectional data. At the same time, the present design cannot establish a causal direction between the mediators and outcomes, or any recursive impact between them. Future research would benefit from the examination of our research question in a longitudinal cohort, which would enable researchers to more systematically examine within-person change over time, including multiple



moves to both higher and lower structural stigma contexts, while controlling for pre-move characteristics.

Despite these limitations, our study has potentially important implications for both theory and intervention. With respect to theory, this study advances our understanding of the sociocultural determinants of sexual orientation-related disparities in depression and suicidality among men (e.g., King et al., 2008; Meyer, 2003a; Ross et al., 2018) by providing additional evidence that structural stigma is associated with the mental health of sexual minority men, both through proximal experiences and as a function of length of exposure to structurally diverse contexts, at least for those who move higher-to-lower structural stigma contexts. Moreover, findings suggest the importance of routinely assessing life-course structural influences on mental health and deploying interventions to address those influences. In fact, multilevel interventions show promise for improving mental health in high-structural-stigma contexts, including through reducing stigma within institutions (e.g., schools, workplaces, clinics; Chaudoir et al., 2017; Lelutiu-Weinberger & Pachankis, 2017) and improving personal coping (e.g., self-acceptance) through scalable behavioral treatments (Pachankis et al., 2020). This study suggests that such interventions may have powerful capacity to interfere with the mental health toll of structural stigma.

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**Table 1** Descriptive statistics of study respondents by migration history in the European MSM Internet Survey 2017.

	Analytic sample n=123,428	Respondents born in country of residence n=106,883	Respondents with a history of moving from higher-to-lower structural stigma countries n=11,831	Respondents with a history of moving from lower-to-higher structural stigma countries n=4,714
Age; median (interquartile range)	36.00 (19.00)	36.00 (21.00)	34.00 (16.00) <sup>a</sup>	38.00 (20.00) <sup>b</sup>
Sexual identity; n, (%)				
Gay	96,696 (78.4)	83,347 (78.0)	9,521 (80.5) <sup>a</sup>	3,828 (81.2) <sup>b</sup>
Bisexual	18,918 (15.3)	16,854 (15.8)	1,489 (12.6)	575 (12.2)
Heterosexual	612 (0.5)	548 (0.5)	54 (0.5)	19 (0.4)
Other	7,138 (5.8)	6,094 (5.7)	758 (6.4)	286 (6.1)
Relationship status; n, (%)				
Single	75,756 (61.4)	65,637 (61.5)	7,442 (63.0) <sup>a</sup>	2,677 (56.8) <sup>b</sup>
Steady relationship	47,514 (38.6)	41,132 (38.5)	4,377 (37.0)	2,032 (43.1)
Employment status; n, (%)				
Unemployed/long-term sick-leave/medically retired	8,762 (7.1)	7,565 (7.1)	875 (7.4)	322 (6.8)
Employed/student/retired/other	114,472 (92.9)	99,145 (92.9)	10,941 (92.6)	4,386 (93.0)
Education; n, (%)				
High (6+ years post 16 years-of-age; i.e. first stage of tertiary or more in most countries)	67,346 (58.5)	56,958 (57.2)	7,482 (67.6) <sup>a</sup>	2,906 (66.3) <sup>b</sup>
Medium (2-5 years post 16 years-of-age; i.e. at least upper secondary in most countries)	41,995 (36.5)	37,510 (37.7)	3,204 (28.9)	1,281 (29.2)
Low (< 2 years post 16 years-of-age; i.e. no higher than lower secondary)	5,693 (4.9)	5,106 (5.1)	389 (3.5)	198 (4.5)
Settlement size; n, (%)				
A big city or town (500,000 or more people)	55,443 (45.4)	46,205 (43.7)	6,817 (57.2) <sup>a</sup>	2,421 (51.4) <sup>b</sup>

A small or medium-sized city or town (10,000-499,999 people)	51,383 (42.1)	45,548 (43.1)	4,139 (35.3)	1,696 (36.0)
A village or the countryside (less than 10,000 people)	15,254 (12.5)	13,962 (13.2)	753 (6.4)	539 (11.4)
Diagnosed HIV; n, (%)				
Yes	12,758 (10.4)	10,544 (9.9)	1,560 (13.3) <sup>a</sup>	654 (13.9) <sup>b</sup>
No	109,922 (89.6)	95,673 (90.1)	10,212 (86.5)	4,037 (85.6)
Reason for migration; n, (%)				
Was brought as a child			2,182 (18.5)	1,081 (23.0) <sup>c</sup>
Moved to study			3,628 (30.7)	890 (18.9) <sup>c</sup>
Moved for work			5,109 (43.2)	2,176 (46.2) <sup>c</sup>
Moved to be with a partner			1,528 (12.9)	707 (15.0) <sup>c</sup>
Moved to live more openly as gay or bisexual or trans			2,270 (19.2)	344 (7.3) <sup>c</sup>
Moved to seek asylum			344 (2.9)	36 (0.8) <sup>c</sup>
Age of moving; n, (%)				
0-9 years			1,789 (15.4)	853 (18.4) <sup>c</sup>
10-19 years			2,133 (18.3)	647 (14.0) <sup>c</sup>
20-34 years			6,330 (54.3)	2,169 (46.9) <sup>c</sup>
35 or older			1,402 (12.0)	956 (20.7) <sup>c</sup>

