



# Associations among experienced and internalized stigma, social support, and depression among male and female sex workers in Kenya

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## Abstract

**Objectives** This study (1) estimated the association between experienced sex work-related stigma and moderate-to-severe depressive symptoms (hereafter depression), (2) examined independent associations between internalized stigma, experienced stigma, and depression among sex workers, and (3) investigated the potential modifying role of social support.

**Methods** A cross-sectional survey was conducted among 729 male and female sex workers in Kenya.

**Results** The prevalence of depression was 33.9%, and nearly all participants reported at least one of the experienced and internalized stigma items. Increasing levels of experienced stigma was associated with an increased predicted prevalence of depression [aPD 0.15 (95% CI 0.11–0.18)]. Increasing internalized stigma was independently associated with higher experienced stigma and depression and appeared to account for 25.5% of the shared variance between experienced stigma and depression after adjustment for confounders. Social support from same-sex sex workers did not appear to modify the association between experienced stigma and depression.

**Conclusions** Addressing the high levels of stigma that sex workers face and their mental health needs should be a public health and human rights imperative.

**Keywords** Stigma · Discrimination · Sex work · Depression · Sub-Saharan Africa · Kenya

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## Introduction

Depression is the leading cause of mental health-related disease burden globally, a major cause of the global burden of disability, and increasing in prevalence, particularly in low- and middle-income countries (LMICs) such as Kenya (Friedrich 2017; Herrman et al. 2019). In 2015, the World Health Organization estimated that 1.9 million people in Kenya—4.4% of the adult Kenyan population—were living with depression (WHO 2017). Beyond the morbidity produced by depression, it also negatively impacts both physical and sexual health. Global evidence has established associations between depression, risky behaviors, poor healthcare engagement, and increased morbidity and mortality (Gonzalez et al. 2011; Kessler and Bromet 2013). The prevalence of depression is higher in the presence of risk factors such as poverty, illness, stressful life events, trauma, violence, and neglect (Friedrich 2017; Herrman et al. 2019). As such, the burden of depression is particularly problematic among vulnerable groups, and neglecting

it could impede efforts to combat both non-communicable and communicable diseases in LMICs.

Stigma and discrimination are consistently linked with poor mental health. In Kenya, as in other sub-Saharan African countries, sex workers are a severely marginalized group that face sex work-related stigma due to their work, perceived HIV status, homophobia, and criminalization (Baral et al. 2012, 2015). Around a third of sex workers are estimated to be living with HIV (Musyoki et al. 2015). They are also especially vulnerable to physical and sexual violence, other key predictors of poor mental health (Dworkin et al. 2017; Shen et al. 2016). While mental health research is still scarce, a few studies have documented the high prevalence of depression among sex workers (Love 2015; Oldenburg et al. 2014; Rael and Davis 2017; Shen et al. 2016; Yuen et al. 2016). In an effort to identify ways to improve health outcomes for sex workers, research is also beginning to explore the potential protective role of social support—a multidimensional concept referring to emotional, instrumental, or informational assistance received from others (House et al. 1988)—in relation to stigma and mental health (Carlson et al. 2017; Lancaster et al. 2016). Despite recognition of the deleterious effects of stigma, reduced social support, and depression on myriad health outcomes, the link between these factors and their significance are poorly understood, particularly among sex workers in sub-Saharan Africa.

While the association between stigma and poor mental health has been established, research has yet to unpack the pathways through which stigma is experienced and processed at the individual level and may ultimately impact health outcomes (Rinehart et al. 2019; Turan et al. 2017a). While there are limited conceptual models specific to sex work-related stigma, Earnshaw et al.'s HIV Stigma Framework and a recent adaptation of the Minority Stress Model for understanding HIV-related stigma posit a degree of directionality from experienced stigma (actual experiences of discrimination) to internalized stigma (acceptance of negative social views as true and just) (Earnshaw et al. 2013; Turan et al. 2017b). Unpacking the association between experienced stigma and internalized stigma may be particularly important as a critical link from negative external experiences (e.g., discrimination) to resulting negative emotional or cognitive response (e.g., internalized stigma) (Cox et al. 2012; Fazeli et al. 2017). Additionally, we have a limited understanding of what factors can protect and support mental health in the face of stigma. Social support is hypothesized to protect mental health both directly, through the benefits of social relationships, and indirectly, as a buffer against stressful circumstances (Garipey et al. 2016). Where preventing discrimination through interventions targeting perpetrators is not possible,

interventions that empower sex workers, combat internalized stigma, and enhance social capital may be a viable alternative (Pantelic et al. 2019). Improving understanding of the relationship among experienced and internalized sex work-related stigma, depression, and the potential protective effect of social support from fellow sex workers has the potential to identify areas for intervention.

