

## **Being in the closet. Correlates of outness amongst MSM in 13 European cities**

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This analysis was conceived by LGI and MMI. Data were analysed by MMI and LGI.

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## **COMPETING INTERESTS**

The authors declare that they have no competing interests.

## **Being in the closet. Correlates of outness amongst MSM in 13 European cities.**

### **ABSTRACT**

Data for MSM continue to show a high risk of acquiring HIV-STIs. Within this population, outness seems to have an impact both on risk taking and on health seeking behaviors. The objective of this study is to assess the relation between socio-demographic, behavioural characteristics, testing attitudes and outness level amongst MSM, using data from a multi-centre bio-behavioural cross-sectional study carried out in 13 EU cities. A multi-level analysis was conducted to identify factors associated with being open (“out”) versus not being open (“in”). A total of 4,901 MSM were enrolled in the study and were classified as “out” in 71% of the cases. MSM “out” were more likely to report HIV testing and being reached by HIV prevention programmes compared to MSM who were “in”. The results confirm the key role of outness in relation to different healthy and risky behavior, ranging from testing to party-drug use.

### **KEYWORDS**

MSM; outness; bio-behavioural survey; Time-Location Sampling; Respondent-Driven Sampling; risk behaviours; HIV testing

## Introduction

Evidence suggests that lesbian, gay, bisexuals, transgender and intersex (LGBTI) people, and among these communities Men who have Sex with Men (MSM) in particular, are reporting worse general health and mental health compared to the general population (Bybee, 2009) (Blondeel, 2016). From a public health perspective, surveillance data for MSM continue to show that the risk of acquiring HIV and Sexually Transmitted Infections (STIs) is particularly high amongst gay, bisexual and other MSM and their communities (Beyrer, 2012) (ECDC, 2015). A range of different factors from behavioural aspects such as levels of condom use, and the use of drugs before or during sexual encounters, to other broader and more contextual factors (e.g. the level and quality of prevention campaigns targeting this specific group, potential discriminatory environments or community attitudes towards gay people), may play decisive roles in influencing the epidemic's amongst MSM. In addition, recent data confirms the existence of concentrated epidemics among MSM, presumably due also to sexual networking which might considerably increase the risk of acquiring HIV (Baral, 2013) (Young, 2013). These aspects clearly highlight the urgency and need for further prevention efforts in this field, including a better understanding of the factors which might shape the epidemics and healthy lives among MSM population (ECDC, 2017).

The findings of previous behavioural studies have led researchers to consider the key role of contextual and psychosocial factors such as perceived homophobia and level of outness – generally defined as the degree to which people are open about their sexual orientation and/or behaviour – in affecting general health and mental health (Bybee, 2009), in hindering HIV test seeking behaviours and treatment (Wao, 2016). Perceived homophobia and outness also play a role in enhancing the probability of

adopting risk behaviours and thus in acquiring HIV and STIs (Pachankis J. E., 2015) (Pachankis J. H., 2017) (Berg, 2015) (Mansergh, 2015) (Rosser, 2008) (Ross, 2013). Despite some divergent results, there is broad agreement that hetero-normative environments (if not intolerant environments towards same sex relations) may negatively impact on general wellbeing and healthy behaviours amongst MSM including access to health care services (Whitehead, 2016), therefore potentially exposing this population to considerable level of stress (Herek, 2004) (Singer M. B., 2017).

In particular, 'outness' has a moderating effect both on risk taking and on health seeking behaviours (Pitpitan, 2016) (Mansergh, 2015) (Mirandola M. G., 2017) (Whitehead, 2016), although the direct effect on sexual behaviours is somewhat debatable (Bybee, 2009). Both outness and perceived stigma might contribute to a reduction in access to a cluster of health prevention initiatives and services, including condom promotion, and testing and treatment (Ayala, 2013) (Mirandola M. G., 2017) (Mirandola M. G.-S., 2017). Both disclosure and coming out play also a key role in the general process of identity and sexual identity formation (Feldman, 2013). In addition, sexual identity was defined from the WHO as an integral part of one's sexual health, providing an approximation of a level of sexual well-being (WHO, 2010) (Toskin, 2013).

Focusing on coming out, broader social norms may impact on this multifaceted process: migrant MSM or MSM sharing specific cultural backgrounds are likely to experience even more difficulties in disclosing their sexual orientation or identity (Rosario, 2004) (Xu, 2017).

Considering this scenario, research is needed to investigate more closely the role outness plays within MSM populations and to better characterise those MSM who are “out” versus those MSM who are “in the closet” (a generally accepted colloquialism for MSM “not out”). This will better inform targeted prevention campaign focusing on this latter sub-population, whom may be particularly exposed to psycho-social stressors and related risk behaviours (Pitpitan, 2016).

