



## Original article

## Depressive symptoms and substance use as mediators of stigma affecting men who have sex with men in Lesotho: a structural equation modeling approach



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## ABSTRACT

**Purpose:** Research on the relationship between sexual orientation–related stigma and risks for HIV among men who have sex with men (MSM) is limited. This study tests a hypothesis that substance use and depressive symptoms mediate the relationship between stigma in the health care system and HIV-related risk practices among MSM in Maseru, Lesotho.

**Methods:** In 2014, we conducted a cross-sectional study among MSM in Lesotho accrued via respondent-driven sampling including a survey and biological testing for HIV. The hypothesis was tested using structural equation modeling.

**Results:** Of the 318 participants, 22.3% had experienced stigma in the health care system. Stigma in the health care system was associated with depression ( $\beta = 0.329$ ,  $P = .018$ ) and alcohol use ( $\beta = 1.417$ ,  $P = .001$ ). Noninjection illicit drug use ( $\beta = 0.837$ ,  $P = .039$ ) and alcohol use ( $\beta = 0.282$ ,  $P = .000$ ) significantly predicted number of sex partners. Stigma was directly associated with condomless anal sex ( $\beta = 0.441$ ,  $P = .036$ ), and no indirect association was found.

**Conclusions:** Alcohol use and depressive symptoms mediate the relationship between MSM stigma in the health care system and reported number of sex partners. The implications are significant with a focus on the need for comprehensive interventions addressing stigma and mental health when aiming to improve more proximal HIV-related risk practices for MSM.

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## Introduction

Lesotho is estimated to have the third highest HIV prevalence in the world, with about 23% of adults currently living with HIV [1]. Although Lesotho has a broadly generalized HIV epidemic disproportionately affecting women, emerging data have resulted in men who have sex with men (MSM) being identified in the national AIDS strategic plan as a high-risk group [2]. Self-reported HIV prevalence, a measure that tends to underestimate true HIV prevalence among MSM in Africa, was estimated to be 11.6% in a previous cross-sectional study [3]. Across Sub-Saharan Africa, there are growing

and consistent data highlighting the disproportionate burden of HIV among MSM as compared with men of reproductive age [4].

Risks for HIV among MSM are multifactorial including biological, behavioral, and higher order determinants of HIV risks. At the biological level, studies have demonstrated that condomless anal sex is the most efficient mode of sexual HIV transmission for serodiscordant partners [5]. Having multiple sexual partners also contributes to the sustained and high HIV incidence among MSM [6]. However, additional structural level risks including stigma have also been identified as determinative in individual risks for HIV. Stigma has been previously defined as a social process that discredits a person to a discounted state [7,8]. It has been characterized in many ways but here refers to stigma toward MSM that is anticipated, enacted, or perceived in a health setting [8–13]. Within health systems, enacted stigma focused on HIV status, behavior, and

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sexual orientation has been shown to limit the uptake of services [14]. In an earlier study among MSM in Lesotho, fear of seeking health care was found in more than 20% of participants with over 3% reporting denial of care [3].

The relationship between sexual orientation-related stigma and sexual risk practices among MSM remains unclear. Some studies have demonstrated an indirect relationship between stigma and condomless anal sex through sensation seeking among rural MSM in the United States [15]. Meanwhile, stigma has been associated with depression among Latino and African Americans living with HIV and also among Latino gay and bisexual men [16,17]. Previous studies have also found major depressive disorder to be associated with engagement in condomless sex and having multiple partners [18,19]. These data suggest that sexual orientation-related stigma may mediate sexual risk practices via depressive symptoms rather than directly.

Substance use (including alcohol and drug use) has been found to be an important co-factor for condomless sex among both HIV-negative and HIV-positive MSM [20–23]. It was estimated that 33.8% of MSM reported drinking alcohol more than 5 days per month, and 7.7% reported injecting illicit drugs in Lesotho [3]. In addition, noninjectable drug use might be more prevalent according to previous studies in Swaziland, where less than 5% reported noninjection drug use and 33.7% reported using noninjectable illicit drugs [24]. Depression may interact with substance/alcohol misuse synergistically in resulting in increased sexual risk practices [25,26].

The main objective of this study was to test the hypothesis that depressive symptoms, alcohol use, and noninjection drug use mediate the relationship between sexual orientation-related stigma in the health care system and increased engagement in sexual risk practices among MSM in Lesotho.