To address the dearth in knowledge around sex work-related stigma, a cross-sectional survey was conducted on stigma, discrimination, and healthcare-seeking behavior among male and female sex workers in Kenya. The analysis presented here estimates the association between experienced sex work-related stigma and moderate-to-severe depressive symptoms (hereafter, depression) in this population. We examine the independent associations between depression and both experienced and internalized stigma to explore whether internalized stigma could partially explain the association between experienced stigma and depression. Finally, we investigate the potential modifying role of social support from fellow same-sex sex workers.

## Methods

### Study design

A cross-sectional study was conducted in January 2015 to examine the association between different types of sex work-related stigma (experienced and internalized) and seeking health services among female and male sex workers in Kenya. In addition to measuring the prevalence of various types of sex work-related stigma and healthcare utilization over the past year, the study also captured social capital and depression. A snowball sample of participants was recruited from four study sites (Nairobi, Kitui, Busia, and Homa Bay) using a modified respondent-driven sampling process. Four sex worker organizations identified “seed” respondents who participated in the study and were given coupons to recruit other eligible participants. Successive participants were also given recruitment coupons until the target sample size was achieved. All participants were reimbursed 500 shillings (KSh) for their transport and time and 300 KSh for each successfully recruited participant. Data were collected using face-to-face interviews. Additional information on study design and data collection has previously been published (Nyblade et al. 2017).

### Study population

Eligible participants were over the age of 18, earned a significant part of their income over the last three months from sex work, had been a resident in the study-site

location for at least six months prior to the study, and were either a seed or possessed a valid recruitment coupon. Individuals unable to provide informed consent and visibly under the influence of drugs or alcohol were ineligible. In total, 754 individuals presented at the study sites to participate in the survey; 25 people were deemed ineligible to participate due to failing to meet the eligibility criteria or provide informed consent, being visibly under the influence of drugs or alcohol, or admitting that they received the recruitment coupon from a stranger. Of the 729 participants who were interviewed, 68.2% were female and the mean age was 27.9 (SD 6.3).

## Measures

*Depression* was measured using the Patient Health Questionnaire 9 (PHQ-9), which consists of nine questions on the frequency of depressive symptoms experienced over the past two weeks. Responses to each of the nine questions were totaled; scores could range from 0 to 27. Scores of 10 or above were considered indicative of depression (Kroenke et al. 2001). These items showed good internal consistency (Cronbach's alpha 0.85).

*Experienced sex work-related stigma* was measured using 19 questions from the validated Sex Work Experienced Stigma Scale (SWESS) that asked participants about the frequency of experiencing sex work-related stigma from four different sources: the general community, family members, healthcare providers, and police officers (Oga et al. 2019) (Electronic Supplementary Material 1). Response options included never, once longer than a year ago, once in the last year, a few times in the last year, and often in the last year. Each item was scored from zero (least frequent (never)) to four being the most frequent (often in the last year). The mean score of the 19 experienced stigma items was used to create a continuous count variable ranging from zero (no experiences of any type of stigma) to four (often experiencing all types of stigma in the past year). Participants were assigned a missing value for this score if they did not respond to at least 15 of the 19 items. These items showed excellent internal consistency (Cronbach's alpha 0.93).

*Internalized sex work-related stigma* was measured using an adapted version of Kalichman et al.'s internalized AIDS-related Stigma Scale in which we replaced "HIV status" with "selling sex." Respondents reported their level of agreement with the 6 adapted statements using a 4-point Likert scale (Kalichman et al. 2009) (Electronic Supplementary Material 2). Each internalized stigma item was scored from 1 (strongly disagree) to 4 (strongly agree). The mean score of the 6 items was used to create a continuous count variable ranging from 1 (strongly disagree with every statement, i.e., lower internalized stigma) to 4

(strongly agree with every statement, i.e., greater internalized stigma). Participants were assigned a missing value for this score if they did not respond to at least 5 of the 6 items. These items showed good internal consistency (Cronbach's alpha 0.82).