<sup>a</sup> Differences between non-movers and respondents with a history of moving from higher-to-lower structural stigma country were significant at  $p < .001$ .

<sup>b</sup> Differences between non-movers and respondents with a history of moving from lower-to-higher structural stigma country were significant at  $p < .001$ .

<sup>c</sup> Differences between respondents with a history of moving from higher-to-lower structural stigma country and respondents with a history of moving from lower-to-higher structural stigma country were significant at  $p < .001$ .

Note. Statistical significance for categorical demographic variables evaluated by Chi-square. Statistical significance for age evaluated by independent samples  $t$ -test.

**Table 2** Association between country-of-origin structural stigma and mental health by years since arriving to current country of residence among movers from higher-to-lower structural stigma countries.

Migration history	Multilevel-model estimates of association between mental health and structural stigma in country of origin						
	n (%)	Adj. $\beta^a$	Depression		Suicidality		
			95% CI	Sig.	Adj. $\beta^a$	95% CI	Sig.
<i>Years since arriving to current country of residence</i>							
0–4 years	4,329 (36.6)	0.21	0.13, 0.29	$P < 0.001$	0.07	0.03, 0.11	$P < 0.001$
5–14 years	3,496 (29.5)	0.05	-0.01, 0.11	$P = 0.117$	0.003	-0.03, 0.03	$P = 0.827$
15 years or more	4,006 (33.9)	0.03	-0.03, 0.09	$P = 0.299$	0.001	-0.02, 0.02	$P = 0.926$

<sup>a</sup> Models are adjusted for: age, education, employment status, settlement size, and HIV diagnosis at Level 1 (i.e., individual level), and country-of-origin GDP and country-of-origin DALYs (disability-adjusted life years) lost due to mental disorders and current country-of-residence structural stigma towards sexual minorities at Level 2 (i.e., country level). These models are conducted only among sexual minorities with a history of moving from higher-to-lower structural stigma countries ( $n=11,831$ ).