## Methods

### Study population and setting

In 2014, we conducted a cross-sectional study to examine factors associated with HIV-related risk behaviors among MSM in Maseru, Lesotho. A total of 318 participants were recruited through respondent-driven sampling (RDS), and attainment of equilibrium was defined using two criteria which have been described in detail in a previous article [27]. MSM born male and aged 18 and older, fluent in Sesotho or English and who lived in Lesotho for at least the past 3 months were eligible for the study. Consent forms were signed by the interviewer who obtained verbal consent from participants. After informed consent, participants completed interviewer-administered face-to-face questionnaires. HIV screening was done using Determine Rapid Test (Alere, USA), and blood samples were collected by a trained nurse counselor. Participants who tested positive for HIV were referred to a health care center. The study received ethical approval from the Population Services International Research Ethics Board and the National Health Research Ethics Committee of Lesotho. Participants were compensated 46 LSL (approximately 4.6 USD) for their time and travel to study site.

### Measures

#### Dependent variables

Sexual risk practices include having condomless anal sex and multiple sex partners. Participants were asked about (1) the number of male sex partners they had and (2) whether they have ever had anal sex without a condom in the last 12 months.

#### Independent variables

**Depression.** Depression was assessed using the nine-item depression scale of the Patient Health Questionnaire [28]. For each of the nine items, participants were asked whether they had experienced these symptoms “not at all”, “several days”, “more than half the days,” or “nearly every day” over the last 2 weeks with corresponding scores of 0 to 3. The scale was used to measure latent variable “depression” in structural equation modeling (SEM) analysis. For descriptive purposes, depression was treated as an ordinal variable, with a total score of 0–4 representing no depression, 5–9 mild depression, 10–14 moderate depression, 15–19 moderately severe depression, and 20–27 severe depression.

**Noninjection drug use and alcohol use.** Participants were asked about whether they have ever used any noninjection drug (yes or no). Alcohol use was assessed using the Alcohol Use Disorders Identification Test (AUDIT-C) [29]. Participants were asked “how often did you have a drink containing alcohol”, “how many drinks did you have on a typical day,” and “how often did you have six or more drinks on one occasion” over the last 12 months. Each question was assessed on a scale of 0–4, and in men, a total score of 4 is considered positive for alcohol misuse. The scale with three indicators was used to measure alcohol use in SEM analysis, and those who answered “don’t know” to any of the three questions were eliminated from further analysis.

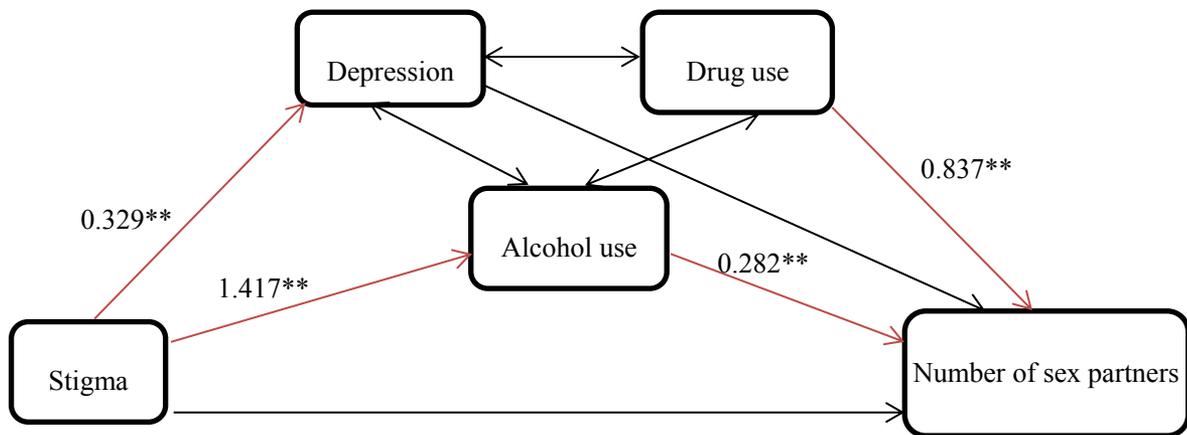
**Sexual orientation-related stigma in the health care system.** Both perceived and enacted stigma in the health care system because of sexual orientation were assessed using five questions asking about “have you ever felt afraid to go to health care services”, “have you ever avoided going to health care services”, “have you ever been denied health services”, “have you ever heard health care providers gossiping about you,” and “have you ever felt that you were not treated well”. Those who answered “yes” for any of the five questions were treated as ever reporting stigma in the health care system.

#### Control variables

Participants’ gender identity (man vs. other), disclosure of sexual orientation to health care providers, and age were included as control variables in both models. These potential confounders were identified a priori based on previous literature [27,30].