*Social support* was measured by asking respondents to rate their level of agreement with six statements about relying on other same-sex sex workers to borrow money, accompany them to the doctor or hospital, talk with them about their problems, provide a place to stay, help deal with a violent or difficult client, or help find clients (Fonner et al. 2014) (Electronic Supplementary Material 3). Each item was scored using a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). The mean score of these six social support items was used to create a continuous count variable ranging from 1 (strongly disagree with every statement, i.e., lower social support) to 4 (strongly agree with every statement, i.e., greater social support). Participants were assigned a missing value for this score if they did not respond to at least 5 of the 6 items. These social support items showed reliable internal consistency (Cronbach's alpha 0.77).

*Potential confounders* were identified through a priori directed acyclic graph (DAG) analysis (Electronic Supplementary Material 4). These covariates included: age, sex, number of years in sex work, weekly income in Kenyan Shillings (logged for normality), education, ever raped, HIV status, and drug use. Age, number of years in sex work, and weekly income are continuous variables. Education was categorized as primary or less, at least some secondary, and tertiary. HIV status was self-reported; "refused to answer" and "unknown status" were treated as missing. Drug use was defined as injecting or using illegal drugs in the past year.

## Analysis

First, we examined the prevalence of depression, experienced stigma, internalized stigma, and social support among the study population.

Second, we estimated the association between experienced stigma and depression using a linear–binomial model to estimate prevalence differences of depression among sex workers with increasing levels of stigma using complete case analysis. We fit these regressions as generalized linear models with an identity link and binomial error distribution via iteratively reweighted least squares. We checked for a linear functional form between depression prevalence and continuous predictors using Lowess plots. Prevalence was estimated due to the cross-sectional nature of the data. Additional details on model specification are available in Electronic Supplementary Materials 5–8.

Third, we investigated the role of internalized stigma in the association between experienced stigma and depression. We used linear models to estimate the independent association between internalized stigma and both experienced stigma and depression. To assess the extent to which internalized stigma may explain the association between experienced stigma and depression, we implemented a partial correlation analysis (Palar et al. 2018). First, we calculated the unadjusted correlation between experienced stigma and depression (A). We then calculated their correlation adjusted for potential confounders, but without including internalized stigma (B). Finally, we calculated their correlation adjusted for potential confounders while including internalized stigma (C). To assess the extent to which internalized stigma explained the proportion of shared variance between moderate-to-severe depression and experienced stigma, we took the difference in the proportion of variance between the two adjusted models (B–C) and divided it by the proportion of variance in the adjusted model excluding internalized stigma (B).

Finally, we assessed effect measure modification (EMM) on the additive scale of the association between experienced stigma and depression by social support, using likelihood ratio tests to compare models with and without an interaction term between experienced stigma and social support.

All analyses were performed using Stata IC 14.2, September 2016.

## Results

### Prevalence of depression, experienced stigma, and internalized stigma

The characteristics of the 729 participants surveyed are presented in Table 1. Over a third (33.9%) of participants reported a PHQ-9 score of 10 or higher, indicative of moderate-to-severe depressive symptoms. A large proportion of participants reported experienced and internalized stigma; only 7.1% of participants reported no experienced stigma, and only 25.8% reported no internalized stigma (Electronic Supplementary Materials 1–2). Notably, nearly half (48.0%) of participants had ever been raped. Over 10% ( $n = 73$ ) of participants did not answer, refused to answer or did not know their HIV status; of those who responded with a known HIV status, 26.2% were HIV positive. A larger proportion of female sex workers reported depression and rape than male sex workers. Similarly, female sex workers reported higher experienced stigma scores than their male counterparts.

### Association between experienced stigma and depression

Only the 715 participants with complete data on all variables except HIV status were included in the final complete case analysis. The final model controlled for the minimally sufficient adjustment set including: age, sex, number of years in sex work, weekly income in Kenyan Shillings, education, ever raped, and drug use. Based on functional form assessment, experienced stigma, internalized stigma, and social support were modeled as linear variables. Further details on the assessment of functional form, sparse data, and collinearity as well as on final adjustment set are available in Electronic Supplementary Materials 5–7. Additionally, the possible effects of selection bias resulting from missing data on HIV status were examined in several sensitivity analyses available in Electronic Supplementary Material 8. Adjusting for confounders, the modeled prevalence of depression increased 15 percentage points [aPD 0.15 (95% CI 0.11–0.18)] per one-unit increase in experienced stigma (Fig. 1).

### The role of internalized stigma

Increasing internalized stigma was independently associated with both increasing experienced stigma and a higher prevalence of depression. (Table 2) Adjusting for confounders, the modeled prevalence of depression increased 14 percentage points [aPD 0.16 (95% CI 0.13–0.19)] per one-unit increase in internalized stigma. Experienced stigma scores increased on average 0.28 (95% CI 0.19–0.37) with every one-unit increase in internalized stigma score.