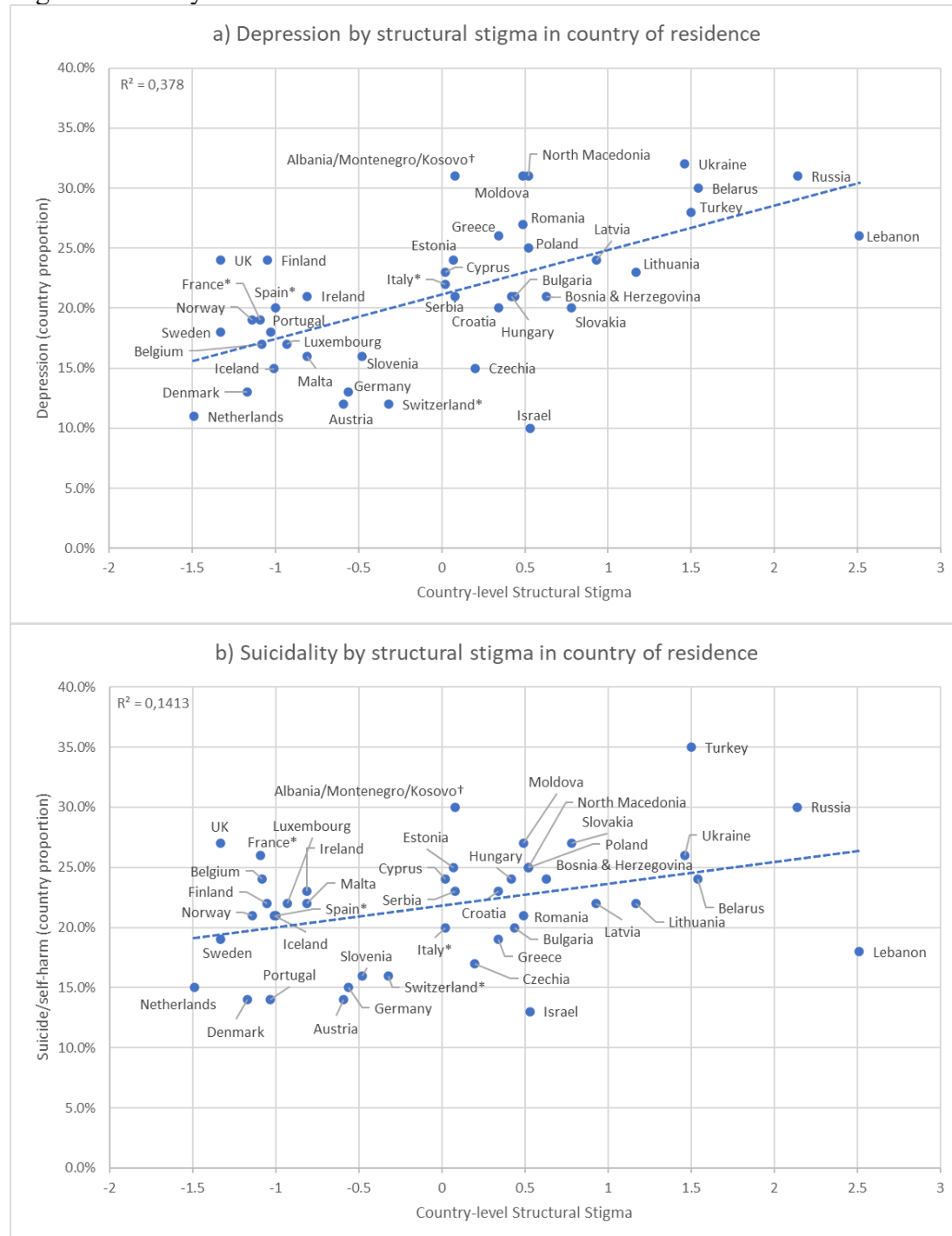
**Table 3** Multilevel-model estimates of indirect effects of the association between country-of-origin structural stigma and mental health outcomes via sexual orientation concealment, internalized homonegativity, and social isolation stratified by years since arriving to current country of residence among movers from higher-to-lower structural stigma countries.

	Multilevel-model estimates of indirect effects of psychosocial mediators								
	Sexual orientation concealment			Internalized homonegativity			Social isolation		
	Adj. $\beta^a$	95% CI	Sig.	Adj. $\beta^a$	95% CI	Sig.	Adj. $\beta^a$	95% CI	Sig.
<b>Depression by migration history</b>									
<i>Years since arriving to current country of residence</i>									
0–4 years	0.02	0.004, 0.05	0.020	0.07	0.04, 0.10	<0.001	0.11	0.07, 0.14	<0.001
5–14 years	0.01	-0.01, 0.03	0.492	0.07	0.04, 0.10	<0.001	0.08	0.02, 0.10	0.004
15 years or more	0.02	0.005, 0.03	0.006	0.05	0.03, 0.08	<0.001	0.02	-0.01, 0.05	0.149
<b>Suicidality by migration history</b>									
<i>Years since arriving to current country of residence</i>									
0–4 years	0.01	0.003, 0.02	0.012	0.03	0.02, 0.04	<0.001	0.05	0.03, 0.07	<0.001
5–14 years	0.01	0.001, 0.01	0.032	0.03	0.01, 0.04	<0.001	0.02	0.007, 0.03	0.002
15 years or more	0.01	0.002, 0.01	0.022	0.01	0.004, 0.02	0.007	0.01	-0.003, 0.02	0.148

<sup>a</sup> Models are adjusted for: age, education, employment status, settlement size, and HIV diagnosis at Level 1 (i.e., individual level), and country-of-origin GDP and country-of-origin DALYs (disability-adjusted life years) lost due to mental disorders and current country-of-residence structural stigma towards sexual minorities at Level 2 (i.e., country level). These models are conducted only among sexual minority men with a history of moving from higher-to-lower structural stigma countries ( $n=11,831$ ).

**Figure 1a-b**

Country proportion of self-reported depression and suicidality among non-movers by structural stigma in country of residence.