#### Analysis

The distribution of demographic characteristics and study measures was summarized using Stata 13.0 (College Station, TX). We used SEM analysis to examine the effect of depression and substance use as mediators in the relationship between stigma in the health care system and sexual risk practices. In this analysis, depression was treated as a scale with nine components, and alcohol use was treated as a scale with three components. Stigma and noninjection drug use were treated as binary variables. The final path diagrams are shown in [Figures 1 and 2](#). SEM analysis was performed using Mplus 7.3 (Muthen & Muthen, 2014), and models were estimated with the weighted least squares with mean and variance-adjusted estimator, which is robust to deviations from model assumptions [31]. Acceptable model fit is determined by comparative fit index (CFI) >0.95, the Tucker-Lewis Index (TLI) >0.95, root mean square error of approximation (RMSEA) <0.06, and Weighted Root Mean Square Residual (WRMR) <0.90 [32,33]. Respondent-driven sampling analysis tool was used to confirm attainment of equilibrium [34].



**Fig. 1.** Path model showing the indirect association between sexual orientation–related stigma in the health care system and number of sex partners in the last 12 months via depression, alcohol use, and drug use adjusting for age, gender identity, and sex-orientation disclosure (\*\* $P < .05$ ).

**Results**

Demographic characteristics of the 318 participants are shown in Table 1. The mean age of participants was 23.6 years, ranging from 18 to 56. Less than half (42.4%—135 of 318) had a secondary or less education, and 39.0% (124/318) were unemployed. Most (90.6%—288/318) participants considered themselves as men, and 43.4% (138/318) identified as homosexual, 50.9% (162 of 318) bisexual, and 4.4% (14 of 318) heterosexual. For self-reported HIV status, 19.2% (61 of 318) had never been tested for HIV infection, 11.6% (37 of 318) reported living with HIV and 69.2% (220 of 318) reported they were not living with HIV.

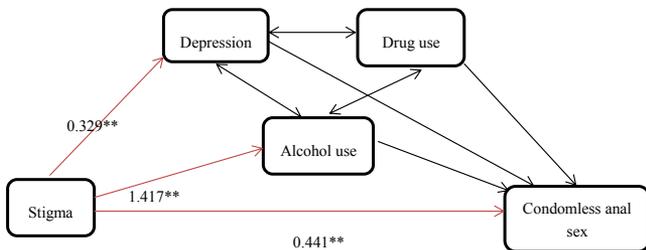
On average, participants had four male sex partners in the past 12 months, and 68.6% (216 of 315) had condomless anal sex in the last 12 months. More than one-quarter (26.3%—83 of 316) had mild depressive symptoms, whereas 21.8% (69 of 316) had moderate-to-severe depressive symptoms. More than half of participants (58.4%—184 of 315) were positive for alcohol misuse based on the AUDIT-C. About one-quarter (22.3%—71 of 318) had ever experienced or perceived stigma in the health care system (Table 2).

Participants with missing data for depression symptoms, alcohol misuse, or noninjection drug use were excluded, resulting in 308 participants for SEM analysis. Figure 1 shows the path diagram of number of sex partners in the last 12 months. Stigma in the health care system was significantly associated with depression ( $\beta = 0.329$ ,  $P = .018$ ) and alcohol use ( $\beta = 1.417$ ,  $P = .001$ ). No significant association was found between depression, drug use, and alcohol use. In addition, noninjection drug use ( $\beta = 0.837$ ,  $P = .039$ ) and alcohol use ( $\beta = 0.282$ ,  $P = .000$ ) significantly predicted number of sex partners, whereas only a marginally significant association was

found between depression and number of sex partners ( $\beta = 0.453$ ,  $P = .108$ ). The total effect of stigma in the health care system on number of sex partners was 1.235 ( $P = .026$ ), whereas no significant direct effect was found between them ( $\beta = 0.686$ ,  $P = .212$ ). Total indirect from stigma to number of sex partners was 0.549 ( $P = .005$ ), with the specific indirect via alcohol use being 0.400 ( $P = .018$ ). CFI of 0.971, RMSEA of 0.041, TLI of 0.961, and WRMR of 0.831 indicated a good fit.