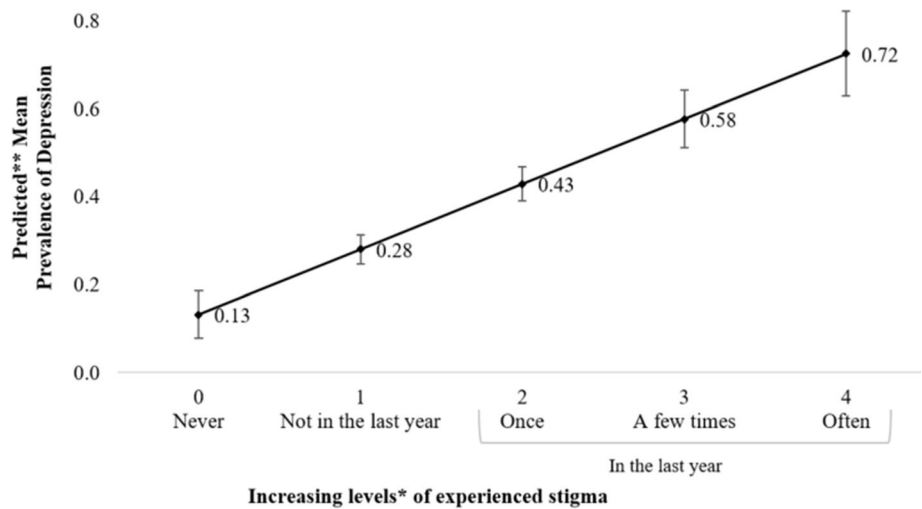
The unadjusted correlation between depression and experienced stigma was 0.353, indicating that experienced stigma explained 12.4% of the variance in depression and vice versa (Model A) (Table 3). Adjusting for potential confounders, but excluding internalized stigma, this correlation was 0.297 and the proportion of variance explained between experienced stigma and depression was 8.8% (Model B). When we further added internalized stigma to Model B (Model C), the correlation between experienced stigma and depression further decreased to 0.256, indicating that experienced stigma explained 6.5% of the remaining variance in depression after accounting for the other variables in the model. The change in the proportion of variance explained between experienced stigma and depression when the adjustment set included internalized stigma was 2.3 percentage points. Thus, internalized stigma accounted for 25.5% (8.8–6.5/8.8) of the shared variance between experienced stigma and depression after adjustment for confounders.

**Table 1** Population characteristics, by sex (*N* = 729) in Kenya, 2015

Variable	Total ( <i>N</i> = 729)	Male ( <i>n</i> = 232)	Female ( <i>n</i> = 497)
Depression, % ( <i>n</i> )	33.9 (247)	22.0 (51)	39.4 (196)
Experienced stigma (0–4), mean (SD)	1.4 (1)	0.9 (0.8)	1.6 (1.1)
Experience at least 1 of 19 items, % ( <i>n</i> )	39.4 (196)	85.8 (199)	96.2 (478)
Internalized stigma (1–4), mean (SD)	2.6 (0.7)	2.6 (0.6)	2.6 (0.8)
Any agreement with at least 1 of 6 items, % ( <i>n</i> )	96.2 (478)	79.7 (185)	71.6 (356)
Social support (1–4), mean (SD)	3.2 (0.6)	3.2 (0.5)	3.2 (0.6)
Any agreement with at least 1 of 6 items, % ( <i>n</i> ) <sup>a</sup>	95.3 (695)	97.8 (227)	94.2 (468)
Age (18–71), mean (SD)	27.9 (6.3)	26.8 (5.9)	28.5 (6.3)
Education, % ( <i>n</i> ) <sup>b</sup>			
Primary or less	46.0 (334)	18.7 (43)	58.7 (291)
At least some secondary	43.4 (315)	59.6 (137)	35.9 (178)
Tertiary	10.6 (77)	21.7 (50)	5.4 (27)
Weekly income in KS (100–20,000), median (25th percentile–75th percentile)	1200 (1000–2000)	1000 (800–2000)	1200 (1000–2000)
Years in sex work (0.25–28), mean (SD) <sup>c</sup>	5.4 (4.6)	5.9 (5.2)	5.2 (4.3)
Ever raped, % ( <i>n</i> ) <sup>d</sup>	48.0 (349)	31.3 (72)	55.7 (277)
HIV positive, % ( <i>n</i> ) <sup>e</sup>	26.2 (172)	31.3 (57)	24.3 (115)
Used drugs in the past year, % ( <i>n</i> )	9.9 (72)	9.5 (22)	10.1 (50)

