

DEPRESSIVE SYMPTOMS AND ALCOHOL USE AS MEDIATORS OF
HIV-RELATED RISK PRACTICES AND STIGMA AFFECTING MEN WHO
HAVE SEX WITH MEN IN LESOTHO: A STRUCTURAL EQUATION
MODELLING APPROACH

by
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ABSTRACT

Background

Men have sex with men (MSM) in Lesotho can be exposed to sex-orientation stigma, which could result in increased engagement in sexual risk behaviors.

Methods

We investigated whether alcohol use and depressive symptoms mediate the relationship between MSM stigma in health system and HIV-related risk practices using structural equation modelling (SEM).

Results

Of the participants, the mean age was 23.6 (range 18 -56), and 94.3% (300/318) reported being homosexual or bisexual. The average PHQ-score is 5.3(SD=4.0) and the average AUDIT-C score is 4.1(SD=4.0). 22.3% (71/318) had ever experienced stigma in health system. In latent class analysis (LCA), 84.7% (260/307) were assigned to the high risk group and 15.3% (47/307) to the low risk group. Stigma in health system is significantly associated with depression ($\beta = 0.219$, $p = 0.002$) and alcohol use ($\beta = 0.643$, $p = 0.000$). Depression significantly predicted sexual risk behavior class ($\beta = 0.569$, $p = 0.000$). There is also a partial significant effect of alcohol use on sexual risk behavior class ($\beta = 0.104$, $p = 0.072$). There was no significant direct effect of stigma on sexual risk behavior ($p = 0.472$).

Conclusions

MSM stigma in health system is associated with increased engagement in sexual risk behavior and depressive symptoms and alcohol use mediate the association. Implications for interventions include the importance of reducing MSM stigma, as well as a focus on depression and alcohol use as two methods of reducing engagement in sexual risk practices.

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CHAPTER 1 INTRODUCTION

Lesotho has the third highest HIV prevalence in the world and about 23% adults in the country are living with HIV [1]. The HIV epidemic is female-predominant, with around 60% of the population living with HIV being females [1]. Although most studies in Lesotho tend to focus on females, MSM has been identified in the national AIDS Strategic Plan 2011/12-2015/16 in Lesotho as a high-risk group [2]. Few epidemiological studies have been done among MSM in Lesotho, and there was a lack of evidence to make conclusions about the prevalence in this subgroup. Earlier studies have shown that MSM are at an even higher risk of HIV prevalence compared with general population in other African countries [3]. Self-reported HIV prevalence, a measure that tends to significantly underestimate true HIV prevalence among MSM in Africa, was estimated as 11.6% by Baral et al. in a cross-sectional study [4].

Sexual practices, such as and condom and lubricant use during sex and number of sexual partners were still unclear for MSM in Lesotho. Also, bisexual concurrency was common in other Southern African countries including Malawi, Botswana and Namibia, making MSM a key population in identifying the links between hetero- and homosexual HIV transmission [3]. HIV-related knowledge was low in this region, which might increase their engagement in sexual risk behaviors [4].

Fear of stigma and discrimination may be the main reason why people are reluctant to get tested, disclose their HIV status and take antiretroviral drugs [5]. Specifically in

health system, judgement about a person's HIV status, behavior and sexual orientation exist among healthcare workers. HIV-related stigma and discrimination were common in Lesotho. As same sex is illegal in Lesotho, MSM could also be exposed to sex-orientation stigma. In an earlier study among MSM in Lesotho, the fear of seeking healthcare was found in 22.2% of participants and 3.2% reported ever been denied healthcare services [4].

Alcohol use was found to be an important co-factor for sexual risk behavior such as unprotected sex among both HIV-negative and HIV-positive MSM, and it also contributed to the formation of concurrent relationships [6-9]. It was estimated that 33.8% of MSM reported drinking alcohol more than five days per month in Lesotho, and they were less likely to use condoms during sexual intercourse when drunk [4]. A study among Latino gay and bisexual men in the U.S showed an association between MSM stigma and sexual risk behavior via alcohol use, but few relevant studies have been done for MSM in Southern Africa [10].