**Table 1**  
Demographics of men who have sex with men in Maseru, Lesotho

Demographics	Proportion
Age	
Mean (range)	23.6 (18–56)
18–25 years	73.6% (234/318)
Religion	
Roman Catholic	45.3% (144/318)
Protestant	34.0% (108/318)
Anglican	14.5% (46/318)
Muslim	0.6% (2/318)
Other	5.7% (18/318)
Education	
Secondary or less	42.4% (135/318)
Tertiary or more	57.6% (183/318)
Employment	
Unemployed	39.0% (124/318)
Employed	29.6% (94/318)
Student	27.7% (88/318)
Informal sector worker	2.8% (9/318)
City dweller	67.6% (213/318)
Country of origin	
Lesotho	100.0% (318/318)
Income (LSL)	
Mean/median	1031/500
Any income	72.9% (231/317)
No income	27.1% (86/317)
Gender identity	
Man	90.6% (288/318)
Woman	7.9% (25/318)
Other	1.6% (5/318)
Sexual orientation	
Homosexual	43.4% (138/318)
Bisexual	50.9% (162/318)
Heterosexual/straight	4.4% (14/318)
Other	1.3% (4/318)
Marital status	
Single/never married	81.5% (259/318)
Ever married	4.7% (15/318)
Cohabiting	0.9% (3/318)
In a relationship, not living with boyfriend	12.9% (41/318)
Have children	8.5% (27/318)



**Fig. 2.** Path model showing the indirect association between sexual orientation–related stigma in the health care system and condomless anal sex in the last 12 months via depression, alcohol use, and drug use adjusting for age, gender identity, and sex-orientation disclosure (\*\* $P < .05$ ).

**Table 2**  
Characteristics of selected study variables of men who have sex with men in Maseru, Lesotho

Study variables	Proportion
Number of sex partners in the last 12 months	
Mean (range)	4 (1–70)
Single sex partner	26.7% (85/318)
Multiple sex partners	73.3% (233/318)
Condomless anal sex in the last 12 months	
Yes	68.6% (216/315)
No	31.4% (99/315)
Self-reported HIV status	
Unknown	19.2% (61/318)
Positive	11.6% (37/318)
Negative	69.2% (220/318)
PHQ-9 score	
Mean/median	5.3/4
Normal (0–4)	52.5% (166/316)
Mild depressive (5–9)	26.3% (83/316)
Moderate depressive (10–14)	17.1% (54/316)
Moderately severe-to-severe depressive ( $\geq 15$ )	4.7% (15/316)
AUDIT-C score	
Mean/median	4.1/4
Alcohol misuse ( $\geq 4$ )	59.0% (186/315)
Noninjection drug use	
Yes	17.7% (56/317)
No	82.3% (261/317)
Ever facing stigma in the healthcare system	22.3% (71/318)

Figure 2 shows the path diagram of condomless anal sex in the last 12 months. The total effect of stigma in the health care system on condomless anal sex was 0.461 ( $P = .022$ ) and a significant direct effect ( $\beta = 0.441$ ,  $P = .036$ ) was found between them. Stigma in the health care system was significantly associated with depression ( $\beta = 0.329$ ,  $P = .018$ ) and alcohol use ( $\beta = 1.417$ ,  $P = .001$ ). No significant association was found between depression, drug use and alcohol use. In addition, none of these three factors was found to be significantly associated with condomless anal sex. RMSEA of 0.042, CFI of 0.971, TLI of 0.961, and WRMR of 0.816 indicated good model fit.

## Discussion

Given the multiple levels of stigma-affecting MSM across Sub-Saharan Africa and their association with HIV infection, an understanding of how stigma contributes to increased HIV infection risks is vitally needed [13,35]. In this study of MSM in Lesotho, there was a highly significant indirect relationship between stigma and number of sex partners mediated by alcohol use and to a lesser extent, depression. No direct association was found between stigma and number of sex partners in the last 12 months. Meanwhile, stigma was directly associated with condomless anal sex, and no indirect effect was found.

Research regarding the relationship between sexual HIV risk behavior and depression has demonstrated inconsistent findings [36–38]. Our study suggests that, among MSM in Lesotho, depression has a complex effect on HIV risk. Depression may enhance HIV risks by increasing number of sex partners, although there were no significant differences in reported levels of condom use with sexual partners. In much of Sub-Saharan Africa, behavior change interventions supporting MSM are often primarily aiming to decrease numbers of male sexual partners. However, the results presented here suggest that number of sexual partners is in part related to mental health and alcohol use which in turn are highly dependent on health care-related stigma. And these relationships may, in part, explain the results of methodologically sound behavior change studies being unsuccessful in lowering the incidence of HIV

among MSM [39]. Combined with the high force of HIV transmission associated with each act of condomless anal sex with serodiscordant and viremic partners, it reinforces how high the bar is for effective HIV prevention for MSM.