The aim of the present analysis is to explore the relationship between outness and demographics, drug use, testing behaviours, sexual satisfaction and perceived stigma amongst MSM enrolled in the Sialon II bio-behavioural multi-site survey which was co-funded by the European Commission under the Second Programme of Community Action in the Field of Health 2008-2013 (Mirandola M. F., 2009) (Mirandola M. G., 2016) (Gios, 2016).

The core assumptions of the analysis are based on some key findings which underline that MSM in the closet – compared to MSM who declared to be out – are more likely to: (i) report risk behaviours defined as party drug use (Chard, 2017); (ii) perceive a high level of stigma towards LGB people (Pachankis J. H.-D., 2017); (iii) report low levels of health seeking behaviours (e.g. get tested and/or being reached by prevention programmes); (iv) engage in bisexual behaviours (Mirandola M. G.-S., 2017). In the present analysis, these main areas are considered in a unique model based also on previous work suggesting a potential link between perceived stigma, outness levels, and bisexuality (Mirandola M. G.-S., 2017) (Pachankis J. H., 2017).

## **Materials and Methods**

### **Study design**

The Sialon II project was a multi-centre biological and behavioural cross-sectional survey carried out across 13 European cities including: Brussels (Belgium), Sofia (Bulgaria), Hamburg (Germany), Verona (Italy), Vilnius (Lithuania), Warsaw (Poland), Lisbon (Portugal), Bucharest (Romania), Bratislava (Slovakia), Ljubljana (Slovenia), Barcelona (Spain), Stockholm (Sweden), and Brighton (UK). The survey was implemented adopting the same methodologies (protocols, UN Global AIDS Response Progress Reporting GARPR indicators, epidemiological algorithms) in each study site, whilst two different enrolling methods have been adopted in line with the local context and needs, namely Time-Location Sampling (TLS) and Respondent-Driven Sampling (RDS). Study procedures as well as bio-behavioural data collection and testing methodologies have been described in detail elsewhere (Gios, 2016).

### **Participants**

The study population comprised male participants present in the study cities during the data collection period. The following inclusion criteria were used to define eligibility: being older than 18 years old, having had sex (any kind of sex) with a man during the last 12 months, providing a consent form, agreeing to donate either oral fluid specimen (in case of the TLS survey) or whole blood specimen (in case of the RDS survey).

### **Survey questionnaire**



A pen-and-paper questionnaire was designed based on the GARPR indicators guidelines (UNAIDS, 2014) and former relevant projects targeting MSM. Proper piloting and translation/back translation were done to ensure consistency and quality of the items. The self-administered tool was used to gather information on demographic profile, sexual and testing behaviour, perceived stigma, and outness.

## **Variables**

### *Dependent variable*

Outness was measured using an item already analysed in previous publications (Mirandola M. G., 2016) (Mirandola M. G.-S., 2017). The following question was adopted: “Thinking about all the people who know you (including family, friends and work or study colleagues), what proportion knows that you are attracted to men?” Possible options were: “none”; “few”; “less than half”; “more than half”; “all or almost all.”

In order to facilitate the analysis, the variable was dichotomised as follows: i) those out to “no one”, to “few” the people they know (defined as “in the closet”), ii) those out to “less than half”, “more than half” or to “all or almost all” of the people they know (defined as “out”). This categorisation is also based on previous studies on outness (Pitpitan, 2016).

### *Independent variables*

The following variables were included as explanatory variables based on self-reported data: age, level of education (categorised as secondary school/high school or lower vs.

university degree or higher), origin (emigrant/immigrant or visitor *vs.* native-born considering the study country), lifetime HIV testing, being reached by prevention programmes in the last year (as measured according to the GARPR guidelines), use of party drugs, sexual satisfaction and perceived stigma. The latter was based on the item “In your experience, what is most people’s attitude towards gays or bisexuals in the following contexts?”. The item addressed three main areas, such work/school, parents and friends/acquaintances. Survey participants were asked to respond using a 5-point Likert scale ranging from 1 (very negative) to 5 (very positive) regarding perceptions of homophobia (Cronbach’s alpha .73). To simplify data interpretation, the scale’s range – originally ranging from a minimum of 3 to a maximum of 15 points – was reversed. The sexual satisfaction variable was based on the WHO item “How satisfied are you with your sex life?” (WHO, 2010). Four options were possible, ranging from “very satisfied” to “very unsatisfied”. The sexual satisfaction variable was dichotomised, considering (i) those reporting either “very satisfied” or “satisfied” answers and (ii) those reporting either “unsatisfied” or “very unsatisfied” responses.