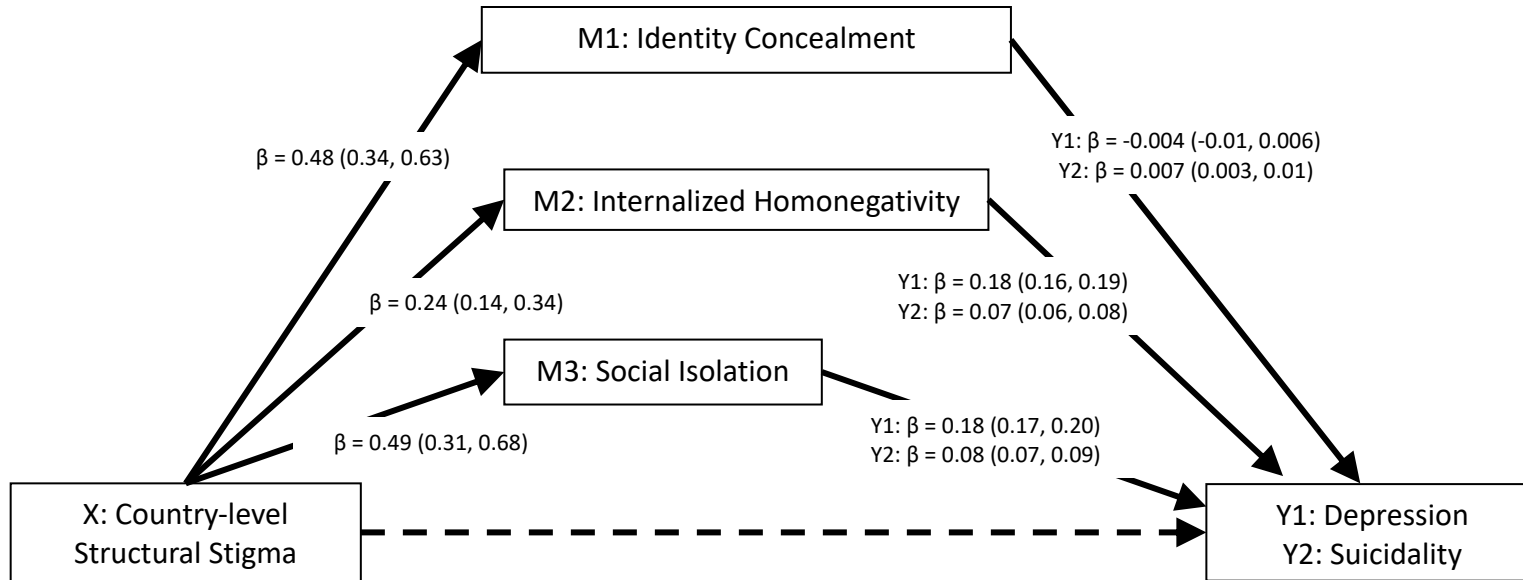


\* Includes microstates: Monaco (France), San Marino (Italy), Liechtenstein (Switzerland), and Andorra (Spain).

†The designation of Kosovo is without prejudice to positions on status and is in line with UNSCR 1244/1999 and the International Court of Justice Opinion on the Kosovo declaration of independence.

**Figure 2**

Direct and indirect effects of sexual orientation concealment, internalized homonegativity, and social isolation as mediators of the association between country-level structural stigma and mental health.



**Indirect effects**

X→M1→Y1:  $\beta = -0.002$  (-0.007, 0.003),  $p = 0.402$   
 X→M2→Y1:  $\beta = 0.04$  (0.02, 0.06),  $p < 0.001$   
 X→M3→Y1:  $\beta = 0.09$  (0.06, 0.12),  $p < 0.001$

**Direct effects**

X→Y1:  $\beta = 0.16$  (0.07, 0.25),  $p < 0.001$   
 X→Y1 controlling for M1:  $\beta = 0.17$  (0.08, 0.26),  $p < 0.001$   
 X→Y1 controlling for M2:  $\beta = 0.16$  (0.06, 0.26),  $p = 0.002$ ; reduction: 28.1%  
 X→Y1 controlling for M3:  $\beta = 0.07$  (-0.06, 0.19),  $p = 0.282$ ; reduction: 52.6%

**Indirect effects**

X→M1→Y2:  $\beta = 0.003$  (0.001, 0.005),  $p = 0.002$   
 X→M2→Y2:  $\beta = 0.02$  (0.009, 0.02),  $p < 0.001$   
 X→M3→Y2:  $\beta = 0.04$  (0.02, 0.05),  $p < 0.001$

**Direct effects**

X→Y2:  $\beta = 0.03$  (0.001, 0.07),  $p = 0.042$   
 X→Y2 controlling for M1:  $\beta = 0.03$  (0.001, 0.07),  $p = 0.047$ ; reduction: 8.8%  
 X→Y2 controlling for M2:  $\beta = 0.03$  (-0.007, 0.06),  $p = 0.125$ ; reduction: 66.7%  
 X→Y2 controlling for M3:  $\beta = -0.03$  (-0.15, 0.10),  $p = 0.667$ ; reduction: 95.0%



**Supplemental Table 1**

Coding of structural stigma index based on discriminatory legislation, recognition of same-sex relationship, and protection against discrimination, assessed for each of the 178 countries included in the study.