The association between HIV-stigma and sexual risk behavior was not constant in previous studies, with no association found among HIV-positive men and women in New York State, and a positive association among rural MSM in the U.S [11, 12]. However, stigma has been associated with depression among HIV-positive Latino and African Americans and also among Latino gay and bisexual men [13, 14]. Previous studies also found major depressive disorder associated with sexual risk behaviors such as engagement in unprotected sex and having multiple partners [15, 16]. It is

possible that HIV-stigma does not directly influence sexual risk behavior, but via depressive symptoms.

The main purpose of the study was to test the hypothesis that sex-orientation related stigma perceived in healthcare system was associated with increased engagement in sexual risk behavior among MSM, and depressive symptoms and alcohol use can mediate the this relationship. Also, a latent class analysis was conducted to assess the nature of sexual risk behavior among MSM.

CHAPTER 2 METHODS

Study population and setting

In 2014, we conducted a cross-sectional study among men who reported ever having had sex with another man in Maputsoe and Maseru, Lesotho. Participants were recruited through respondent-driven sampling (RDS), with targets of 315 MSM in each city. Persons born male and aged 18 years and above, being fluent in Sesotho or English, and having lived in Lesotho for at least the past three months were eligible for the study. Participants gave verbal informed consent and consent forms were signed by the interviewer who obtained verbal consent. Following informed consent, participants completed interviewer-administered face-to-face questionnaires. HIV screening was done with rapid test kits and blood samples were collected by a trained nurse counselor. Participants who tested positive for HIV were then referred to a healthcare 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) per visit according to the compensation procedures.

Measures

Sexual risk behavior was treated as an index with 3 components:

- Condomless sex: Practicing safe anal sex was defined as always using condoms

with water-based lubricants during sex. Condom use in the past 12 months during both insertive and receptive anal sex was collected. Participants were categorized into 2 groups: those who always use condoms during either insertive or receptive anal sex (coded as 1) and those who do not (coded as 0). Specifically, for those involved both in insertive and receptive sex, they were coded as 1 only if they always use condoms in both. Lubricant use and the type of lubricants used were collected in the questionnaire. Those who use water-based lubricant most often during anal sex were categorized as using condom compatible lubricant (CCL). For condomless anal sex, those who always use condoms with water-based lubricants during sex were coded as 0, and the others, including those who use condoms with other types of lubricants and those who do not use condoms (regardless of their lubricant use) were coded as 1.

- Having concurrent sex partners: participants were asked about whether they have concurrent sex partners (including both male and female partners) in the past 12 months and those who said yes were coded as 1 for partner concurrency.
- Having multiple sexual partners: The number of men participants had anal sex with in the last 12 months was collected, and those who had more than one sexual partner was treated as having multiple sexual partners.

We used a latent class analysis approach (LCA) with these three indicators to create sexual risk behavior groups.

Depression

Depression was assessed using the nine-item depression scale of the Patient Health Questionnaire (PHQ-9). For each of the 9 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 SEM. Depression was also 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 [17].

Alcohol use

Alcohol use was assessed using The Alcohol Use Disorders Identification Test (AUDIT-C). Participants were asked “how often did they have a drink containing alcohol”, “how many drinks did they 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 use [18]. The scale with 3 indicators was used to measure alcohol use in SEM analysis and those who answered “don’t know” were eliminated from further analysis.

Knowledge

Knowledge of sexual risk behaviors was assessed by asking “what type of sex puts you most at risk for HIV infection”, “What type of anal sex puts you most at risk for HIV infection” and “Which is the safest lubricant to use during anal sex with latex condoms”. For those who answered “don’t know” for any of the three questions, they were treated as giving wrong answers. We created a new ordinal variable “knowledge” which equals the number of questions they answered correctly. This ordinal variable was used to measure latent variable “knowledge” in SEM analysis.