<sup>a</sup>Missing *n* = 1; <sup>b</sup>missing *n* = 3; <sup>c</sup>missing *n* = 9; <sup>d</sup>missing *n* = 2; <sup>e</sup>missing *n* = 73 including “Don’t know” = 3 and “refused to answer” = 32

**Fig. 1** Adjusted prevalence of depression by levels of experienced stigma based on linear–binomial regression analysis in Kenya, 2015



\*level of stigma is created from the mean score of the experienced stigma questions, ranging from 0–4  
 \*\*Adjusted for age, sex education, years in sex work, weekly income, ever raped, and drug use

**Effect measure modification (EMM) by social support**

Both the crude and adjusted analysis of EMM by social support did not suggest modification (*p* values > 0.5). The predicted prevalence of depression for those with low social support (set at the 25th percentile) and those with high social support (set at the 75th percentile) is shown in Fig. 2. While those with higher social support do appear to have a lower predicted prevalence of depression, the

differences between strata are insufficient to support departure from perfect additivity.

**Discussion**

This study documented the high prevalence of depression and experienced and internalized sex work-related stigma. Increasing levels of experienced stigma were associated with an increased predicted prevalence of depression.



**Table 2** Independent associations between internalized stigma, experienced stigma, and depression based on linear regression analysis in Kenya, 2015

	Experienced stigma <i>0 = no stigma 4 = max stigma</i>		Depression	
	Unadjusted MD (95%CI)	Adjusted <sup>a</sup> aMD (95%CI)	Unadjusted PD (95%CI)	Adjusted <sup>a</sup> aPD (95%CI)
Internalized stigma <i>1 = no stigma 4 = max stigma</i>	0.27 (0.17–0.37)	0.28 (0.19–0.37)	0.16 (0.12–0.20)	0.16 (0.13–0.19)

<sup>a</sup>Adjusted for age, sex, education, years in sex work, weekly income, ever raped, and drug use

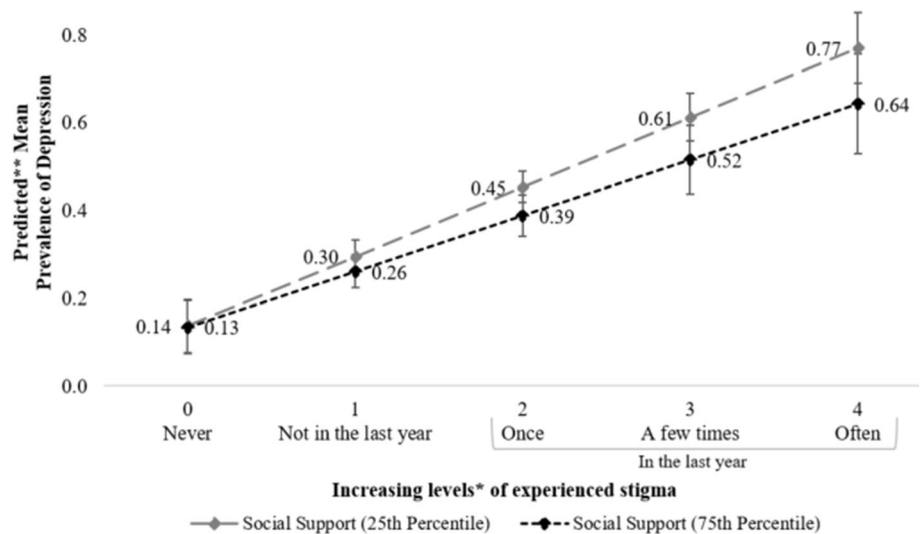
**Table 3** Partial correlation analysis of internalized stigma in the relationship between experienced stigma<sup>a</sup> and depression<sup>b</sup> in Kenya, 2015

	Correlation between depression and experienced stigma ( <i>r</i> )	Proportion of variance explained ( $r^2 \times 100$ ) (%)
A: Unadjusted ( <i>n</i> = 729)	0.3528	12.4
B: Adjusted <sup>c</sup> for potential confounders (model <i>excluding</i> internalized stigma) ( <i>n</i> = 715)	0.2965	8.8
C: Adjusted*** for potential confounders (model <i>including</i> internalized stigma) ( <i>n</i> = 715)	0.2559	6.5
Proportion of variance between depression and experienced stigma accounts for by internalized stigma		25.5