<b>Legal discrimination and criminalization</b>
Age of consent same for same-sex and opposite-sex sexual acts (-1 point)
Male homosexuality illegal (1 point)
Female homosexuality illegal (1 point)
Arrests due to homosexuality/same-sex acts in past 3 years (1 point)
Penalizing legal texts:
- Sexual acts (1 point)
- Sodomy (1 point)
- Against nature (1 point)
- Buggery (1 point)
- Indecency/other (1 point)
Promotion of morality:
- Penal code (1 point)
- Morality code (1 point)
Maximum sentence in months and years:
- 1 month to 2 years (1 point)
- 3 to 7 years (2 points)
- 8 to 13 years (3 points)
- 14 – years to life (4 points)
- Death (5 points)
<b>Recognition</b>
Equal rights included in constitution (-1 point)
Same-sex civil relationship recognition (-2 points)
Same-sex marriage (-3 points)
Joint adoption for same-sex couples (-1 point)
Second parent adoption for same-sex couples (-1 point)
<b>Protection</b>
Constitution (-1 point)
Employment (-1 point)
Hate crime (-1 point)
Incitement (-1 point)
<b>Total points</b>
Maximum high: 15
Maximum low: -13

**Supplemental Table 2** Multilevel-model estimates of the association between country-of-origin structural stigma and sexual orientation concealment, internalized homophobia, and social isolation stratified by years since arriving to current country of residence among movers from higher-to-lower structural stigma countries.

	Multilevel-model estimates of the association between country-of-origin structural stigma and psychosocial mediators								
	Sexual orientation concealment			Internalized homophobia			Social isolation		
	Adj. $\beta^a$	95% CI	Sig.	Adj. $\beta^a$	95% CI	Sig.	Adj. $\beta^a$	95% CI	Sig.
<i>Years since arriving to current country of residence</i>									
0-4 years	0.57	0.48, 0.66	<0.001	0.35	0.22, 0.48	<0.001	0.66	0.46, 0.87	<0.001
5-14 years	0.44	0.36, 0.52	<0.001	0.32	0.22, 0.42	<0.001	0.32	0.11, 0.53	0.003
15 years or more	0.28	0.20, 0.35	<0.001	0.27	0.19, 0.36	<0.001	0.12	-0.04, 0.28	0.152

<sup>a</sup>Models are adjusted for: age, level of education, employment status, settlement size, and HIV status at Level 1 (i.e., individual level), and country-of-origin GDP and country-of-origin DALYs (disability-adjusted life years) lost due to mental disorders and current country-of-residence structural stigma towards sexual minorities at Level 2 (i.e., country level). These models are conducted only among sexual minorities with a history of moving from higher-to-lower structural stigma countries ( $n=11,831$ ).

**Supplemental Table 3** List of countries with structural stigma score and country rank.<sup>a</sup>

<b>Country-level Structural Stigma</b>		
<b>Country</b>	<b>Rank</b>	<b>score</b>
Somalia	1	1.91
Iran	2	1.73
United Arab Emirates	3	1.71
Nigeria	4	1.66
Mauritania	5	1.5
Ethiopia	6	1.48
Sudan	7	1.44
Senegal	8	1.43
Saudi Arabia	9	1.38
Iraq	10	1.35
Afghanistan	11	1.34
Qatar	12	1.32
Pakistan	13	1.31
Egypt	14	1.28
Malawi	15	1.25
Libya	16	1.22
Eritrea	17	1.18
Zambia	18	1.16
Tanzania	19	1.15
Sri Lanka	20	1.14
Guinea	21	1.13
Maldives	22	1.12
Oman	23	1.12
Gambia	24	1.09
Yemen	25	1.09
Cameroon	26	1.07
Comoros	27	1.04
Morocco	28	1.01
Kuwait	29	0.98
Solomon Islands	30	0.98
Uganda	31	0.98
Antigua and Barbuda	32	0.95
Brunei	33	0.9
Tunisia	34	0.9

