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HHS Public Access

Author manuscript

AIDS Behav. Author manuscript; available in PMC 2020 March 01.

Published in final edited form as:

AIDS Behav. 2019 March ; 23(3): 684–694. doi:10.1007/s10461-018-2306-z.

The Role of Gay-Related Stigma in HIV-Risk Behavior Among Sexual Minority Men in Europe

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Abstract

Sexual orientation stigma stems from discriminatory social contexts and may ultimately impact the behavioral health of stigmatized individuals through stress-related pathways. Sexual minority stigma is of particular concern in Europe given the diversity of social contexts on the continent and sexual minority men’s rapidly increasing risk of HIV infection, especially in Central and Eastern Europe, potentially rooted in stigma. This study assesses whether stigma in the ubiquitous social contexts surrounding sexual minority men (e.g., family, workplace, government) may place them

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Compliance with Ethical Standards

Conflict of interest The authors have no conflicts of interest to declare.

Research Involving Human Subjects Informed consent was obtained from all individual participants included in the study. Study protocols were approved by each study site’s ethics committee, and are in compliance with the 1964 Declaration of Helsinki for ethical principles for conducting research with human subjects.

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at higher risk for HIV contraction across six countries. We utilized a large cross-sectional survey sample of HIV-negative sexual minority men (N = 2087; mean age = 31.6, SD = 9.7) from six European countries to test whether those who reported sexual orientation stigma also engaged in more HIV risk-related behaviors, including condomless sex with casual partners (in the absence of PrEP) and substance use before and during sex. Regression analyses were performed in *Mplus.* We found that a one standard deviation increase in reported sexual orientation stigma was significantly associated with the following during the last sexual encounter: a 19% increase in odds of sex under the influence of alcohol, 27% increase in odds of sex under the influence of cannabis, 49% increase in odds of sex under the influence of illicit drugs, an 11% increase in odds of condomless sex with casual partners in the past 6 months, and a 26% increase in odds of knowing where to receive an HIV test. Sexual minority men who reported perceiving greater sexual orientation-related stigma within their ubiquitous social contexts were significantly more likely to report sexual risk and alcohol and drug use during their last sexual encounter, yet reported more knowledge of preventive services. Contextual stigma might serve as a precursor to behavioral risks of HIV infection, generating maladaptive stress responses capable of being modified through individually-focused interventions. Structural interventions are also needed to ultimately reduce stigma at its source.

Keywords

Sexual minority men; HIV risk; Sexual orientation-related stigma; Drug use; Alcohol use

Introduction

Stigma toward sexual minorities varies widely across geographic regions, even on the same continent [1]. For instance, while Western European countries promote the equal treatment of sexual minority citizens through affirmative and non-discriminatory laws, policies, and national attitudes, many countries in Central and Eastern Europe lack equal legislative protections for sexual minorities and actively discriminate against them through legislation that promotes inequality and homophobic attitudes [1]. Globally, sexual orientation stigma has been shown to be associated with increased vulnerability to health risks [2, 3] including HIV transmission-risk behavior and substance use [4–8].

After political shifts in Central and Eastern Europe over the past two decades, gay, bisexual, and other men who have sex with men (referred hereafter as sexual minority men) in this region gained unprecedented freedoms of association (with preferred social, sexual and romantic partners) and travel. Consequently, Central and Eastern European sexual minority men who were previously insulated due to strict international travel prohibitions and censure against sexual minorities became newly exposed to the high HIV and substance use prevalence among sexual minority men living in Western Europe and other nearby regions. At the same time of this new exposure, sexual minority men living in Central and Eastern Europe have also been under-equipped with HIV prevention and transmission knowledge. In fact, Eastern Europe represents one of the highest-priority regions in the world for HIV prevention given that the HIV rate there has increased significantly in the past decade, with a particularly alarming increase in transmissions among sexual minority men [9]. For

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example, in one of the countries included in the current study, Romania, HIV prevalence among sexual minority was less than 10% in 2009, but close to 20% in 2014, based on best available evidence [10, 11].