## **Statistical methods**

### *Descriptive and bivariate analysis*

For nominal variables, percentages and Fisher's exact test were used, whilst for quantitative variables, mean, median, standard deviation, Wilcoxon–Mann–Whitney test and Kruskal–Wallis test by ranks were used. Bivariate analyses were carried out using a multivariate logistic model and  $p < .05$  was adopted as threshold to include variables.

### *Multi-level Modelling*

A multivariable multi-level logistic random-intercept model (also known as hierarchical modelling) was estimated. This approach was used specifically for (i) dealing with the structure of the sample (cities), and (ii) the possibility of including random intercepts and slopes when needed (Rabe-Hesketh, 2008). Through this modelling approach, factors associated with being out *vs.* being not out were identified, according to the categorisation described above. STATA Version 14.2 was used for all analyses (College Station, TX: StataCorp LP).

### **Ethics**

Prior to data collection, research protocols were submitted to and approved by the ethics committee in each participating city, as well as both by WHO Research Project Review Panel (RP2) and WHO Research Ethics Review Committee (ERC) in 2012-13.

# Results

## Participants

Across the 13 sites, 4,901 MSM were enrolled in the study (TLS survey: 3,596 participants; RDS survey: 1,305 participants; a total of 4,742 MSM were then considered for outness analysis). An extensive description of the sample, characterising the main demographic data has been published elsewhere (Mirandola M. G., 2016).

## Proportions of MSM “out” and “in the closet” across study sites

Considering the entire sample, more than two thirds of the study participants can be considered “out” (3,358; 71% of the sample). However, the number of MSM reporting to be out versus in the closet greatly varies among the different study sites (Table 1). Amongst the Sialon II study sites, cities with the highest proportion of MSM “in the closet” were mainly Eastern European cities such as Bucharest (57%), Vilnius (47%) and Warsaw (45%) (in the first two cities, RDS survey was adopted). Within the study sites, the highest level of MSM defined as “out” were reported in Brighton (86%), Hamburg (85%) and Brussels (83%).

## Association between outness and demographic data (bivariate analysis)

Data on bivariate analysis are presented in table 2. Considering demographic data, compared to the participants defined as “in the closet”, MSM who are “out” were older (mean age 34.44 vs. 32.55 amongst those “in the closet”) and better educated (57% university degree vs. 52%,  $p < 0.01$ ). Compared to MSM in the closet, MSM who are open about their sexual practice are more likely to live in the study city (72.2% vs. 71.5%,  $p < 0.01$ ) and to be migrant or visitor (17% v vs. 16%,  $p < 0.01$ ). In terms of

participants considered as bisexual, that is, MSM declaring to had sex with both men and women in the previous six months), being Men who have Sex with both Men and Women (MSMW) is more frequent amongst those “in the closet” compared to those are open about their sexual practice (25% vs. 7% among those who are “out”,  $p < 0.05$ ).

**Association between outness and testing, risk behaviour (party drugs use), prevention programmes, stigma and sexual satisfaction (bivariate analysis)**

MSM who are “out” are more likely to report being reached by HIV prevention programmes in the last 12 months (66%), compared to those who were classified as being in the closet (53%;  $p < 0.01$ ). MSM open about their sexual behaviour are more often reporting being tested for HIV at least once (83% vs. 65% among those “in the closet”,  $p < 0.01$ ). Usage of party drugs seems to be more common behaviour for those who are “out”, compared to the MSM who are not open (10% vs. 7%), even if this difference is not statistically significant ( $p > 0.05$ ). When considering perceptions of LGB stigma, MSM who are “out” report significantly higher levels of perceived stigma than MSM in the closet (Mean 9.5 vs. 7.1,  $p < 0.01$ , according to the LBG score used in the present study).

Finally, in terms of sexual satisfaction, minor differences are reported between the two groups ( $p > 0.05$ ): 936 MSM who are in the closet (74%) described themselves as sexually satisfied, whilst 2,482 MSM (78%) open about their orientation (sexual behaviour) are reporting positive sexual satisfaction.

**Being in the closet vs. being out (multilevel multivariate model)**

Considering the outputs of the bivariate analysis, some predictors identified in that phase of the analysis were not significantly associated with the dependent variable once included in the multilevel multivariate model (see Table 3).

Being MSMW represents a significant factor in characterising MSM who are open about their own sexual behaviour versus MSM in the closet. MSM who are “out” show a decrease in the odds of being MSMW compared to the MSM who are not out (OR = 0.27;  $p < 0.01$ ). In terms of demographical characteristics, MSM with a high educational status (university degree or higher) report an odds ratio of 1.24 to be “out of the closet” (OR = 1.24;  $p > 0.05$ ) compared to those who are reporting a secondary school or lower level.