<sup>a</sup>Modeled as a linear term, range 0–4

<sup>b</sup>Modeled as binary term, depression vs not depressed

<sup>c</sup>Controlling for age, sex, education, years in sex work, weekly income, ever raped, and drug use

**Fig. 2** Effect modification in adjusted prevalence of depression by levels of experienced stigma based on linear–binomial regression analysis in Kenya, 2015

\*level of stigma is created from the mean score of the experienced stigma questions, ranging from 0–4

\*\*Adjusted for age, sex education, years in sex work, weekly income, ever raped, and drug use

Increasing internalized stigma was independently associated with higher experienced stigma and depression. Internalized stigma appeared to partially explain the association between experienced stigma and depression. Finally, social support from same-sex sex workers did not appear to modify this association.

A third of participants reported depression. A recent literature review and meta-analysis supports this finding, calculating a pooled prevalence of depression as high as 62.4% (Yuen et al. 2016). Our findings are also similar to those from a study conducted among female sex workers in Mombasa (White et al. 2016) and support the growing

body of evidence documenting the high burden of depression among sex workers (Love 2015; Yuen et al. 2016). Depression is associated with a wide range of poor physical and sexual health outcomes (Gonzalez et al. 2011; Kessler and Bromet 2013). Further, depression is consistently associated with risky sexual behaviors (Oldenburg et al. 2014; Rael and Davis 2017; Shen et al. 2016; Yuen et al. 2016), suggesting that untreated depression may increase sex workers' risk of HIV and STI infection and transmission. While some interventions have been developed with the potential to address the mental health needs of sex workers with varying success (Gunn et al. 2016; Swendeman et al. 2015), further investment in mental health programming for this population is urgently needed.

This study also revealed a high prevalence of experienced and internalized sex work-related stigma as nearly all participants reported at least one of the experienced and internalized stigma items. Other studies conducted in Kenya and in the sub-Saharan region have also shown the severe magnitude of stigma and discrimination faced by sex workers due to their involvement in sex work, real or perceived HIV status, homophobia, and criminalization (Baral et al. 2012, 2015; Scorgie et al. 2013). Sex workers in Kenya, like many other vulnerable populations, are disproportionately burdened by HIV and other sexually transmitted diseases (Baral et al. 2012; Beyrer et al. 2012). Given the widespread stigmatization of HIV in the region and the association between sex work and HIV, sex workers may face compounding HIV-related and sex worker-related stigmas (Logie et al. 2011). This high prevalence of stigma is particularly concerning as stigma is consistently associated with decreased engagement in healthcare and poor health outcomes (Ma et al. 2017; Nyblade et al. 2017; Scorgie et al. 2013). Such evidence suggests that many health interventions may have limited success without attention to stigma reduction, particularly those focused on HIV or STI prevention, care, and treatment.

Experiencing greater levels of stigma was associated with markedly increased likelihood of reporting depression. These findings are comparable to those of the few studies that examined any type of stigma and depression among sex workers. Studies in the Dominican Republic and Vietnam found similar associations between internalized or perceived sex work-related stigma and depression (Oldenburg et al. 2014; Rael and Davis 2017). These findings suggest a need to reduce stigma and discrimination faced by sex workers and address their mental health needs. Recent developments in stigma reduction among healthcare providers and police have been shown to be effective in reducing stigma toward vulnerable groups such as sex workers (Stangl et al. 2013). However, further research and

evaluation of such programs will be needed to fully realize their effect on sex workers' health and well-being.

Social support from fellow sex workers did not modify the association between experienced stigma and depression. Research has documented associations between social support and depression (Brittain et al. 2017; Garipey et al. 2016), and that higher levels of various types of stigma are associated with lower levels of general social support (e.g., from family, friends, or the general community) (Rueda et al. 2016). This is unsurprising as these are often the perpetrators of stigma and discrimination. However, the interrelationships between depression, stigma, and social support are poorly understood and studies continue to test different modification, mediation, and multilevel models with different types of stigma and social support (Brittain et al. 2017; Takada et al. 2014). We hypothesized that the source of social support may be important in the stigma–social support association; specifically, that support from within the stigmatized population (e.g., from fellow same-sex sex workers) might buffer the adverse impacts of experiencing stigma perpetrated by individuals outside of that group. One explanation for the lack of modification may be that the specific source—from fellow same-sex sex workers—of social support is not pertinent to the association between stigma and mental health. Alternatively, there were no validated social support measures for this population, so it is also possible our measures did not appropriately capture this particular social support construct. Additional research is needed to better capture social support and explore how and from what sources social support can modify experiences of stigma and depression.