While lesbian, gay, bisexual and transgender (LGBT) civil rights movements followed democratic reform eastward upon communism's fall [12], with Central and Eastern European sexual minority men's greater visibility came greater vulnerability in terms of increased legal and attitudinal stigma and discrimination [12–19] as a conservative response, primarily driven by religious dogma, to the increasingly overt diversity in sexual identities [20]. Stigma is often defined as an attribute or characteristic that is devalued in certain social contexts [21, 22]. But rather than residing within the stigmatized individuals themselves, stigma is ultimately propagated by social institutions [23]. For instance, social institutions such as workplaces, churches, families, communities, and government can perpetuate stigma toward sexual minorities, thereby thwarting their belongingness to these institutions and driving unhealthy coping reactions [24–27], including HIV-transmission risk behavior and substance use, which can co-occur with sexual behavior to generate HIV risk. Thus, identifying and intervening upon the source of stigma in these social contexts and institutions represents an important public health priority, especially in high-stigma locales [28, 29].

In this study, we examined the relationship between sexual minority stigma present in ubiquitous social contexts and HIV-transmission risk behaviors in a geographically diverse sample of European sexual minority men. Across Europe, sexual minority men represent the highest-risk group for HIV infection [9, 30, 31]. While various forms of stigma, including national laws and policies toward sexual minorities, and self-stigma (i.e., internalized homophobia), have been shown to be associated with European sexual minority men's HIV risk [32–34], no research has examined HIV risk as a function of perceptions of social contextual stigma among geographically diverse European sexual minority men, especially those living in Central and Eastern Europe. We define social contextual stigma to consist of attitudes (or the degree of prejudice) towards sexual minorities (homosexuals or bisexuals) perceived across several life domains: work/school; parents; friends/acquaintances; political; social; and religious. Therefore, we sought to establish the association between social contextual stigma and HIV-transmission risk behavior among HIV-negative sexual minority men living in six European contexts [35, 36]. Europe offers an important geographic context in which to test these hypotheses given the wide variation in national contexts surrounding sexual minority men and the relatively high-quality data available across these contexts.

Method

Study Design

This manuscript is based on data collected through a multicenter biological and behavioral cross-sectional survey of sexual minority men implemented in the context of the SIALON (*saliva* in Ancient Greek) project, co-funded by the European Commission under the Public Health Programme 2003–2008 (GA 2007309) [37]. The survey was co-funded by the EU and implemented in six European cities: Barcelona (Spain), Bratislava (Slovakia), Bucharest (Romania), Ljubljana (Slovenia), Prague (Czech Republic), and Verona (Italy). Study sites

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were selected to provide comparative geographic contexts, including high-and low-stigma contexts.

The following eligibility criteria were applied: having had any kind of sex at least once with another man during the previous year; having signed the survey's informed consent, agreeing to answer the study questionnaire and donate an oral fluid sample. Oral fluid data are not included in the current analyses. Exclusion criteria were adopted as follows: being younger than 18 years old; active injecting drugs; and having already participated in the study. Study bio-behavioral data collection procedures are described in detail elsewhere [38, 39].

Ethics

Prior to data collection, informed consent was obtained for each participant. To guarantee anonymity and confidentiality, a barcode was assigned to each enrolled participant to maintain their anonymity. The unique barcode was assigned to each participant when he agreed to take part in the study. The same barcode was used to link all the materials and documents pertaining to the subject (informed consent, questionnaire, biological sample, card to pick up the result). Requiring a card for participants to retrieve results (using the unique barcode) was explicitly requested by the ethics committee. This approach and the related procedure were approved by the ethics committee in each participating site. Study protocols were approved by each study site's ethics committee.