The area of residence was not a significant factor in differentiating MSM “out” or “in the closet” in the model, despite participants who are living in the study city report an odds ratio of 1.14 to be “out of the closet” compared to those who are living out-side the study city ( $p > 0.05$ ). This seems to suggest that MSM “in” were more likely than MSM “out” to live in rural areas, or in small cities/towns. Considering the status of native-born in the country study versus the status of migrant or visitor, MSM who are native-born report a higher OR of being open (OR = 1.43;  $p > 0.05$ ).

When considering protective factors, such as HIV testing and being reached by prevention programmes, the model shows different levels of odds ratio between the two groups. MSM who tested at least once in their life and confirmed that they were reached by prevention programmes report a high odds ratio to be out of the closet (OR = 1.91;  $p > 0.01$  and OR = 1.34;  $p > 0.01$  respectively), compared to those who didn't report such behaviours. The model shows that MSM who are out are more likely to report party drugs use compared to those who are “in the closet” (OR = 1.99;  $p < 0.01$ ).

The model also shows significant differences among MSM “out” and “in” in terms of stigma perception. MSM who are open about their sexual behaviour are less likely to perceive a hostile environment toward LGBT people, compared to the participants who were classified as “in the closet” (OR = 0.65;  $p < 0.01$ ).

In terms of sexual satisfaction, the model does not highlight substantial differences between MSM “out” and MSM “in the closet” (OR = 0.93;  $p > 0.05$ ).

Finally, the lower the odds of being out of the closet are, the higher the age is, even if this difference in terms of OR is relatively narrow (OR 0.99;  $p < 0.05$ ). This seems to suggest that old MSM are more likely to be open about their sexual behaviour, compared to the young MSM.

## Discussion

To our knowledge, the data presented in this study are unique considering no previous survey has examined outness using sampling methods designed specifically for ‘hard to reach’ and/or most at-risk populations such as MSM via TLS and RDS in the context of a wide multi-site European survey (13 European cities).

Levels of outness greatly varied across study the 13 cities, with higher levels of MSM classified as “in the closet” in Eastern European sites, such as Bucharest (57%), Vilnius (47%) and Warsaw (45%); amongst the different sites, the highest levels of participants defined as “out” were found in Brighton (86%), Hamburg (85%) and Brussels (83%).

Compared to the MSM “in the closet”, MSM who are “out” were older, better educated, more likely to live in the study city and less likely to be behaviourally bisexual (MSMW) ( $p < 0.05$ ).

In our analysis, considering factors like testing and prevention, MSM who were “out” were more likely to report being reached by HIV prevention programmes, HIV testing (lifetime), compared to those who were classified as being in the closet ( $p < 0.01$ ).

MSM open about their same-sex sexual practices were less likely report high levels of stigma perception compared than MSM in the closet. Results on outness and perceptions of stigmatising environment seem to confirm that these two factors might be reinforcing each other: a non-LGBT friendly social arena might heavily hamper the disclosure of one’s sexual orientation on one side and on the other it might lead to a decreased access to testing services (Mirandola M. G., 2017).



When considering variables which might be defined as protective factors versus risk factors, the present results seem to highlight a multifaceted characterisation of both MSM in the closet and out of the closet.

On one side, compared to MSM who are defined as “in the closet”, MSM who are “out” seem to benefit from a set of protective factors, such as a higher level of HIV testing and prevention programmes coverage, and have a perception of a lower LGB stigmatising environment. This seems somehow confirmed also from other studies (Berg, 2015) (Mansergh, 2015) (Pitpitan, 2016). On the other side, MSM who are in the closet are less likely to be party-drugs users compared to MSM who are open about their sexual behaviour; this might lead to a lower opportunity to adopt drug-related risky behaviours, considering (i) the presumably different social network and (ii) the probably diverse level of attendance of venues where drug consumption might be frequent.

Notwithstanding the strength of the survey and the uniqueness of the data collected, data presented in this manuscript should be interpreted with caution in light of some limitations. First, in the Sialon II survey recruitment strategies based on websites or gay apps were not foreseen, leading to a possible underrepresentation of specific segments of the MSM populations. This might imply a low representation of MSM who are experiencing low levels of outness and who are users of MSM-based mobile dating apps to access the gay community.

Moreover, all the data used in the present analysis were based on self-reported information gathered through the survey questionnaire. Despite the fact that the questionnaire was structured carefully and piloted to ensure easy-to-read/understand

items and to participant-friendly questions sequence, recall biases might not be categorically excluded with particular reference to items focusing on testing.

An additional limitation might lie in the definition of outness in it-self, which was and is a sometimes controversial topic within the scientific debate over the years (Griffith, 2002) (Coleman, 1982) (McDonald, 1982) (Meidlinger, 2014) (Whitehead, 2016).

Still, there is a general agreement in considering a reliable indicator of outness as the proportion of people one is out to as homosexual (and/or bisexual) and this approach is currently adopted in several studies (Pitpitan, 2016) (Mansergh, 2015).