Perceived and Enacted MSM Stigma In health system

Health-care related MSM stigma was assessed using 5 questions asking about both perceived stigma such as “have you ever felt afraid to go to health care services”, “have you ever avoided going to health care services” and enacted stigma such as “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” because of their sexual orientation. Those who answered “yes” for any of the 5 questions were treated as ever experiencing stigma in the health system.

Analysis

Descriptive statistics

We summarize the distribution of demographic characteristics and study measures among 318 participants using Stata 13.0 (College Station, Texas).

LCA

We identified sexual risk behavior subgroups of participants based on three binary observed indicators (condomless sex yes/no; multiple sexual partners yes/no; concurrent partners yes/no). Number of latent classes was determined by the Lo-Mendell-Rubin test and the bootstrapped likelihood test [19]. Entropy was used to determine the accuracy of classification. We assigned the most likely class to each participant and used the class membership in further structural equation models (SEM). The class with higher probability of having concurrent sexual partners, condomless sex and multiple sexual partners was defined as the higher risk class. Then we used a chi-square test to examine if the probability of each of the three indicators was different among the two classes.

SEM

We used a structural equation modelling (SEM) to examine the effect of depression and alcohol use as mediators in the relationship of stigma in health system and sexual risk behavior class membership. Our path diagram includes (1) a direct path from stigma to sexual risk practices (2) an indirect path from stigma to sexual risk behavior via depression (3) an indirect path from stigma to depression, then alcohol use, and finally sexual risk practices (Figure 1). Correlation matrix was performed in Mplus which chose the appropriate correlation for the pair of variables involved, for example, tetrachoric for two binary variables and Pearson for two continuous variables.

LCA and SEM analyses were performed using Mplus 7.3 (Muthen & Muthen, 2014), and models were estimated with the weighted least-squares with mean and variance adjusted (WLSMV) estimator for categorical outcomes, which is robust to deviations from model assumptions [20].

CHAPTER 3 RESULTS

The 318 participants accrued in Maseru had a mean age of 23.6 years ranging from 18 to 56. 45.3% (144/318) of participants were Roman Catholic, 34.0% (108/318) Protestant and 14.5% (46/318) Anglican. 42.4% (135/318) of participants had a secondary or less education, and 39.0% (124/318) were unemployed. All participants were born in Lesotho and 67.6% (213/318) of them reported growing up in urban center. The mean income was 1031.4 maloti per month and 27.1% (86/317) of them had no income. In terms of sexual orientation, 43.4% (138/318) reported being homosexual, 50.9% (162/318) being bisexual, and 4.4% (14/318) being heterosexual. 81.5% (259/318) of them were not married and 8.5% (27/318) had children (Table 1).

Among the 318 participants, 19.2% (61/318) have never been tested for HIV infection and among those who had ever been tested for HIV infection, 14.4% (37/257) had been told by a doctor or health care provider that they have HIV. HIV status was significantly correlated with perceived stigma such as being afraid to go to health care services ($p=0.033$) and avoiding going to health care services ($p=0.004$). In terms of enacted stigma, we also found a significant correlation between HIV status and denial of health services ($p=0.003$), as well as gossiping of health care providers ($p=0.005$).

On average, participants had 4.0 sex partners and 73.3% (233/318) of them had more than one sex partners over the last 12 months. 45.6% (145/318) of participants always used condom during anal sex, specifically, for the 84 participants reporting both

insertive and receptive sex, 55.0% (31/84) of them always used condoms in both types of sex; for those only having insertive sex ($n = 172$), 52.9% (91/172) of them always used condoms; and for those only having receptive sex ($n=62$), 37.1% (23/62) always had condoms during sex. In terms of lubricant use, 41.8% (133/318) of them used water-based lubricant during sex regardless of condom use status. Only 18.5% (58/314) reported always using condoms in sex and also using water-based lubricants with condoms. 84.3% (268/318) of participants had concurrent sex partners (including both male and female partners). For depression measurement, the average PHQ-score is 5.3, indicating an increasing risk of depression. About half participants had normal PHQ-score, 26.3% (83/316) had mild depressive symptoms and 21.8% (69/316) had PHQ-score greater than 10 which indicates major depression. The average alcohol use measured by AUDIT-C score is 4.1, and 59.0% (184/315) of them were alcohol use positive based on the score. For the 3 questions regarding participants' knowledge about sexual risk behavior and HIV-infection risk, only 5.4% (17/316) answered them all correctly. 22.3% (71/318) of participants had ever experienced stigma in health system (Table 2).