Sampling

Sexual minority men were recruited using time-location sampling (TLS), a venue-based sampling method widely adopted for bio-behavioral surveys among sexual minority men [40]. In line with the main TLS principles, formative research including a gay-venue mapping exercise was conducted in each participating city. A list of venue-day-time (VDT) units was prepared according to the formative research results. A data collection calendar was calculated according to TLS principles, creating VDT units. VDT units were then categorized according to the median attendance on the basis of two categories: "high attendance" (15 sexual minority men) and "low attendance" (5 sexual minority men). A training was delivered to field workers at local LGBT associations, who were in charge of approaching potential participants in the specific VDT unit and distributing questionnaires.

On the basis of the type of venues (e.g., disco, bar, sauna, cruising setting, sex shop/party), VDT units were randomly selected within homogeneous clusters of venues in order to ensure their comprehensive inclusion in the first sampling stage and therefore improve the heterogeneity of the final sample of sexual minority men. Finally, data collectors were selected and trained to distribute anonymous pen-and-paper questionnaires, and an info-pack containing prevention materials and information. Participants competed the questionnaires in the venues where they were recruited, and oral fluid samples were also collected in these locations (via Oracle device), in a pre-identified private area within the venue. Oral fluid, rather than blood, was collected to ensure participants' safety and increase acceptability among participants by preventing the need for venipuncture.

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Questionnaire

A preliminary version of the self-administered pen-and-paper questionnaire was prepared with specific reference to the Global AIDS Response Progress Reporting (GARPR) guidelines [39]. A preliminary version of the questionnaire was then piloted among sexual minority men attending gay venues. Feedback regarding layout, wording, and comprehension was collected and included in the final version of the questionnaire. Translation procedures have been previously described elsewhere [37].

The self-administered questionnaire assessed a range of variables, of which we included the following in the current analyses: age, education, relationship status, behavioral practices (including sexual and substance use behaviors), types of sex partners (gender; steady and/or casual), and perceived stigma towards sexual minority men. Sexual orientation was assessed by asking “At present, how would you best define your sexual orientation?” with response options being “gay/homosexual,” “bisexual,” “heterosexual,” or “other.” We describe in detail the subset of variables we included in our analyses below.

Dependent Variables

We selected the following dependent variables because they have been shown in previous literature to have significant associations with HIV risk [41–46].

Sexual Behavior, Including HIV-Transmission Risk Behavior—We included two count variables indicating the number of (1) casual partners over the past 6 months and (2) instances of receptive and insertive sex (anal or vaginal) without a condom with casual partners reported over the past 6 months. Further, we included several dichotomous (yes/no) variables: (3) any HIV status-unknown casual partner at the last sexual encounter and (4) whether or not participants were under the influence of alcohol and/or recreational drugs (marijuana or illicit drugs such as cocaine, amphetamine, and/or ecstasy) prior to or during the last sexual encounter.

HIV Testing—We examined two factors related to HIV testing as dependent variables: (1) whether or not participants had an HIV test in the past 12 months (yes/no), and (2) whether they knew where to receive an HIV test (yes/no).

Predictor Variable

Sexual Orientation Stigma—Participants reported stigma toward sexual minorities in their daily contexts as a response to the following question [35, 36]: “In your experience, what is people’s attitude towards homosexuals or bisexuals in the following contexts: work/school; parents; friends/acquaintances; political; social; and religious.” Response options ranged from 1 = very negative to 5 = very positive, and scale reliability was 0.76. This variable was z-scored for analyses.

Analytic Strategy—Analyses were conducted using *Mplus* version 8.0. Given the nesting within countries, we initially intended to analyze the data using multilevel modeling. However, the number of level 2 units (i.e., countries) was only six, power to detect any level 2 effects as well as to examine random between-country variability was substantially

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reduced. In unconditional multilevel models, we found that there was not significant between-country (i.e., random) variability on the majority of the outcomes—subsequent models that attempted to include predictors failed to converge due to difficulties estimation of random variances with a limited number of level 2 units. The lack of between-country variability also suggested that a single-level model that did not account for nesting within country was statistically appropriate. As such, we took the most parsimonious (and more simplistic) approach that was capable of handling the level of complexity observed in these data.