Finally, items on sexual identity were not included for all study sites in the questionnaire, and therefore this piece of information is not present in data analysis.

This might limit results interpretation, as identity somehow represents an important topic to be considered when investigating MSMs disclosure (Rosario, 2004)

(Pachankis J. H., 2017). In addition, the use of RDS and TLS might have possibly led to capture different sub-populations also in terms of outness (Kendall, 2008), and contextual data related to policy, structural and societal perceptions or norms in the different study sites were not included.

## Conclusions

Previous research clearly confirmed how the social and cultural environment impacts on MSM's openness about sexual orientation (Pachankis J. H., 2017). This seems to be evident also in light of the present analysis, as MSM who reported low level of outness also perceive a negative attitude towards gay/bisexual men within their social context, even if with not so different proportions.

It is generally recognised that a high degree of "outness" is linked with positive social supports (APA, 2003). Despite this could not be directly confirmed in the present analysis, the fact that MSM in the closet are reporting (i) less prevention/testing levels, (ii) lower perception of a supporting environment and (iii) different use of sex drugs (compared to MSM who are defined as "out") supports the idea that a cluster of risky patterns is present for this sub-group. Moreover, this pattern can be explained also considering the socio-demographic characteristics of the sample, older and prevalently residing in the big cities and therefore having high probability to be exposed to HIV prevention programmes, including testing.

In addition, even if not significant in the model, the role of sexual satisfaction might be a crucial factor to consider also when planning HIV prevention strategies targeting MSM and/or MSMW (Bourne, 2013). For extension, these findings might be considered if not as a confirmation, at least in light of the so-called *syndemic* phenomenon, largely considered as the co-occurrence of psychosocial and health difficulties which are circularly reinforcing each other (Singer M. , 2009). Compared to MSM who are out, MSM in the closet seems to experience a more disadvantaged condition, not only in terms of social stress but also in terms of testing and access to prevention initiatives.

In the efforts to tackle HIV epidemic among MSM and to reach the highest level possible of access to HIV prevention and treatment, further studies are required to better understand the different social and behavioural patterns (including sexual wellbeing, health seeking behaviours and prevention needs) which characterise MSM who are in the closet compared to those are out. This paper sought to identify and describe some of those types of data, coming from the biggest bio-behavioural survey ever implemented in Europe. However, additional information is needed (i) to more closely understand factors which shape the experiences and behaviours of MSM in the closet compared to those out and (ii) to further inform meaningful and targeted prevention strategies, considering the specific prevention needs of this sub-population particularly exposed to a multifaceted range of social stressors.

## References

- APA. (2003, April). *American Psychological Association. Degree of 'outness' key to social support for gays and lesbians.* (American Psychological Association)  
Retrieved 2017, from <http://www.apa.org/monitor/apr03/degree.aspx>
- Ayala, G. M.-M. (2013). Access to Basic HIV-Related Services and PrEP Acceptability among Men Who Have sex with Men Worldwide: Barriers, Facilitators, and Implications for Combination Prevention. *2013, 953123.*  
<http://doi.org/10.1155/2013/953123>.
- Baral, S. L. (2013). Modified social ecological model: a tool to guide the assessment of the risks and risk contexts of HIV epidemics. *13, 482.*  
<http://doi.org/10.1186/1471-2458-13-482>.
- Berg, R. W. (2015). The Relationship of Internalized Homonegativity to Sexual Health and Well-Being Among Men in 38 European Countries Who Have Sex With Men. *2015 Jul 3; 19(3):285-302. Epub 2015 Apr 20.*
- Beyrer, C. B. (2012). Global epidemiology of HIV infection in men who have sex with men. *380(9839):367-77.*
- Blondeel, K. S. (2016). (2016). Evidence and knowledge gaps on the disease burden in sexual and gender minorities: a review of systematic reviews. *15, 16.*  
<http://doi.org/10.1186/s12939-016-0304-1>.
- Bourne, A. H. (2013). What constitutes the best sex life for gay and bisexual men? Implications for HIV prevention. *13, 1083.* <http://doi.org/10.1186/1471-2458-13-1083>.
- Bybee, J. S. (2009). Are gay men in worse mental health than heterosexual men? The role of age, shame and guilt, and coming-out. *2009;16(3):144-154.*