Table 3 shows the correlation between selected study variables. Human rights violation in health system was positively related with PHQ-score, AUDIT-C score and having multiple partners. HIV-related knowledge was positively related with PHQ-score and AUDIT-C score. In terms of sexual risk behaviors, condomless sex was negatively related with PHQ-score and HIV-related knowledge. Having multiple

sexual partners was positively related with sexual partner concurrency, and also AUDIT-C score.

Participants who have missing data for lubricant use, depression measurement or alcohol use were excluded, leaving 307 participants for LCA. The LCA results suggested that a two-class model fit the observed data best, and an entropy score of 0.852 indicates a good separation of the classes [21, 22]. 260 people were assigned to the high risk group which accounted for 84.7% of the sample. 47 people were assigned to the low risk group which represented 15.3% of the sample. As shown in Table 4, there was a statistically significant difference in the proportion of partner concurrency and multiple sexual partners between risk classes. We also compared the distribution of alcohol use, depressive symptoms, knowledge and exposure to human right violation in health system between high and low risk groups. As shown in Table 4, there was no statistically significant difference in the distribution of these variables between the two risk classes. Figure 1 shows the path diagram and corresponding coefficients.

Stigma in health system is significantly associated with depression ($\beta = 0.219$, $p = 0.002$), and also with alcohol use ($\beta = 0.643$, $p = 0.000$). Depression significantly predicted sexual risk behavior class ($\beta = 0.569$, $p = 0.000$). There is also a partial significant effect of alcohol use on sexual risk behavior class ($\beta = 0.104$, $p = 0.072$). The total effects of stigma on sexual risk class is 0.293 ($p = 0.047$). The indirect effect via depression and alcohol use was 0.189 ($p = 0.001$), which was composed of 0.067

($p = 0.098$) via alcohol use and 0.124 ($p = 0.008$) via depression. There was no significant direct effect of stigma on sexual risk behavior ($p = 0.472$).

CHAPTER 4 DISCUSSION

We found a significant direct effect of depression on sexual risk behavior, which is consistent with previous studies where major depressive disorder has been associated with engagement in unprotected sex and having multiple partners [15, 16]. Alcohol use also had a direct effect on sexual risk behavior, supporting findings of similar studies among MSM and other PLWHA in the U.S and Africa [6, 11, 23]. But no association between alcohol use and sexual risk behavior was found among HIV-negative MSM, suggesting that HIV serostatus might confound the association [24, 25]. MSM stigma in health care system was directly associated with depression and alcohol use, while there was no direct effect of MSM stigma on sexual risk behavior class membership.

This study gives some insight into the association between MSM stigma and sexual practices via depression among MSM in Lesotho. The ultimate goal is to reduce HIV acquisition and transmission, but interventions directly on reducing sexual risk practices sometimes fail to be effective. MSM sometimes did not want to participate in behavioral interventions and they preferred a supportive group intervention that addresses not only safer sex, but also other coping challenges. Cognitive escape model has shown that HIV-related stigma may result in a negative self-awareness that leads to depressive symptoms, and further, results in engagement in unprotected sex [26]. A positive mental health treatment model was presented among PLWHA where

both behavioral and pharmacological interventions were found to be effective in reducing HIV transmission risk behaviors [27]. However, a random controlled trial among HIV-infected persons with comorbid depressive disorders showed no consistent reductions in sexual risk behaviors only using standard mental health treatment [28]. This suggested that mental health interventions might be tailored to HIV-related issues such as HIV-related stigma. The fundamental intervention in reducing HIV transmission practices might be reducing stigma, which could impact adverse psychological responses before depressive symptoms develop. In 2004, Lesotho's government launched a voluntary counselling and testing campaign which intended to overcome the stigma and discrimination that surrounds HIV and AIDS. But the coverage fell far short of their expectations. It was reported that only 2% of the target 1.3 million people were tested for HIV by August 2007 through the scheme [29]. A possible reason might be that MSM were still afraid of sex-orientation related stigma by community health workers. Our finding underscores the importance of figuring out the effects of MSM stigma on HIV transmission practices.