A positive mental health treatment model was presented among people living with HIV/AIDS in the United States where both behavioral and pharmacological interventions for mental health were found to be effective in reducing HIV-related risk practices [40]. However, a randomized controlled trial among people living with HIV with comorbid depressive disorders in the United States showed no consistent reductions in sexual risk behaviors only using standard mental health treatment [41]. Again, the data presented here suggest that mental health is dependent on stigma-affecting MSM and would indicate that stigma must be mitigated to improve outcomes related to addressing mental health. The epidemiology of mental health among MSM and other populations at risk for the acquisition and transmission of HIV has yet to be really studied in many resource-constrained environments such as Lesotho. Our results also suggest the need for effective linkages between sexual health programs, mental health programs, and programs addressing multiple levels of stigma as are often the case in higher income settings [42].

These data further support the possible pathway with alcohol use as a mediator between stigma-affecting sexual risk practices. These results are consistent with empiric findings where heavy drinkers are more likely to engage in sexual risk practices and report higher levels of internalized sexual stigma [43,44]. Our results support a significant direct relationship between stigma and condomless anal sex but no indirect relationship via alcohol or drug use. However, a previous SEM has suggested that internalized stigma related to homosexual orientation is directly associated with condomless receptive anal sex and indirectly via sex under the influence of alcohol [43]. A potential reason for this difference is that our study measures external instead of internalized forms of stigma. Another reason might be that we measure general drinking patterns rather than alcohol use before or during sex, which is more related to “sex under the influence of alcohol” that has clear temporality. The relationship between alcohol use and number of sex partners, however, is consistent with a previous study suggesting the potential value of addressing alcohol and other substance use as part of HIV-related interventions [45]. More broadly, several alcohol and HIV prevention interventions have recently been implemented in Sub-Saharan Africa to reduce alcohol-related sexual risks [46]. Specifically, curriculum-based programs in South Africa successfully reduced the general frequency of alcohol use, drinking before or during sex, and increased intention to use condoms during sex. Integration of alcohol use into HIV prevention and treatment programs, such as screening for alcohol misuse as part of HIV testing programs, is needed in Lesotho.

In addition, nonrandom selection of seeds may introduce bias in RDS [47]. In this study, equilibrium was reached for all observed variables in SEM, including age, gender, HIV disclosure, stigma, and noninjection drug use, as well as items measuring latent variables depression and alcohol use. This suggests a minimal overall bias due to nonrandom recruitment. We also conducted a sensitivity analysis by adjusting for individualized sampling weights of condomless anal sex and having multiple sex partners (four or more) calculated by respondent-driven sampling analysis tool. In the adjusted model, there was some attenuation in the association between stigma and number of sex partners mediated via alcohol use. However, we chose to present the unadjusted results here because there is not a consensus for how to handle RDS sampling weights in multivariate models and because weighting tends to produce larger confidence intervals [48,49].

There are some limitations in the methods described here. Because we used cross-sectional data, there is potential reverse causation in that stigma from health care providers may have caused increased sexual risk behaviors or substance use. However, we measured lifetime experiences of stigma and past 12-month sexual risk behaviors to reduce the likelihood that stigma preceded risk behavior. Similarly, we cannot rule out the possibility that noninjection drug use may have temporally preceded stigma in health care system given the timeframes of measurement (past 12-month drug use and lifetime report of stigma). However, our data suggested that many participants initiated drug use at a young age (23 years), indicating the potential likelihood for early life exposure. In addition, social support could be a potential mediator linking stigma and sexual risk practices. Social exclusion has been associated with HIV-related stigma and engagement in riskier and unhealthy behaviors, but a previous SEM among young women living with HIV in the United States found no significant association between stigma and risk class membership via social support [50–52]. Further analysis can help clarify the role of social support in engagement in sexual risk practices.

Stigma appears to underlie the mental health and alcohol use determinants of HIV-related risk practices among MSM in Lesotho. Consequently, effectively addressing stigma for these men could serve as a foundation for the provision and uptake of comprehensive services that can address more proximal risks for the acquisition and transmission of HIV. There are several domains of stigma observed here, including enacted and perceived stigma likely related to lived personal experiences or expectations based on how one is treated broadly in society [53]. Although the evidence base for stigma mitigation programs is currently limited, the available data suggest the need for these interventions to be multifaceted in content and in terms of to whom these programs are addressing [54]. Thus, interventions aiming to minimize stigma from health care providers through education and training as well as more broadly in society through social media and mass media campaigns with programs aiming to build resiliency through enhanced social capital may be effective. For MSM in Sub-Saharan Africa, there have been health-sector interventions including in Kenya that have shown early successes in improving the provision of competent care for MSM [55]. Although these interventions aim to address enacted health care–related stigma, to really change the perceptions of stigma among MSM, broader social change is likely needed. It may be that an effective HIV response to those most at risk for HIV provides the impetus for such change.