- Chard, A. M. (2017). Social Stressors and Intoxicated Sex Among an Online Sample of Men who have Sex with Men (MSM) Drawn from Seven Countries. *2017 Aug 9:1-9. doi:10.1080/10826084.2017.1322985. [Epub ahead of print] PubMed PMID: 28792280.*
- Coleman, E. (1982). Developmental stages of the coming out process. *1982;7(2-3):31-43.*
- ECDC. (2015). *European Centre for Disease and Control Special Report. Thematic report: Men who have sex with men. Monitoring implementation of the Dublin Declaration on Partnership to Fight HIV/AIDS in Europe and Central Asia: 2014 progress report.* Stockholm: ECDC.
- ECDC. (2017). *European Centre for Disease Prevention and Control. HIV and men who have sex with men. Monitoring implementation of the Dublin Declaration on Partnership to Fight HIV/AIDS in Europe and Central Asia: 2017 progress report.* Stockholm: ECDC.
- Feldman, S. E. (2013). Dual Impact: Outness and LGB Identity Formation on Mental Health. *Vol. 25 , Iss. 4, 2013.*
- Gios, L. M. (2016). Bio-behavioural HIV and STI surveillance among men who have sex with men in Europe: the Sialon II protocols. *2016 Mar 2;16(1):212.*
- Griffith, K. H. (2002). The disclosure dilemma for gay men and lesbians: “coming out” at work. *2002;87(6):1191.*
- Herek, G. (2004). Beyond “homophobia”: Thinking about sexual prejudice and stigma in the twentyfirst century. *2004;1(2):6-24.*
- Kendall, C. K. (2008). An empirical comparison of respondent-driven sampling, time location sampling, and snowball sampling for behavioral surveillance in men

- who have sex with men, Fortaleza, Brazil. *2008 Jul;12(4 Suppl):S97-104. doi: 10.1007/s10461-008-9390-4. Epub 2008 Apr 4. PubMed PMID: 18389357.*
- Mansergh, G. S. (2015). Internalised homophobia is differentially associated with sexual risk behaviour by race/ethnicity and HIV serostatus among substance-using men who have sex with men in the United States. *2015 Aug; 91(5):324-8. Epub 2014 Dec 15.*
- McDonald, G. (1982). Individual differences in the coming out process for gay men: implications for theoretical minds. *1982;8(1):47-60.*
- Meidlinger, P. C. (2014). Differentiating disclosure and concealment in measurement of outness for sexual minorities: The Nebraska Outness Scale. *1(4), 489-497*  
*http://dx.doi.org/10.1037/sgd0000080.*
- Mirandola, M. F. (2009). HIV bio-behavioural survey among men who have sex with men in Barcelona, Bratislava, Bucharest, Ljubljana, Prague and Verona, 2008-2009. *2009 Dec 3;14(48). pii: 19427.*
- Mirandola, M. G. (2016). *The Sialon II Project. Report on a Bio-behavioural Survey among MSM in 13 European cities.* ISBN 978-88-98768-55-4 Cierre Grafica.
- Mirandola, M. G. (2017). Socio-demographic factors predicting HIV test seeking behaviour among MSM in 6 EU cities. *2017 Apr 1;27(2):313-318. doi: 10.1093/eurpub/ckw144. PubMed PMID: 27615734.*
- Mirandola, M. G.-S. (2017). Socio-demographic Characteristics, Sexual and Test-Seeking Behaviours Amongst Men Who have Sex with Both Men and Women: Results from a Bio-behavioural Survey in 13 European Cities. *2017 Jun 22. doi: 10.1007/s10461-017-1831-5.*

- Pachankis, J. E. (2015). Hidden from health: Structural stigma, sexual orientation concealment, and HIV across 38 countries in the European MSM Internet Survey. *29(10)*, 1239-1246.
- Pachankis, J. H. (2017). The Geography of Sexual Orientation: Structural Stigma and Sexual Attraction, Behavior, and Identity Among Men Who Have Sex with Men Across 38 European Countries. *Jul;46(5):1491-1502*.
- Pachankis, J. H.-D. (2017). Anti-LGBT and Anti-Immigrant Structural Stigma: An Intersectional Analysis of Sexual Minority Men's HIV Risk When Migrating to or Within Europe. *2017 Aug 4. doi:10.1097/QAI.0000000000001519. [Epub ahead of print] PubMed PMID: 28787329*.
- Pitpitan, E. S.-M. (2016). "Out-ness" as a Moderator of the Association Between Syndemic Conditions and HIV Risk-Taking Behavior Among Men Who Have Sex with Men in Tijuana, Mexico. *2016 Feb;20(2):431-8*.
- Rabe-Hesketh, S. S. (2008). *Multilevel and longitudinal modeling using Stata*. College Station: Stata Press.
- Rosario, M. S. (2004). Ethnic/racial differences in the coming-out process of lesbian, gay, and bisexual youths: a comparison of sexual identity development over time. *2004 Aug; 10(3):215-28*.
- Ross, M. W. (2013). Internalised homonegativity predicts HIV-associated risk behavior in European men who have sex with men in a 38-country cross-sectional study: some public health implications of homophobia. *3(2)*, e001928. <http://doi.org/10.1136/bmjopen-2012-001928>.
- Rosser, B. H. (2008). Predictors of HIV disclosure to secondary partners and sexual risk behavior among a high-risk sample of HIV-positive MSM: results from six epicenters in the US. *2008;20(8):925-930*.