Dominica	35	0.89
Burundi	36	0.88
Ghana	37	0.87
Tajikistan	38	0.87
Togo	39	0.87
Azerbaijan	40	0.84
Kenya	41	0.84
Sierra Leone	42	0.84
Palestine	43	0.81
Saint Lucia	44	0.8
Uzbekistan	45	0.78
Turkmenistan	46	0.77
Zimbabwe	47	0.76
Malaysia	48	0.73
Algeria	49	0.72
Jamaica	50	0.72
Lebanon	51	0.72
Swaziland	52	0.7
Western Sahara	53	0.7
Armenia	54	0.69
Syria	55	0.67
Central African Republic	56	0.6
India	57	0.6
Niger	58	0.6
Barbados	59	0.59
Ivory Coast	60	0.59
Russia	61	0.59
Angola	62	0.58
Chad	63	0.55
Guyana	64	0.54
Mali	65	0.54
Trinidad and Tobago	66	0.54
Liberia	67	0.52
Congo - Kinshasa	68	0.51
Djibouti	69	0.51
Equatorial Guinea	70	0.51
Gabon	71	0.51

Guinea-Bissau	72	0.51
Indonesia	73	0.51
Madagascar	74	0.48
Rwanda	75	0.48
Myanmar	76	0.47
Burkina Faso	77	0.45
Bangladesh	78	0.43
Kyrgyzstan	79	0.37
Benin	80	0.36
Botswana	81	0.35
Kazakhstan	82	0.34
Singapore	83	0.34
Congo - Brazzaville	84	0.33
Panama	85	0.31
Belarus	86	0.3
Jordan	87	0.3
Moldova	88	0.29
Macedonia	89	0.28
Monaco	90	0.28
Mongolia	91	0.28
Ukraine	92	0.28
China	93	0.27
Georgia	94	0.2
Haiti	95	0.19
Bahamas	96	0.12
Bosnia and Herzegovina	97	0.08
Kosovo	98	0.06
Vietnam	99	0.06
Turkey	100	0.04
Liechtenstein	101	0.03
Cambodia	102	0
Croatia	103	-0.03
Japan	104	-0.03
Namibia	105	-0.03
Timor-Leste	106	-0.05
Mauritius	107	-0.06
Paraguay	108	-0.06

Vanuatu	109	-0.08
Suriname	110	-0.09
Albania	111	-0.12
Latvia	112	-0.13
Lithuania	113	-0.13
Montenegro	114	-0.15
Guatemala	115	-0.17
Laos	116	-0.18
Bahrain	117	-0.2
Korea, South	118	-0.2
Romania	119	-0.21
Dominican Republic	120	-0.24
Poland	121	-0.25
Bulgaria	122	-0.28
El Salvador	123	-0.31
Mozambique	124	-0.31
Peru	125	-0.31
Serbia	126	-0.33
Honduras	127	-0.37
Seychelles	128	-0.38
Thailand	129	-0.42
Israel	130	-0.43
Vatican City	131	-0.43
Cuba	132	-0.47
Slovakia	133	-0.48
Venezuela	134	-0.52
Greece	135	-0.56
Nicaragua	136	-0.57
Andorra	137	-0.62
Estonia	138	-0.62
San Marino	139	-0.65
Bolivia	140	-0.68
Cyprus	141	-0.68
Hungary	142	-0.7
Cape Verde	143	-0.76
Czechia	144	-0.78
Costa Rica	145	-0.81