## Conclusion

This study proposes an evidence-based framework for how stigma operates in mediating HIV-related behavioral risks among MSM in Lesotho. Taken together, these data reinforce the need to comprehensively address HIV risks when informing the development of optimal combination intervention packages addressing these behaviors. Interventions aiming to change behaviors that do not effectively integrate stigma mitigation and mental health may be of limited utility. Although this study was completed in Lesotho, this is likely a universal truth for HIV prevention among MSM given the consistency of these data with previous studies. Changing the trajectory of incident HIV infections among MSM combined with better addressing, the needs of those living with HIV necessitate understanding the best approaches to measure and mitigate stigma for these men and address mental health concerns in the context of a resource-constrained environment.

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## References

- [1] Lesotho Ministry of Health, Global AIDS Response Country Progress Report, 2015. Available at: [http://www.unaids.org/sites/default/files/country/documents/LSO\\_narrative\\_report\\_2015.pdf](http://www.unaids.org/sites/default/files/country/documents/LSO_narrative_report_2015.pdf). accessed 08.07.2016.
- [2] U. A. Commission and Others. UNGASS country progress report Uganda. Uganda: Kampala Gov; 2010.
- [3] Baral S, Adams D, Lebona J, Kaibe B, Letsie P, Tshehlo R, et al. A cross-sectional assessment of population demographics, HIV risks and human rights contexts among men who have sex with men in Lesotho. *J Int AIDS Soc* 2011;14(1):36.
- [4] Baral S, Trapence G, Motimedi F, Umar E, lipinge S, Dausab F, et al. HIV prevalence, risks for HIV infection, and human rights among men who have sex with men (MSM) in Malawi, Namibia, and Botswana. *PLoS One* 2009;4(3):e4997.
- [5] Vittinghoff E, Douglas J, Judon F, McKimian D, MacQueen K, Buchinder SP. Per-contact risk of human immunodeficiency virus transmission between male sexual partners. *Am J Epidemiol* 1999;150(3):306–11.
- [6] García MC, Duong QL, Meyer SB, Ward PR. Multiple and concurrent sexual partnerships among men who have sex with men in Viet Nam: results from a National Internet-based Cross-sectional Survey. *Health Promot Int* 2016;31:133–43.
- [7] Link BG, Phelan JC. Conceptualizing stigma. *Annu Rev Sociol* 2001;27:363–85.
- [8] Goffman E. *Stigma: Notes on the management of spoiled identity*. Simon and Schuster, New York City, NY, USA; 2009.
- [9] Green C. Attitudes towards people with HIV: Are they as stigmatizing as people with HIV perceive them to be? *Soc Sci Med* 1995;41(4):557–68.
- [10] Turan JM, Bukusi EA, Onono M, Holzemer WL, Miller S, Cohen CR. HIV/AIDS stigma and refusal of HIV testing among pregnant women in rural Kenya: results from the MAMAS Study. *AIDS Behav* 2011;15(6):1111–20.
- [11] Nyblade LC. Measuring HIV stigma: existing knowledge and gaps. *Psychol Health Med* 2006;11(3):335–45.
- [12] Logie CH, James LI, Tharao W, Louffy MR. HIV, gender, race, sexual orientation, and sex work: a qualitative study of intersectional stigma experienced by HIV-positive women in Ontario, Canada. *PLoS Med* 2011;8(11):e1001124.
- [13] Fay H, Baral SD, Trapence G, Motimedi F, Umar E, lipinge S, et al. Stigma, health care access, and HIV knowledge among men who have sex with men in Malawi, Namibia, and Botswana. *AIDS Behav* 2011;15(6):1088–97.
- [14] W. H. Organization and others. Global HIV/AIDS response: epidemic update and health sector progress towards Universal Access. Progress Report 2011. Geneva: WHO; 2011. Available at: [http://apps.who.int/iris/bitstream/10665/44787/1/9789241502986\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/44787/1/9789241502986_eng.pdf). accessed 26.01.2014.
- [15] Preston DB, D'augelli AR, Kassab CD, Starks MT. The relationship of stigma to the sexual risk behavior of rural men who have sex with men. *AIDS Educ Prev* 2007;19(3):218–30.
- [16] Wohl AR, Galvan FH, Carlos JA, Myers HF, Garland W, Witt MD, et al. A comparison of MSM stigma, HIV stigma and depression in HIV-positive Latino and African American men who have sex with men (MSM). *AIDS Behav* 2013;17(4):1454–64.
- [17] Diaz RM, Ayala G, Bein E, Henne J, V Marin B. The impact of homophobia, poverty, and racism on the mental health of gay and bisexual Latino men: Findings from 3 US cities. *Am J Public Health* 2001;91(6):927.