- Singer, M. (2009). *Introduction to syndemics: a critical systems approach to public and community health*. San Francisco: Jossey-Bass Inc. Pub.
- Singer, M. B. (2017). Syndemics and the biosocial conception of health. *2017*; 389: 941–50 .
- Toskin, I. A. (2013). Sexual Health: Conceptual Framework and Recommendations For Indicators. . *89(Suppl 1)*, A7-A8.
- UNAIDS, J. U. (2014). *Global AIDS response progress reporting 2014: construction of core indicators for monitoring the 2011 UN political declaration on HIV/AIDS*. Geneva: Joint United Nations Programme on HIV/AIDS (UNAIDS), WHO Library Cataloguing-in-Publication Data.
- Wao, H. A. (2016). MSM's versus healthcare providers' perceptions of barriers to uptake of HIV/AIDS-related interventions: systematic review and meta-synthesis of qualitative and quantitative evidence. *28(1)*, 1-12.
- Whitehead, J. S. (2016). Outness, Stigma, and Primary Health Care Utilization among Rural LGBT Populations. *11(1)*: e0146139.  
*doi:10.1371/journal.pone.0146139*.
- WHO. (2010). *Measuring sexual health: conceptual and practical considerations and related indicators*. Geneva: World Health Organisation.
- Xu, W. Z. (2017). Internalized homophobia, mental health, sexual behaviors, and outness of gay/bisexual men from Southwest China. *16*, 36.  
*http://doi.org/10.1186/s12939-017-0530-1*.
- Young, S. D. (2013). The Relationship between Online Social Networking and Sexual Risk Behaviors among Men Who Have Sex with Men (MSM). *8(5)*, e62271.  
*http://doi.org/10.1371/journal.pone.0062271*.



## Tables

**Table 1. Number of MSM being out and being in the closet, per city**

| City       | Being in the closet | Being out  | Total       |
|------------|---------------------|------------|-------------|
| Barcelona  | 90                  | 300        | 390         |
|            | <i>23%</i>          | <i>77%</i> | <i>100%</i> |
| Bratislava | 155                 | 238        | 393         |
|            | <i>39%</i>          | <i>61%</i> | <i>100%</i> |
| Brighton   | 57                  | 340        | 397         |
|            | <i>14%</i>          | <i>86%</i> | <i>100%</i> |
| Brussels   | 65                  | 315        | 380         |
|            | <i>17%</i>          | <i>83%</i> | <i>100%</i> |
| Bucharest  | 100                 | 74         | 174         |
|            | <i>57%</i>          | <i>43%</i> | <i>100%</i> |
| Hamburg    | 58                  | 338        | 396         |
|            | <i>15%</i>          | <i>85%</i> | <i>100%</i> |
| Lisbon     | 106                 | 293        | 399         |
|            | <i>27%</i>          | <i>73%</i> | <i>100%</i> |
| Ljubljana  | 88                  | 292        | 380         |
|            | <i>23%</i>          | <i>77%</i> | <i>100%</i> |
| Sofia      | 150                 | 259        | 409         |
|            | <i>37%</i>          | <i>63%</i> | <i>100%</i> |
| Stockholm  | 63                  | 248        | 311         |
|            | <i>20%</i>          | <i>80%</i> | <i>100%</i> |
| Verona     | 124                 | 269        | 393         |
|            | <i>32%</i>          | <i>68%</i> | <i>100%</i> |
| Vilnius    | 150                 | 170        | 320         |
|            | <i>47%</i>          | <i>53%</i> | <i>100%</i> |
| Warsaw     | 178                 | 222        | 400         |
|            | <i>45%</i>          | <i>56%</i> | <i>100%</i> |
| TOTAL      | 1,384               | 3,358      | 4,742       |
|            | <i>29%</i>          | <i>71%</i> | <i>100%</i> |