Specifically, we analyzed the eight outcome variables within a series of simultaneous regressions based on the types of analyses we conducted for each of them. The following six outcomes were analyzed using logistic regression given their dichotomous nature: sex under the influence of alcohol, sex under the influence of cannabis, sex under the influence of illicit drugs, knowing where to receive an HIV test, receiving an HIV test in the past 12 months, and having had any HIV-status-unknown casual partners at the last sexual encounter. The following two outcomes were analyzed using Poisson regression given their count nature: number of casual partners and frequency of condomless sex with casual partners in the past 6 months. We utilized robust maximum likelihood (i.e., MLR) estimation, which is known to be the optimal method for analyses with missing data, with the requisite Montecarlo integration. By default, *Mplus* will include participants who have not reported an outcome variable of interest, but will not include participants who have not reported on predictor variables of interest. In order to include participants who were missing predictor variables within the models, we utilized the option to estimate the mean and variance of each predictor variable within the model. The model also included dummy-coded dichotomous indicators for whether participants were missing any of the demographic covariates (1 = yes, 0 = no) and whether they were missing a score on the stigma variable (1 = yes, 0 = no). Upon preliminary examination of associations, the following demographic variables showed significant associations with stigma scores, and were therefore included in all models to adjust for their potential confounding influence: age (in continuous form), education (basic/up to 12 grades vs. above), sexual orientation (gay/homosexual vs. bisexual/heterosexual/other), size of residence (small vs. large, with the latter including settlements with over 100,000 inhabitants), employment (employed vs. unemployed), and relationship status (having had a steady partner in the past 6 months vs. not). We included in analyses only participants whose HIV-negative serostatus was confirmed by this project, using Oracol oral fluid collection kits.

Results

Of the 2424 surveys in the dataset, we excluded 181 HIV-positive participants and 139 without HIV test results given our focus on predicting HIV-transmission risk behavior among HIV-negative participants. Finally, 17 cases missing all of the outcome variables were excluded from analyses, resulting in a final analytic sample of 2087 HIV-negative sexual minority men. Table 1 shows the prevalence of missing data on each of the covariates, which ranged from 3.4 to 6.6%. In total, 4.5% of the sample was missing data for the stigma variable (not shown) and prevalence of missing data on the eight outcomes ranged from 0 to 11%. Across all variables within the model, covariance coverage ranged from 86 to 100%.

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Participant Characteristics

Table 1 reports the socio-demographic characteristics of the sample. By design, the sample was nearly evenly divided among the five cities included within the present analyses. The majority of participants reported basic education or less (57.9%), being employed (73.9%), living within a city with population size exceeding 100,000 (66.5%), a gay sexual identity (80.2%), and having had a steady partner within the past 6 months (67.5%). The average age was 31.6 (SD = 9.7).

Associations of Demographic Characteristics and HIV Risk Behavior

Tables 2 and 3 report the results of the eight simultaneous regression analyses performed. With regard to demographic covariates, age was significantly associated with six of the outcome variables, education was significantly associated with three, employment was significantly associated with two, sexual orientation was significantly associated with five, location of primary dwelling was associated with four, and having a steady/main partner was associated with five.

Associations of Sexual Minority Stigma and Alcohol/Drug Use at Last Sexual Encounter

Stigma was significantly associated with five of the out-comes (Table 2). For the three substance-related outcomes, a one standard deviation increase in stigma was associated with a 19% increase in the odds of sex under the influence of alcohol at the last sexual encounter, a 27% increase in the odds of sex under the influence of cannabis at the last sexual encounter, and a 49% increase in the odds of sex under the influence of illicit drugs at the last sexual encounter.

Associations of Sexual Minority Stigma and Condomless Sex and HIV Testing

Table 3 presents results indicating that stigma was positively associated with one HIV risk outcome in the expected direction. Namely, a one standard deviation increase in stigma was associated with an 11% increase in the odds of condomless sex with casual partners in the past 6 months. Conversely, a one standard deviation increase in stigma was associated with a 26% increase in the odds of knowing where to receive an HIV test, though not associated with actual testing in the prior 12 months. Stigma was also not associated with having HIV status-unknown casual partners or with the total number of casual partners in the past 6 months.