- [18] Wagner GJ, Holloway I, Ghosh-Dastidar B, Kityo C, Mugenyi P. Understanding the influence of depression on self-efficacy, work status and condom use among HIV clients in Uganda. *J Psychosom Res* 2011;70(5):440–8.
- [19] V Bradley M, Remien RH, Dolezal C. Depression symptoms and sexual HIV risk behavior among serodiscordant couples. *Psychosom Med* 2008;70(2):186–91.
- [20] Colfax G, Vittinghoff E, Husnik MJ, McKirnan D, Buchbinder S, Koblin B, et al. Substance use and sexual risk: a participant-and episode-level analysis among a cohort of men who have sex with men. *Am J Epidemiol* 2004;159(10):1002–12.
- [21] Vanable PA, McKirnan DJ, Buchbinder SP, Bartholow BN, Douglas Jr JM, Judson FN, et al. Alcohol use and high-risk sexual behavior among men who have sex with men: the effects of consumption level and partner type. *Health Psychol* 2004;23(5):525.
- [22] Semple SJ, Patterson TL, Grant I. HIV-positive gay and bisexual men: predictors of unsafe sex. *AIDS Care* 2003;15(1):3–15.
- [23] "Gender and Multiple and Concurrent Sexual Partnerships in Lesotho."
- [24] Baral S, Grosso A, Mnisi Z, Adams D, Fielding-Miller R, Mabuza X, et al. Examining prevalence of HIV infection and risk factors among female sex workers (FSW) and men who have sex with men (MSM) in Swaziland. *Balt MD Res Prev* 2013;19. Available at: <http://www.jhsph.edu/research/centers-and-institutes/research-to-prevention/publications/Swazi-Quantitative-final.pdf>. accessed 08.07.2016.
- [25] Ha H, Risser JM, Ross MW, Huynh NT, Nguyen HT. Homosexuality-related stigma and sexual risk behaviors among men who have sex with men in hanoi, Vietnam. *Arch Sex Behav* 2015;44(2):349–56.
- [26] Safren SA, Reisner SL, Herrick A, Mimiaga MJ, Stall R. Mental health and HIV risk in men who have sex with men. *J Acquir Immune Defic Syndr* 2010;55(Suppl 2):S74.
- [27] Stahlman S, Grosso A, Ketende S, Sweitzer S, Mothopeng T, Tarubekera N, et al. Depression and Social Stigma Among MSM in Lesotho: Implications for HIV and Sexually Transmitted Infection Prevention. *AIDS Behav* 2015;19:1460–9.
- [28] Kroenke K, Spitzer RL. The PHQ-9: a new depression diagnostic and severity measure. *Psychiatr Ann* 2002;32(9):1–7.
- [29] Bush K, Kivlahan DR, McDonnell MB, Fihn SD, Bradley KA. The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. *Arch Intern Med* 1998;158(16):1789–95.
- [30] Rao D, Feldman BJ, Fredericksen RJ, Crane PK, Simoni JM, Kitahata MM, et al. A structural equation model of HIV-related stigma, depressive symptoms, and medication adherence. *AIDS Behav* 2012;16(3):711–6.
- [31] Muthen LK, Muthen BO, Mplus user's guide. 6th edition.
- [32] Yu CY. Evaluating cutoff criteria of model fit indices for latent variable models with binary and continuous outcomes. Doctoral dissertation, University of California Los Angeles; 2002. Available at: <http://www.statmodel2.com/download/Yudissertation.pdf>. accessed 08.07.2016.
- [33] Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Struct Equ Modeling* 1999;6(1):1–55.
- [34] Volz E, Wejnert C, Cameron C, Spiller M, Barash V, Degani I, et al. Respondent-Driven Sampling Analysis Tool (RDSAT) Version 7.1. Ithaca, NY: Cornell University; 2012. Available at: <http://www.respondentdrivensampling.org/main.htm>. accessed 26.01.2014.
- [35] Hladik W, Barker J, Ssenkusu JM, Opio A, Tappero JW, Hakim A, et al. HIV infection among men who have sex with men in Kampala, Uganda—a respondent driven sampling survey. *PLoS One* 2012;7(5):e38143.
- [36] Beck A, McNally I, Petrak J. Psychosocial predictors of HIV/STI risk behaviours in a sample of homosexual men. *Sex Transm Infect* 2003;79(2):142–6.