**Table 2. Percent of MSM with various characteristics, by outness (bivariate analysis)**

| Characteristic   |   | MSM in the closet<br>( <i>n</i> = 1,380) |     | MSM out<br>( <i>n</i> = 3,357) |     | <i>P</i><br>value |
|--|---|--|-----|--------------------------------|-----|-------------------|
| Age  |   |  |     |                                |     | <b>0.00</b>       |
|  | Mean                                    | 33.74                                    |     | 34.57                          |     |                   |
|  | Median                                  | 32.00                                    |     | 32.00                          |     |                   |
|  | St. Dev.                                | 11.36                                    |     | 11.12                          |     |                   |
| Being MSMW   |   |  |     |                                |     | <b>0.00</b>       |
|  | No                                      | 985                                      | 75% | 2,968                          | 93% |                   |
|  | Yes                                     | 336                                      | 25% | 219                            | 7%  |                   |
| Area of residence  |   |  |     |                                |     | <b>0.01</b>       |
|  | Outside the study city                  | 391                                      | 28% | 927                            | 28% |                   |
|  | In the study city                       | 982                                      | 72% | 2,410                          | 72% |                   |
| Educational status   |   |  |     |                                |     | <b>0.00</b>       |
|  | Secondary school (high school) or lower | 653                                      | 48% | 1,415                          | 43% |                   |
|  | University or higher                    | 700                                      | 52% | 1,887                          | 57% |                   |
| Origin   |   |  |     |                                |     | <b>0.00</b>       |
|  | Emigrant/immigrant or visitor           | 223                                      | 16% | 560                            | 17% |                   |
|  | Native-born                             | 1,154                                    | 84% | 2,791                          | 83% |                   |
| HIV Testing (lifetime)   |   |  |     |                                |     | <b>0.00</b>       |
|  | Never tested                            | 431                                      | 35% | 516                            | 17% |                   |
|  | Tested at least once                    | 810                                      | 65% | 2,585                          | 83% |                   |
| Being reached by prevention programmes (condom distribution) in the last 12 months |   |  |     |                                |     | <b>0.00</b>       |
|  | No                                      | 632                                      | 47% | 1,126                          | 34% |                   |
|  | Yes                                     | 723                                      | 53% | 2,195                          | 66% |                   |
| Use of party drugs   |   |  |     |                                |     | 0.09              |
|  | No                                      | 1,184                                    | 93% | 2,915                          | 90% |                   |
|  | Yes                                     | 90                                       | 7%  | 323                            | 10% |                   |
| Sexual satisfaction  |   |  |     |                                |     | 0.09              |
|  | Not satisfied                           | 332                                      | 26% | 711                            | 22% |                   |
|  | Satisfied                               | 936                                      | 74% | 2,482                          | 78% |                   |
| LGB stigma perception  |   |  |     |                                |     | <b>0.00</b>       |
|  | Mean                                    | 7.1                                      |     | 9.5                            |     |                   |
|  | Median                                  | 7.0                                      |     | 9.0                            |     |                   |
|  | St. Dev.                                | 2.3                                      |     | 2.4                            |     |                   |

**Table 3: Multilevel Multivariate Model**

|  |   | OR    | 95% CI |       | P           |
|--|---|-------|--------|-------|-------------|
| <b>Fixed part</b>                      |   |       |        |       |             |
| Being MSMW                             | No                                      | 1     |        |       |             |
|  | Yes                                     | 0.27  | 0.21   | 0.35  | <b>0.00</b> |
| Area of residence                      | Out-side the study city                 | 1     |        |       |             |
|  | Study city                              | 1.14  | 0.94   | 1.39  | 0.19        |
| Educational status                     | Secondary school (high school) or lower | 1     |        |       |             |
|  | University or higher                    | 1.24  | 1.03   | 1.50  | <b>0.03</b> |
| Origin                                 | Emigrant/immigrant or visitor           | 1     |        |       |             |
|  | Native-born                             | 1.43  | 1.11   | 1.84  | <b>0.01</b> |
| HIV Testing (lifetime)                 | Never tested                            | 1     |        |       |             |
|  | Tested at least once                    | 1.91  | 1.53   | 2.38  | <b>0.00</b> |
| Being reached by prevention programmes | No                                      | 1     |        |       |             |
|  | Yes                                     | 1.34  | 1.11   | 1.62  | <b>0.00</b> |
| Use of party drugs                     | No                                      | 1     |        |       |             |
|  | Yes                                     | 1.99  | 1.36   | 2.90  | <b>0.00</b> |
| Sexual satisfaction                    | Unsatisfied                             | 1     |        |       |             |
|  | Satisfied                               | 0.93  | 0.75   | 1.15  | 0.49        |
| LGB stigma perception                  |   | 0.65  | 0.62   | 0.68  | <b>0.00</b> |
| Age                                    |   | 0.99  | 0.98   | 1.00  | <b>0.02</b> |
| Const.                                 |   | 51.31 | 27.38  | 99.96 | <b>0.00</b> |
| <b>Random part</b>                     |   |       |        |       |             |
| City                                   |   |       |        |       |             |
|  | Var                                     | 0.22  | 0.09   | 0.53  |             |

LR test vs. logistic regression:  $\text{chibar2}(01) = 88.56$  Prob  $\geq \text{chibar2} = 0.0000$



# Figures

**Figure 1. Number of MSM being out and being in the closet, per city**