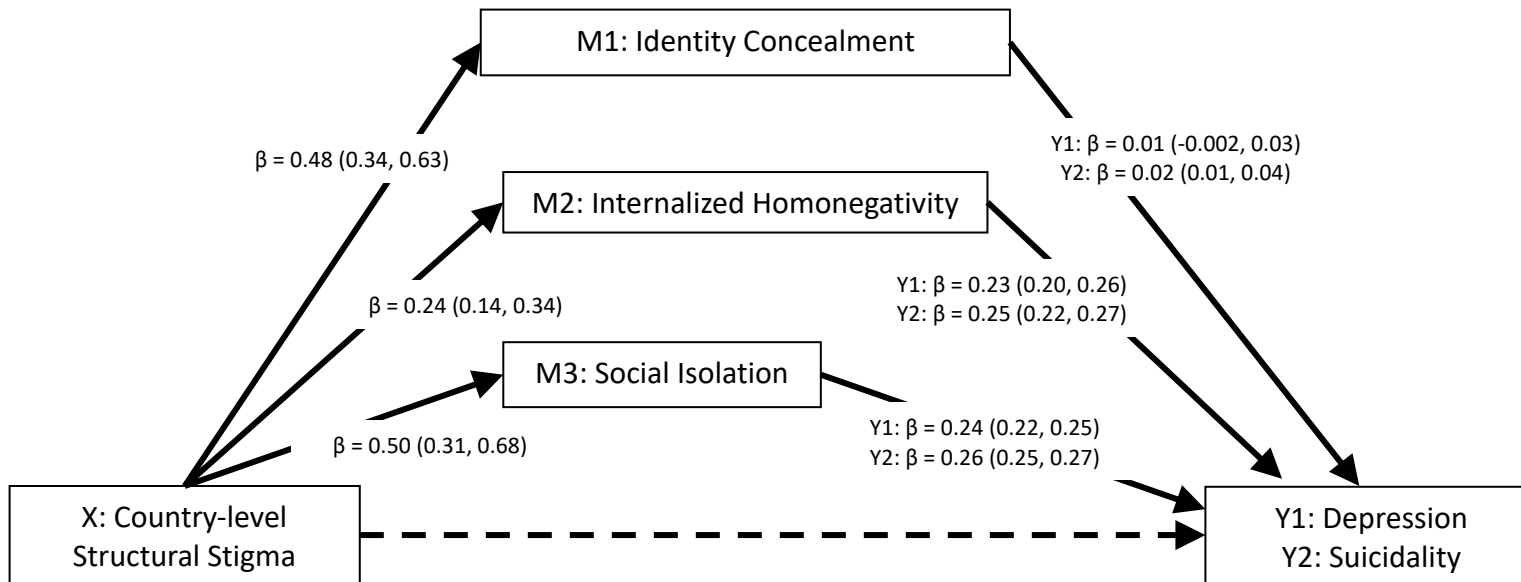
Philippines	146	-0.87
Ecuador	147	-0.91
Chile	148	-0.98
Italy	149	-0.98
Colombia	150	-1.08
Slovenia	151	-1.17
South Africa	152	-1.17
Switzerland	153	-1.19
Argentina	154	-1.3
USA	155	-1.3
Austria	156	-1.35
Germany	157	-1.36
Puerto Rico	158	-1.36
Portugal	159	-1.4
Mexico	160	-1.46
Australia	161	-1.5
Brazil	162	-1.52
New Zealand	163	-1.56
Uruguay	164	-1.59
France	165	-1.61
Malta	166	-1.67
Canada	167	-1.68
Ireland	168	-1.68
Finland	169	-1.78
Luxembourg	170	-1.79
Spain	171	-1.82
Belgium	172	-1.85
Denmark	173	-1.85
Sweden	174	-1.93
Norway	175	-1.94
United Kingdom	176	-1.96
Iceland	177	-1.97
Netherlands	178	-2.22

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<sup>a</sup> Components of each score can be obtained from the International Lesbian, Gay, Bisexual, Trans, and Intersex Association (2017) World Survey of Sexual Orientation Laws (for laws and policies) and the Global Acceptance Index (Flores, 2019) (for attitudes).

**Supplemental Figure 1**

Direct and indirect effects of sexual orientation concealment, internalized homonegativity, and social isolation as mediators of the association between country-level structural stigma and depression and suicidality (using dichotomous outcomes created with the cut-off scores of depression and suicidality).



**Indirect effects**

X→M1→Y1:  $\beta = 0.006$  (-0.001, 0.01),  $p = 0.106$   
 X→M2→Y1:  $\beta = 0.056$  (0.033, 0.078),  $p < 0.001$   
 X→M3→Y1:  $\beta = 0.117$  (0.073, 0.161),  $p < 0.001$

**Direct effects**

X→Y1:  $\beta = 0.181$  (0.067, 0.295),  $p = 0.002$   
 X→Y1 controlling for M1:  $\beta = 0.176$  (0.061, 0.290),  $p = 0.003$   
 X→Y1 controlling for M2:  $\beta = 0.094$  (-0.039, 0.228),  $p = 0.166$   
 X→Y1 controlling for M3:  $\beta = 0.067$  (-0.055, 0.190),  $p = 0.282$

**Indirect effects**

X→M1→Y2:  $\beta = 0.011$  (0.003, 0.018),  $p = 0.006$   
 X→M2→Y2:  $\beta = 0.059$  (0.034, 0.084),  $p < 0.001$   
 X→M3→Y2:  $\beta = 0.128$  (0.080, 0.176),  $p < 0.001$