Discussion

In this large sample of sexual minority men across six diverse European contexts, those who perceived greater sexual orientation stigma in their daily social institutions were significantly more likely to report sexual risk behavior with casual partners, as well as alcohol, marijuana, and illicit drug use (including cocaine, amphetamine, and MDMA) immediately prior to or during their most recent sexual encounter. While alcohol and drug use are established predictors of HIV-risk behavior [47, 48], the results of this study suggest that perceived high sexual orientation stigma from one’s social environment (from family to government), as reported by sexual minority men, might serve as a precursor to these risks, confirming previous findings [49]. At the same time, the impact of stigma on sexual

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minority men's HIV-related risk is capable of being modified through interventions that support stigmatized individuals' acquisition of skills to ameliorate the effects of stigma on health, and to view stigma as a problematic societal phenomenon, external to the individual, in need of change [50–52]. Below, we highlight how individually-focused interventions can improve stigma coping to reduce sexual minority men's HIV risk alongside structural interventions to reduce stigma at its source in discriminatory social institutions.

According to minority stress theory, sexual minority men living in social contexts marked by prevalent sexual minority stigma likely experience increased stress and associated coping strategies, including maladaptive strategies, for managing that stress [53, 54]. Our results suggest that alcohol and drug use might serve as a prominent mechanism for coping with stigma-related stress among European sexual minority men who frequently encounter social contextual stigma. Our findings show that stigma is particularly associated with alcohol and drug use in the context of sexual activity with other men. Perhaps sex with men invokes shame and guilt through making the stigma of one's sexual orientation particularly salient, with substance use during sex being one way to cope with this salience. Indeed, sexual minority men living in stigmatizing national contexts report high degrees of internalized homonegativity [55–57], which, though unmeasured here, potentially drives distress or cognitive dissonance during same-sex sexual behaviors [58]. Internalized homophobia, in turn, has shown consistent associations with substance use across several studies [49, 59]. These findings suggest that HIV-prevention strategies should build not only knowledge, motivation, and skills for engaging in HIV-prevention behavior, but also build adaptive forms of stigma coping as an important goal to reduce HIV-risk behavior [50, 60].

Our analyses paradoxically showed that those reporting higher levels of social contextual stigma were more likely to know where they could test for HIV, which may be explained by successful efforts by local advocates and NGOs to disseminate health-related information to those who most need it. Although stigma appeared to play a protective role in the sense that higher levels predicted better knowledge regarding HIV testing locations, it was not associated with individuals actually testing more frequently. This finding echoes literature indicating that knowledge is not sufficient to lead to action, and that building behavioral skills for self-efficacy is a necessary step alongside acquiring information [61]. Future research will need to determine the mechanisms through which greater stigma predicts greater knowledge of local testing resources. Results further suggest the need for prevention resources to motivate sexual minority men who perceive high levels of stigma in their daily lives to translate their knowledge of preventive resources into action by increasing their HIV testing frequency.

Finally, one's number of casual partners reported over the past 6 months and not knowing the HIV status of these casual partners had no associations with perceptions of social contextual stigma. However, perceptions of social contextual stigma were associated with a small increase in odds of engaging in condomless sex with casual partners over the past 6 months. This finding supports previous research suggesting that stigma serves as a determinant of sexual minority men's HIV risk [8, 29, 62, 63], but suggests that this risk might only extend to condom use, rather than selection of casual partners, lack of communication with partners about status, or number of partners. Future research might

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determine the mechanisms, both environmental (e.g., condom availability) and psychological (e.g., condom use self-assertion), as mechanisms linking perceived stigma to lack of condom use with casual partners.