With an eye for potential intervention, we hypothesized that internalized stigma could potentially mediate the association between experienced stigma and depression, recognizing the exploratory nature of this investigation within a cross-sectional survey. We found that internalized stigma accounted for a quarter of the shared variance between experienced stigma and depression. This suggests the potential for internalized stigma to partially mediate the relationship between experienced stigma and depression, though this relationship remains complex and difficult to untangle. While limited research has examined potential mediation by internalized stigma, a recent study found that internalized HIV-related stigma partially mediated the association between perceived stigma and self-esteem, suggesting that perceived HIV-related stigma in the community may cause people living with HIV to internalize stigma and result in adverse health and psychological outcomes (Turan et al. 2017a). In addition to preventing discrimination, addressing internalized stigma has potential protective benefits to sex workers' mental health. In the field of HIV, strategies have been developed to manage and cope with stigma (Rao et al. 2012; Stangl et al. 2013). For

example, a group-based intervention for women living HIV helped participants acquire new coping skills through exercises on practicing relaxation and self-care, sharing coping strategies, discussing how to handle potentially stigmatizing situations with family and colleagues, and role playing ways to navigate such situations (Rao et al. 2012). However, further investment in high-quality stigma reduction programs with multidimensional stigma indicators and psychometrically sound outcome measures are still needed.

## Limitations

There are several limitations inherent to this analysis. For the purposes of this study, experienced stigma and internalized stigma were treated as the “exposures” and depression as the “outcome.” However, the data are cross-sectional, and the implicit lack of temporality should be recognized. The use of snowball sampling limits the generalizability of findings. We elected not to control for HIV status because it had a large proportion of missing data, introduced convergence challenges, and did not appear to affect our confounding control (Electronic Supplementary Material 8). Due to the severity of HIV-related stigma, it is not surprising that this variable has such a high proportion of missing, unknown, and refused responses. Further, it is likely that HIV status is not missing at random; thus, the complete case analysis may be biased. It is also possible that the survey did not capture important confounders, such as alcohol abuse, or key sources of social support. Finally, all three of the main social constructs—depression, stigma, and social support—have theoretical overlaps; a depressed person may be more likely to perceive more stigma and less support and vice versa.

## Conclusion

Addressing the high levels of stigma that sex workers face and their mental health needs should be a public health and human rights imperative. Our findings suggest that experienced and internalized stigma may be connected with depression among sex workers. This has potential implications for mental, sexual health, and stigma reduction programming for this marginalized group. While this analysis provides a sense of the potential effect that investment in stigma reduction may have in lowering depression among sex workers in Kenya, further research is necessary to understand the mental health impact marginalization has on this vulnerable group.

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does not necessarily reflect the views or policies of US Agency for International Development or the US President’s Emergency Plan for AIDS Relief (PEPFAR) and does not imply endorsement by the US Government.

## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

**Ethical approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the Health Media Lab Institutional Review Board in the USA and the Kenya Medical Research Institute Institutional Review Board in Kenya and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