Our study supported the possible pathway with alcohol use as a possible mediator from MSM stigma to sexual risk practices. On the individual level, a previous randomized clinical trial on reducing alcohol use among HIV positive MSM was effective in reducing the number of days on which both heavy drinking and unprotected sex occurred [30]. On the policy level, Lesotho is revising their National Alcohol Policy according to the recommendations put forward by the World Health

Organization [31]. This policy, if put into law, would benefit the MSM population where a large proportion are alcohol users.

MSM stigma among health care providers might be due to incorrectly linking homosexual orientation to HIV and AIDS, as well as incorrect or incomplete knowledge about HIV transmission and how to protect oneself in the workplace [32]. Thus education programs aimed at increasing awareness of what stigma is and the benefits of reducing stigma among health workers can be very important. These education programs can also provide correct and complete information about homosexuality, HIV transmission as well as self-precautions. Several interventions have been done to reduce health care workers' reluctance to care for and treat PLWHA [33]. A combination of information and skills-building strategies was successful in improving knowledge about HIV and AIDS, as well as willingness to treat PLWHA while further interventions are still need to reduce MSM stigma [34]. According to our findings, these education programs might not directly reduce sexual risk behaviors, but they can work through reducing depression and alcohol use and further, preventing MSM from practicing high risk behaviors.

There are some limitations that should be discussed. "Condomless sex" includes the use of condoms with non-condom-compatible lubricants and not using condoms (regardless of lubricant use). By pooling people with different condom and lubricant use patterns, we are ignoring the heterogeneity in the risk of HIV infection among the "condomless sex" group. In terms of HIV-related knowledge, only three questions

regarding knowledge on sexual risk practices was asked in the questionnaire, which might fail to be an accurate measure of HIV-related knowledge. In addition, social support could be a potential mediator linking stigma and sexual risk practices, which was not included in this analysis. Social exclusion has been associated with HIV-related stigma and engagement in riskier and unhealthy behaviors, but a previous SEM model among MSM in the U.S. found no significance for social support to be a mediator between stigma and risk class membership. Further analysis might be helpful to figure out the role of social support in engagement in sexual risk practices. Although we found significant association between MSM stigma in health care system and sexual risk practices via depression and alcohol use, these findings are based on cross-sectional data where temporality cannot be verified. Moreover, participants were asked about their sexual practices and alcohol use during the past 12 months, not sexual behaviors they had after drinking. It is possible that some factors, such as experiencing stigma, can make people more likely to be both heavy-drinkers and to have high risk sexual behaviors. Therefore, it might be problematic to say that alcohol use has a direct effect on sexual risk practices.

CHAPTER 5 CONCLUSIONS

In Lesotho, MSM failed to be identified as major high-risk groups like sex workers and migrant workers. In sub-Saharan Africa, heterosexual sex is the main route of infection, thus HIV-related stigma is mainly focused on sex work. However, MSM can also be exposed to sex-orientation stigma, and disclosure of sexual orientation to health care providers has been significantly associated with having been denied health care in Malawi, Namibia and Botswana. This study further identified MSM in Lesotho as a potential high risk subgroup and highlighted the importance of dealing with MSM stigma.

This study also provided information on possible casual pathways linking MSM stigma in health care system to sexual risk practices and further intervention targets. Further research will explore whether interventions on depression and alcohol use reduce engagement in sexual risk practices, and mediation analysis is also needed to see whether interventions on MSM stigma reduce depressive symptoms and alcohol use among MSM in Lesotho.