- [37] Perdue T, Hagan H, Thiede H, Valleroy L. Depression and HIV risk behavior among Seattle-area injection drug users and young men who have sex with men. *AIDS Educ Prev* 2003;15(1):81–92.
- [38] Rogers G, Curry M, Oddy J, Pratt N, Beilby J, Wilkinson D. Depressive disorders and unprotected casual anal sex among Australian homosexually active men in primary care. *HIV Med* 2003;4(3):271–5.
- [39] Koblin BA, Chesney M, Coates T, E. S. Team. Effects of a behavioural intervention to reduce acquisition of HIV infection among men who have sex with men: the EXPLORE randomised controlled study. *Lancet* 2004;364(9428):41–50.
- [40] Sikkema KJ, Watt MH, Drabkin AS, Meade CS, Hansen NB, Pence BW. Mental health treatment to reduce HIV transmission risk behavior: a positive prevention model. *AIDS Behav* 2010;14(2):252–62.
- [41] Tsai AC, Mimiaga MJ, Dilley JW, Hammer GP, Karasic DH, Charlebois ED, et al. Does effective depression treatment alone reduce secondary HIV transmission risk? Equivocal findings from a randomized controlled trial. *AIDS Behav* 2013;17(8):2765–72.
- [42] Thornhill L, Klein P. Creating environments of care with transgender communities. *J Assoc Nurses AIDS Care* 2010;21(3):230–9.
- [43] Bruce D, Ramirez-Valles J, Campbell RT. Stigmatization, substance use, and sexual risk behavior among Latino gay and bisexual men and transgender persons. *J Drug Issues* 2008;38(1):235–60.
- [44] Weinhardt LS, Carey MP. Does alcohol lead to sexual risk behavior? Findings from event-level research. *Annu Rev Sex Res* 2000;11(1):125–57.
- [45] Karnell AP, Cupp PK, Zimmerman RS, Feist-Price S, Bennie T. Efficacy of an American alcohol and HIV prevention curriculum adapted for use in South Africa: Results of a pilot study in five township schools. *AIDS Educ Prev* 2006;18(4):295–310.
- [46] Smith EA, Palen LA, Caldwell LL, Flisher AJ, Graham JW, Mathews C, et al. Substance use and sexual risk prevention in Cape Town, South Africa: an evaluation of the HealthWise program. *Prev Sci* 2008;9(4):311–21.
- [47] Wejnert C. An empirical test of respondent-driven sampling: point estimates, variance, degree measures, and out-of-equilibrium data. *Sociol Methodol* 2009;39(1):73–116.
- [48] Winship C, Radbill L. Sampling weights and regression analysis. *Sociol Methods Res* 1994;23(2):230–57.
- [49] Heckathorn DD. Extensions of respondent-driven sampling: analyzing continuous variables and controlling for differential recruitment. *Sociol Methodol* 2007;37(1):151–207.
- [50] Pachankis JE. The psychological implications of concealing a stigma: a cognitive-affective-behavioral model. *Psychol Bull* 2007;133(2):328.
- [51] Baumeister RF, DeWall CN, Ciarocco NJ, Twenge JM. Social exclusion impairs self-regulation. *J Pers Soc Psychol* 2005;88(4):589.
- [52] Clum G, Chung SE, Ellen JM, A. M. T. N. for HIV/AIDS Interventions. Mediators of HIV-related stigma and risk behavior in HIV infected young women. *AIDS Care* 2009;21(11):1455–62.
- [53] Stutterheim SE, Pryor JB, Bos AE, Hoogendijk R, Muris P, Schaalma HP. HIV-related stigma and psychological distress: the harmful effects of specific stigma manifestations in various social settings. *AIDS* 2009;23(17):2353–7.
- [54] Stangl AL, Lloyd JK, Brady LM, Holland CE, Baral S. A systematic review of interventions to reduce HIV-related stigma and discrimination from 2002 to 2013: how far have we come? *J Int AIDS Soc* 2013;16(3Suppl 2):18734.
- [55] van der Elst EM, Smith AD, Gichuru E, Wahome E, Musyoki H, Muraguri N, et al. Men who have sex with men sensitivity training reduces homophobia and increases knowledge among Kenyan healthcare providers in coastal Kenya. *J Int AIDS Soc* 2013;16(4Suppl 3):18748.