As suggested above, interventions that promote stigma coping by promoting self-assertion and reducing social or emotional avoidance, might be employed fruitfully to increase sexual minority men's condom use, HIV testing, and reduce alcohol and drug use. Evidence suggests that such interventions show preliminary promise [50, 64]. Furthermore, mobile health (mHealth) interventions, which possess acceptability, feasibility, as well as efficacy in reducing HIV risk across various cultural contexts [64–66] may be a particularly useful modality of reaching large numbers of vulnerable sexual minority men who are likely to conceal their identities in highly stigmatizing contexts and prefer to access preventive resources in virtual settings where they feel safest [65, 67–69]. These types of interventions address several barriers to prevention by directly delivering LGBT-affirmative HIV risk-reduction interventions to vulnerable populations [70], especially those who are otherwise out-of-reach of public health campaigns because of geographical constraints, lack of brick-and-mortar establishments, and/or stigma itself.

Limitations

These findings should be interpreted in the light of several limitations. First, our study is limited by several aspects of our measurement approach. Measuring stigma is complex given the multiple levels of the ecosystem on which it manifests itself (e.g., from structural to individuals). In fact, in choosing to focus on social contextual stigma, we did not capture other forms of this multifaceted construct, including self-stigma (e.g., internalized stigma) and structural stigma (e.g., national laws and policies toward sexual minorities) [24]. Furthermore, we examined prejudice from different sources as an aggregate of contextual stigma, however, stigma experienced from family vs. coworkers or religious institutions may have differential impact on various outcomes. Therefore, future research would benefit from examining these relationships individually, rather than as a cumulative independent variable on outcomes of sexual risk. Still, evidence suggests that these diverse forms of stigma are related to the construct assessed here [27, 62, 71]. Another measurement limitation involves reliance on self-reported stigma, introducing potential confounds between our stress-related outcomes and stigma [72]. The inclusion of an interviewer-based calendar review of sexual behavior and alcohol/drug use history would have allowed for more fine-grained analyses that would include, for example, alcohol and drug use modelling independent of sexual encounters, or for day-level sexual risk behavior. Relatedly, the data were obtained through self-report, which could be considered to be a limitation in an epidemiological study. Lastly, more recent data would provide a clearer picture of the immediate context; yet associations among the variables examined here are likely to persist across time, even if their overall prevalence changes.

Although a small proportion of respondents was missing data, we utilized one of the most widely accepted techniques for handling such data that also allowed us to include them within models. Patterns of missing data were significantly associated with some but not all outcomes, though these effects were accounted for within the models; nonetheless, findings

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for those models should be interpreted with caution. Sensitivity analyses suggested that our approach of using missing data indicators along with robust maximum likelihood estimation reduced effect sizes for stigma and widened confidence intervals, making it more difficult to detect significant effects, compared to models without such indicators. As such, despite missing data, this conservative approach likely underestimated rather than overestimating the effect sizes and, to the extent it may have been biased, was biased toward non-significance. Because the dataset contained individuals from a diverse group of European countries, we initially hoped to take the nesting of the data into account and consider the role of country-level structural factors. However, with only six countries, the number of Level 2 units within the multilevel model was small, undermining any power to analyze Level 2 predictors and compromising the ability to estimate the Level 2 variance of the eight categorical and count outcomes (i.e., models would not converge due to the combination of model complexity and insufficient Level 2 units of analysis). Future studies with more variability across locations that can also incorporate higher-level predictors are warranted.

Conclusion

Our findings suggest that perceptions of social contextual stigma toward one's sexual orientation serve as an important risk factor for HIV infection. These findings help identify a clear pathway that might jeopardize the health of sexual minority men who live in ubiquitously stigmatizing environments. While our findings suggest that interventions designed to support sexual minority men's stigma coping abilities can protect against risk [50, 51, 64–66, 73–77], concomitant structural changes capable of reducing stigma at its source in stigmatizing political, legal, and institutional structures are also needed. Such changes are especially needed in countries where these structures perpetuate conditions in which sexual minorities are likely to perceive high levels of social contextual stigma and therefore be at greater risk of adverse behavioral health.