REFERENCES:

1. UNGASS (2010) 'UNGASS Country Progress Report'
2. UNGASS (2012) ' Lesotho: Global AIDS Response Country Progress Report'
3. Baral, Stefan, 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* 4.3 (2009): e4997.
4. Baral, Stefan, et al. "A cross-sectional assessment of population demographics, HIV risks and human rights contexts among men who have sex with men in Lesotho." *Journal of the International AIDS Society* 14.1 (2011): 36.
5. WHO (2011) 'Global HIV/AIDS Response: Epidemic update and health sector progress towards Universal Access: Progress report 2011' - See more at: http://www.avert.org/hiv-aids-stigma-and-discrimination.htm#footnote5_wlgqtq3
6. 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. *American Journal of Epidemiology*. 2004;159(10):1002–1012. [PubMed]
7. Vanable PA, McKirnan DJ, Buchbinder SP, Bartholow BN, Douglas JM, Jr., Judson FN, MacQueen KM. Alcohol use and high-risk sexual behavior among men who have sex with men: The effects of consumption level and partner type. *Health Psychology*. 2004;23(5):525–532.[PubMed]
8. Semple SJ, Patterson TL, Grant I. HIV-positive gay and bisexual men: Predictors of unsafe sex. *AIDS Care*. 2003;15(1):3–15. [PubMed]
9. Gender and Multiple and Concurrent Sexual Partnerships in Lesotho (NAC, UNAIDS, FHI 2008)
10. Bruce, Douglas, Jesus Ramirez-Valles, and Richard T. Campbell. "Stigmatization, substance use, and sexual risk behavior among Latino gay and bisexual men and transgender persons." *Journal of Drug Issues* 38.1 (2008): 235-260.
11. Vanable, Peter A., et al. "Impact of HIV-related stigma on health behaviors and psychological adjustment among HIV-positive men and women." *AIDS and Behavior* 10.5 (2006): 473-482.
12. Preston, Deborah Bray, et al. "The relationship of stigma to the sexual risk behavior of rural men who have sex with men." *AIDS Education & Prevention* 19.3 (2007): 218-230.

13. Wohl, Amy Rock, 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 and Behavior* 17.4 (2013): 1454-1464.
14. Diaz, Rafael M., et al. "The impact of homophobia, poverty, and racism on the mental health of gay and bisexual Latino men: Findings from 3 US cities." *American Journal of Public Health* 91.6 (2001): 927.
15. Wagner, Glenn J., et al. "Understanding the influence of depression on self-efficacy, work status and condom use among HIV clients in Uganda." *Journal of psychosomatic research* 70.5 (2011): 440-448.
16. Bradley, Mark V., Robert H. Remien, and Curtis Dolezal. "Depression symptoms and sexual HIV risk behavior among serodiscordant couples." *Psychosomatic medicine* 70.2 (2008): 186-191.
17. Kroenke, Kurt, and Robert L. Spitzer. "The PHQ-9: a new depression diagnostic and severity measure." *Psychiatr Ann* 32.9 (2002): 1-7.
18. Bush, Kristen, et al. "The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking." *Archives of internal medicine* 158.16 (1998): 1789-1795.
19. Lo, Yungtai, Nancy R. Mendell, and Donald B. Rubin. "Testing the number of components in a normal mixture." *Biometrika* 88.3 (2001): 767-778.
20. Muthén, LK, Muthén, BO. *Mplus user's guide*. 6th ed. Los Angeles: Muthén & Muthén; 1998–2010.
21. Greenbaum, P. E., Del Boca, F. K., Darkes, J., Wang, C., & Goldman, M. S. (2005). Variation in the drinking trajectories of freshman college students. *Journal of Consulting and Clinical Psychology*. 73(2), 229–238
22. Muthén, Bengt. "Latent variable analysis." *The Sage handbook of quantitative methodology for the social sciences*. Thousand Oaks, CA: Sage Publications(2004): 345-68.
23. Koblin, Beryl A., et al. "Risk factors for HIV infection among men who have sex with men." *Aids* 20.5 (2006): 731-739.
24. Woolf, Sarah E., and Stephen A. Maisto. "Alcohol use and risk of HIV infection among men who have sex with men." *AIDS and Behavior* 13.4 (2009): 757-782.
25. Leigh, Barbara C. "Alcohol and condom use: a meta-analysis of event-level studies." *Sexually*

transmitted diseases 29.8 (2002): 476-482.