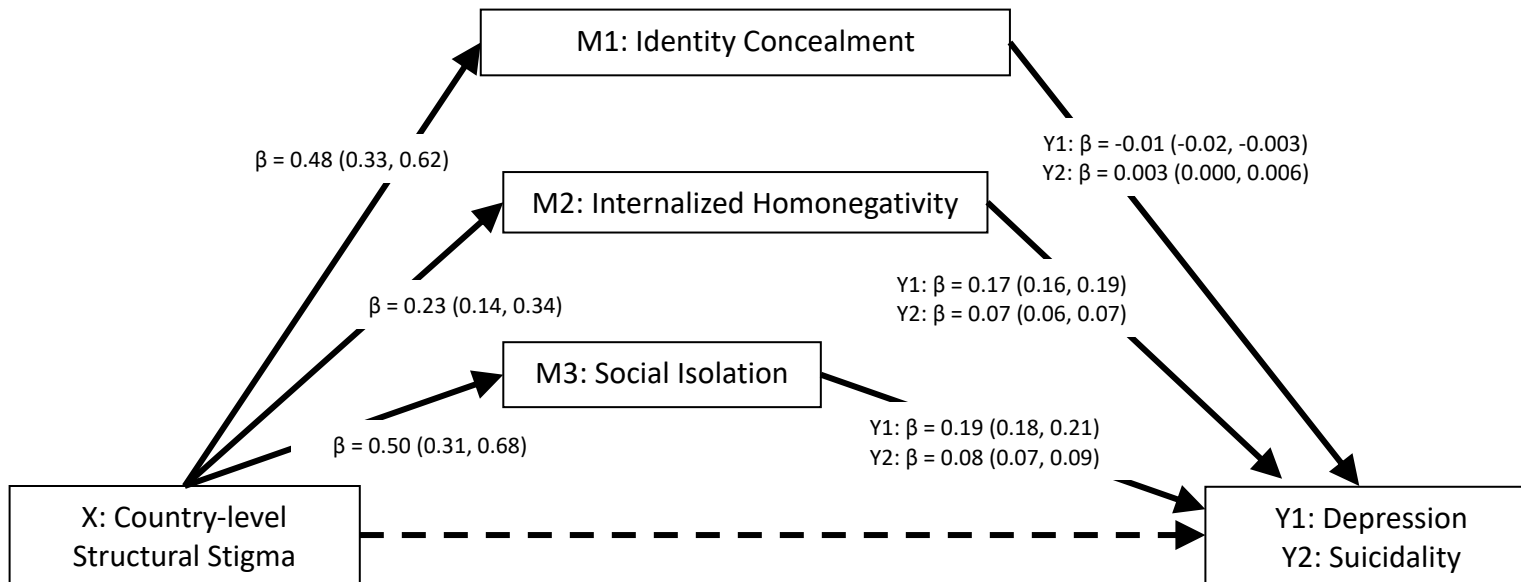
**Direct effects**

X→Y2:  $\beta = 0.071$  (-0.051, 0.193),  $p = 0.255$   
 X→Y2 controlling for M1:  $\beta = 0.061$  (-0.059, 0.181),  $p = 0.321$   
 X→Y2 controlling for M2:  $\beta = -0.020$  (-0.172, 0.132),  $p = 0.797$   
 X→Y2 controlling for M3:  $\beta = -0.027$  (-0.152, 0.097),  $p = 0.667$



**Supplemental Figure 2**

Direct and indirect effects of sexual orientation concealment, internalized homonegativity, and social isolation as mediators of the association between country-level structural stigma and depression and suicidality (using only age and settlement size as sociodemographic covariates in the adjusted models).



**Indirect effects**

X→M1→Y1: β = -0.006 (-0.011, -0.001), p = 0.017  
 X→M2→Y1: β = 0.040 (0.023, 0.056), p < 0.001  
 X→M3→Y1: β = 0.097 (0.061, 0.133), p < 0.001

**Direct effects**

X→Y1: β = 0.162 (0.070, 0.254), p < 0.001  
 X→Y1 controlling for M1: β = 0.165 (0.061, 0.290), p < 0.001  
 X→Y1 controlling for M2: β = 0.149 (0.045, 0.252), p = 0.005  
 X→Y1 controlling for M3: β = 0.182 (0.087, 0.278), p < 0.001

**Indirect effects**

X→M1→Y2: β = 0.001 (0.000, 0.003), p = 0.115  
 X→M2→Y2: β = 0.015 (0.008, 0.022), p < 0.001  
 X→M3→Y2: β = 0.041 (0.026, 0.056), p < 0.001

**Direct effects**

X→Y2: β = 0.032 (-0.001, 0.060), p = 0.061  
 X→Y2 controlling for M1: β = 0.032 (-0.059, 0.181), p = 0.064  
 X→Y2 controlling for M2: β = 0.024 (-0.011, 0.059), p = 0.181  
 X→Y2 controlling for M3: β = 0.041 (0.004, 0.079), p = 0.031

**Supplemental Figure 3a-b** Mean country-level depression and suicidality among those arriving to their current country of residence 0-4 years ago and those arriving to their current country of residence 5 or more years ago by structural stigma in country of origin (restricted to countries with at least 20 individuals in both years-since-moving groups).