Acknowledgements

We gratefully acknowledge all the participants and project staff who have dedicated their time to this research.

Funding This article is based on the findings from the SIALON project, co-funded by the European Commission under the Public Health Programme 2003–2008 (GA 2007309). The sole responsibility lies with the author of the publication, and the Commission is not responsible for any use that may be made of the information contained therein.

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Table 1

Sample characteristics and associations with sexual minority stigma (N = 2087)

	n	%	*M* (SD)	Test statistic[a]
City, Country				
Prague, Poland	336	16.9	0.42 (0.81)	$F(5, 1988) = 31.1$, $p < 0.001$
Bratislava, Slovakia	349	17.5	0.00 (0.77)	
Barcelona, Spain	312	15.6	0.47 (0.83)	
Bucharest, Romania	305	15.3	−0.19 (0.93)	
Ljubljana, Slovenia	354	17.8	0.14 (0.91)	
Verona, Italy	338	16.9	−0.04 (0.86)	
Education				
Basic	1151	57.7	0.14 (0.91)	$F(2, 1991) = 0.42$, $p = 0.66$
University	774	38.8	0.13 (0.84)	
Missing	69	3.4	0.04 (0.96)	
Employment status				
Employed	1481	74.3	0.14 (0.89)	$F(2, 1991) = 0.62$, $p = 0.54$
Unemployed	433	21.7	0.13 (0.86)	
Missing	80	4.0	0.02 (0.94)	
Residential area				
Small city (population < 100,000)	639	32.0	0.40 (0.90)	$F(2, 1991) = 4.96$, $p < 0.01$
City (population > 100,000)	1339	67.1	0.17 (0.87)	
Missing	16	0.80	0.03 (1.11)	
Sexual identity				
Gay/homosexual	1628	81.6	0.18 (0.85)	$F(2, 1991) = 11.5$, $p < 0.001$
Bisexual or heterosexual	343	17.2	−0.07 (0.98)	
Missing	23	1.15	−0.003 (0.96)	
Steady partner in past 6 months				
No	596	29.9	0.12 (0.86)	$F(2, 1991) = 1.57$, $p = 0.21$
Yes	1353	67.9	0.14 (0.89)	
Missing	45	2.25	−0.90 (1.0)	
	M	*SD*	Range	

	n	**%**	***M* (SD)**	**Test statistic[a]**
Age (*Mdn* = 30.0; valid *n* = 2000)	31.6	9.7	18–76	$r = -0.021$, $p = 0.37$

[a]ANOVA tests were used to test for differences across groups

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Table 2

Regression models for sexual behavior under the influence and HIV testing awareness predicted by sexual orientation stigma ($n = 2087$)

	Last sex: under the influence of alcohol			Last sex: under the influence of cannabis			Last sex: under the influence of club drugs			Knowing where to get an HIV test		
	B	**AOR**	**95% CI**	**B**	**AOR**	**95% CI**	**B**	**AOR**	**95% CI**	**B**	**AOR**	**95% CI**
Age	−0.02	0.98**	[0.97, 0.99]	−0.01	0.99	[0.97, 1.01]	−0.01	0.99	[0.97, 1.01]	0.04	1.04**	[1.01, 1.06]
Missing covariates (ref. = no)	0.21	1.24	[− 0.07, 0.49]	0.52	1.68*	[1.05, 2.69]	0.16	1.18	[0.71, 1.95]	−0.52	0.59*	[0.39, 0.90]
Missing stigma (ref. = no)	1.06	2.88***	[0.47, 1.65]	0.46	1.58	[0.60, 4.17]	0.66	1.93	[0.75, 4.94]	−1.02	0.36**	[0.19, 0.68]
University education (ref. = basic)	−0.13	0.88	[0.72, 1.07]	−0.43	0.65*	[0.45, 0.96]	0.04	1.04	[0.71, 1.53]	0.29	1.33	[0.93, 1.92]
Employed (ref. = unemployed)	−0.29	0.75*	[0.59, 0.96]	−0.07	0.93	[0.59, 1.47]	−0.32	0.73	[0.45, 1.19]	0.03	1.03	[0.67, 1.58]
Bisexual orientation (ref. = gay)	0.44	1.55***	[1.22, 1.98]	0.55	1.74**	[1.14, 2.64]	0.83	2.30***	[1.52, 3.47]	−0.25	0.78	[0.52, 1.17]
City dweller (ref. = small city/town)	0.24	1.27*	[1.03, 1.55]	0.31	1.37	[0.91, 2.05]	0.23	1.25	[0.82, 1.92]	0.40	1.50*	[1.06, 2.12]
Had a steady partner (ref. = no)	−0.26	0.77*	[0.63, 0.95]	−0.34	0.71	[0.49, 1.04]	−0.28	0.76	[0.52, 1.11]	0.23	1.26	[0.88, 1.79]
Sexual orientation stigma (*z*-score)	0.18	1.19***	[1.07, 1.33]	0.24	1.27*	[1.03, 1.56]	0.40	1.49***	[1.22, 1.82]	0.23	1.26*	[1.01, 1.59]