26. McKirnan DJ, Venable PA, Ostrow DG, Hope B. Expectancies of sexual 'escape' and sexual risk among drug and alcohol-involved gay and bisexual men. *Journal of Substance Abuse* 2001;13(1-2):137-154. [PubMed: 11547615]
27. Sikkema, Kathleen J., et al. "Mental health treatment to reduce HIV transmission risk behavior: a positive prevention model." *AIDS and Behavior* 14.2 (2010): 252-262.
28. Tsai, Alexander C., et al. "Does effective depression treatment alone reduce secondary HIV transmission risk? Equivocal findings from a randomized controlled trial." *AIDS and Behavior* 17.8 (2013): 2765-2772.
29. Human Rights Watch (2008) 'A testing challenge: The experience of Lesotho's universal HIV counseling and testing campaign'
30. Velasquez, Mary M., et al. "Reducing sexual risk behaviors and alcohol use among HIV-positive men who have sex with men: a randomized clinical trial." *Journal of consulting and clinical psychology* 77.4 (2009): 657.
31. Torunn, S. (2013, July 30). National Alcohol Policy Alliance formed in Lesotho. Retrieved from <http://www.add-resources.org/>
32. Stutterheim SE et al (2009, 13th November), 'HIV-related stigma and psychological distress: the harmful effects of specific stigma manifestations in various social settings', *AIDS* 23:17
33. Lueveswanij, S., Nittayananta, W., & Robison, V. A. (2000). Changing knowledge, attitudes, and practices of Thai oral health personnel with regard to AIDS: An evaluation of an educational intervention. *Community Dental Health*, 17, 165-171.
34. Uwakwe, C. B. (2000). Systematized HIV/AIDS education for student nurses at the University of Ibadan, Nigeria: impact on knowledge, attitudes and compliance with universal precautions. *Journal of Advanced Nursing*, 32(2), 416-424.

APPENDIX

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

Demographics	Proportion
<i>Age</i>	
Mean(range)	23.6(18 – 56)
18 – 25 years	73.6%(234/318)
<i>Ethnic</i>	
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)
<i>Education</i>	
Secondary or less	42.4%(135/318)
Tertiary or more	57.6%(183/318)
<i>Employment</i>	
Unemployed	39.0%(124/318)
Employed	29.6%(94/318)
Student	27.7%(88/318)
Informal sector worker	2.8%(9/318)
<i>City dweller</i>	67.6%(213/318)
<i>Country of origin</i>	
Lesotho	100%(318/318)
<i>Income</i>	
Mean/median	1031/500
Any income	72.9%(231/317)
No income	27.1%(86/317)
<i>Sexual orientation</i>	
Homosexual	43.4%(138/318)
Bisexual	50.9%(162/318)
Heterosexual/straight	4.4%(14/318)
Other	1.3%(4/318)
<i>Marital status</i>	
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)
<i>Have children</i>	8.5%(27/318)

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

Study variablesp	Proportion
<i>Number of sex partners</i>	
Mean(range)	4.0(1- 70)
Single sex partner	26.7%(85/318)
Multiple sex partner	73.3%(233/318)
<i>Always use condom</i>	
People having both insertive and receptive sex	55.0%(31/84)
Only having insertive sex	52.9%(91/172)
Only having receptive sex	37.1%(23/62)
Total	45.6%(145/318)
<i>Lubricant use</i>	
Water-based lubricant	41.8%(133/318)
Other	48.7%(155/318)
<i>Always use condom and with water-based lubricant</i>	
	8.2%(26/318)
	18.5%(58/314)
<i>Partner concurrency</i>	
<i>PHQ-9 score</i>	
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(≥ 15)	4.7%(15/316)
<i>Audit-C score</i>	
Mean/median	4.1/4
Alcohol positive(≥ 4)	59.0%(186/315)
<i>Sexual behavior related questions answered correctly</i>	
0	35.8%(113/316)
1	41.5%(131/316)
2	17.4%(55/316)
3	5.4%(17/316)
<i>Ever facing human rights violation in health system</i>	22.3%(71/318)

Table 3 Correlations between Human rights violation in health system, depression, alcohol use, knowledge and sexual risk behaviors among MSM in Maseru, Lesotho (N = 307)

	1	2	3	4	5	6	7
1							
2	0.225**						
3	0.299**	0.077					
4	0.169	0.247**	0.135*				
5	-0.014	-0.225**	-0.041	-0.562**			
6	0.060	-0.008	0.053	-0.038	0.149		
7	0.319**	0.114	0.154*	0.094	0.061	0.658**	1.000

1- Ever experienced human rights violation in health systems

2- Depression (PHQ-Score)

3- Alcohol use (Audit-C score)

4- Knowledge

5- Condomless sex

6- Partner concurrency

7- Multiple sexual partners

* p <0.05; ** p<0.01

Table 4 Percentage distribution of risk factor endorsement by sexual risk behavior classes among MSM in Maseru, Lesotho (N = 307)

Risk factor	High risk (N=260)	Low risk (N=47)	P value
<i>Binary and categorical (Percentage)</i>			
Condomless sex	82.3% (214/260)	74.5% (35/47)	0.206
Multiple partners	81.2% (211/269)	31.9% (15/47)	0.000
Partner Concurrency	100% (260/260)	0% (0/47)	0.000
Knowledge			
0	27.3%(71/260)	21.3%(10/47)	
1	38.5%(100/260)	48.9%(23/47)	
2	24.6%(64/260)	17.0%(8/47)	
3	9.6%(25/260)	12.8%(6/47)	
Human rights violation in health systems	22.3%(58/260)	19.1%(9/47)	0.629
<i>Continuous (Mean \pm SD)</i>			
Depression (PHQ score)	5.2 \pm 4.9	5.3 \pm 4.5	0.928
Alcohol use (AUDIT-C score)	4.1 \pm 3.6	3.8 \pm 3.5	0.550

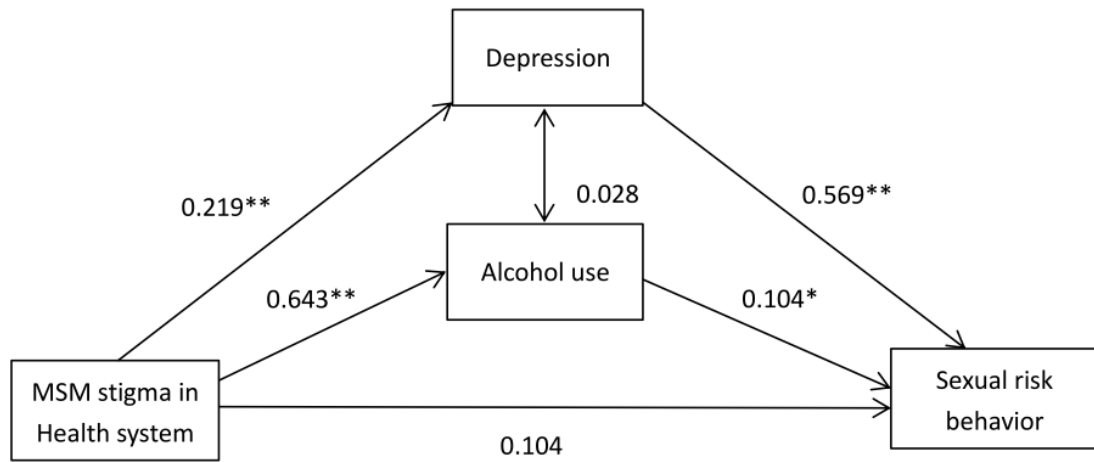


Figure 1 Path model showing the indirect effect of MSM stigma in health system on sexual risk behavior class membership via depression and alcohol use.

* $p=0.072$

** $p<0.01$

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