All models were adjusted for demographic characteristics significantly associated with sexual orientation stigma

B unadjusted coefficient, *AOR* adjusted coefficient

$N = 2087$.

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

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Table 3

Regression models for HIV testing behavior and sexual behaviors predicted by sexual orientation stigma (n = 2087)

	HIV tested past 12 months			Any HIV status-unknown casual partners			Number of casual partners[a]			Frequency of condomless sex with casual partners[a]		
	B	**AOR**	**95% CI**	**B**	**AOR**	**95% CI**	**B**	**AOR**	**95% CI**	**B**	**AOR**	**95% CI**
Age	0.02	1.02***	[1.01, 1.03]	0.03	1.03***	[1.02, 1.04]	0.02	1.02***	[1.01, 1.03]	−0.02	0.98***	[0.97, 0.99]
Missing covariates (ref. = no)	−0.19	0.83	[0.64, 1.08]	−0.26	0.77	[0.59, 1.01]	0.45	1.56	[0.65, 2.47]	0.04	1.04	[0.79, 1.29]
Missing stigma (ref. = no)	−0.30	0.74	[0.45, 1.21]	−0.24	0.79	[0.49, 1.25]	0.03	1.03	[0.63, 1.43]	0.33	1.39	[0.91, 1.86]
University education (ref. = basic)	0.18	1.20	[0.99, 1.44]	0.15	1.16	[0.96, 1.41]	0.42	1.53*	[1.10, 2.11]	−0.39	0.68***	[0.56, 0.82]
Employed (ref. = unemployed)	0.00	1.00	[0.80, 1.26]	−0.04	0.96	[0.76, 1.21]	0.38	1.46*	[1.00, 2.13]	0.05	1.05	[0.84, 1.32]
Bisexual orientation (ref. = gay)	−0.07	0.93	[0.74, 1.18]	−0.31	0.73*	[0.58, 0.93]	0.31	1.37	[0.92, 2.02]	0.10	1.11	[0.92, 1.33]
City dweller (ref. = small city/town)	0.24	1.27*	[1.05, 1.54]	0.03	1.03	[0.85, 1.25]	0.39	1.48***	[1.22, 1.79]	−0.04	0.96	[0.81, 1.14]
Had a steady partner (ref. = no)	0.29	1.34**	[1.10, 1.62]	−0.67	0.51***	[0.42, 0.63]	−0.47	0.63***	[0.53, 0.74]	0.20	1.22*	[1.02, 1.45]
Sexual orientation stigma (z-score)	0.08	1.08	[0.97, 1.20]	−0.09	0.92	[0.83, 1.02]	0.07	1.08	[0.91, 1.27]	0.11	1.11*	[1.01, 1.23]

All models were adjusted for demographic characteristics significantly associated with sexual orientation stigma

B unadjusted coefficient, *AOR* adjusted coefficient

N = 2087.

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

[a] Modeled using Poisson distribution