**Informed consent** Informed consent was obtained from all individual participants included in the study.

## References

- Baral S, Beyrer C, Muessig K et al (2012) Burden of HIV among female sex workers in low-income and middle-income countries: a systematic review and meta-analysis. *Lancet Infect Dis* 12:538–549
- Baral SD, Friedman MR, Geibel S et al (2015) Male sex workers: practices, contexts, and vulnerabilities for HIV acquisition and transmission. *The Lancet* 385:260–273
- Beyrer C, Baral SD, Van Griensven F, Goodreau SM, Chariyalertsak S, Wirtz AL, Brookmeyer R (2012) Global epidemiology of HIV infection in men who have sex with men. *Lancet* 380:367–377
- Brittain K, Mellins CA, Phillips T, Zerbe A, Abrams EJ, Myer L, Remien RH (2017) Social support, stigma and antenatal depression among HIV-infected pregnant women in South Africa. *AIDS Behav* 21:274–282
- Carlson CE, Witte SS, Pala AN, Tsai LC, Wainberg M, Aira T (2017) The impact of violence, perceived stigma, and other work-related stressors on depressive symptoms among women engaged in sex work. *Glob Soc Welf* 4:51–57
- Cox WT, Abramson LY, Devine PG, Hollon SD (2012) Stereotypes, prejudice, and depression: the integrated perspective. *Perspect Psychol Sci* 7:427–449
- Dworkin ER, Menon SV, Bystrynski J, Allen NE (2017) Sexual assault victimization and psychopathology: a review and meta-analysis. *Clin Psychol Rev* 56:65–81
- Earnshaw VA, Smith LR, Chaudoir SR, Amico KR, Copenhaver MM (2013) HIV stigma mechanisms and well-being among PLWH: a test of the HIV stigma framework. *AIDS Behav* 17:1785–1795
- Fazeli PL, Turan JM, Budhwani H, Smith W, Raper JL, Mugavero MJ, Turan B (2017) Moment-to-moment within-person associations between acts of discrimination and internalized stigma in people living with HIV: an experience sampling study. *Stigma Health* 2:216
- Fonner VA, Kerrigan D, Mnisi Z, Ketende S, Kennedy CE, Baral S (2014) Social cohesion, social participation, and HIV related risk among female sex workers in Swaziland. *PLoS One* 9:e87527
- Friedrich M (2017) Depression is the leading cause of disability around the world. *JAMA* 317:1517–1517
- Garipey G, Honkaniemi H, Quesnel-Vallee A (2016) Social support and protection from depression: systematic review of current findings in Western countries. *Br J Psychiatry* 209:284–293



- Gonzalez JS, Batchelder AW, Psaros C, Safren SA (2011) Depression and HIV/AIDS treatment nonadherence: a review and meta-analysis. *J Acquir Immune Defic Syndr* 58:181–187. <https://doi.org/10.1097/QAI.0b013e31822d490a>
- Gunn JK, Roth AM, Center KE, Wiehe SE (2016) The unanticipated benefits of behavioral assessments and interviews on anxiety, self-esteem and depression among women engaging in transactional sex. *Commun Ment Health J* 52:1064–1069. <https://doi.org/10.1007/s10597-015-9844-x>
- Herrman H, Kieling C, McGorry P, Horton R, Sargent J, Patel V (2019) Reducing the global burden of depression: a Lancet–World Psychiatric Association Commission. *The Lancet* 393:e42–e43
- House JS, Umberson D, Landis KR (1988) Structures and processes of social support. *Ann Rev Sociol* 14:293–318
- Kalichman SC, Simbanyi LC, Cloete A, Mthembu PP, Mkhonta RN, Ginindza T (2009) Measuring AIDS stigmas in people living with HIV/AIDS: the Internalized AIDS-Related Stigma Scale. *AIDS Care* 21:87–93
- Kessler RC, Bromet EJ (2013) The epidemiology of depression across cultures. *Annu Rev Public Health* 34:119–138
- Kroenke K, Spitzer R, Williams J (2001) The PHQ-9: validity of a brief depression severity measure. *Gen Intern Med* 16:606–13
- Lancaster KE, Cernigliaro D, Zulliger R, Fleming PF (2016) HIV care and treatment experiences among female sex workers living with HIV in sub-Saharan Africa: a systematic review. *Afr J AIDS Res* 15:377–386
- Logie CH, James L, Tharao W, Loutfy MR (2011) HIV, gender, race, sexual orientation, and sex work: a qualitative study of intersectional stigma experienced by HIV-positive women in Ontario, Canada. *PLoS Med* 8:e1001124
- Love R (2015) Street level prostitution: a systematic literature review. *Issues Ment Health Nurs* 36:568–577. <https://doi.org/10.3109/01612840.2015.1020462>
- Ma PH, Chan ZC, Loke AY (2017) The socio-ecological model approach to understanding barriers and facilitators to the accessing of health services by sex workers: a systematic review. *AIDS Behav* 21:2412–2438
- Musyoki H, Kellogg TA, Geibel S et al (2015) Prevalence of HIV, sexually transmitted infections, and risk behaviours among female sex workers in Nairobi, Kenya: results of a respondent driven sampling study. *AIDS Behav* 19:46–58
- Nyblade L, Reddy A, Mboté D et al (2017) The relationship between health worker stigma and uptake of HIV counseling and testing and utilization of non-HIV health services: the experience of male and female sex workers in Kenya. *AIDS care* 29:1364–1372
- Oga E, Kraemer J, Stewart C, Mboté D, Njuguna S, Stockton M, Nyblade L (2019) Experienced sex-work stigma in male and female sex workers in Kenya: development and validation of a scale. *Stigma Health*. <https://doi.org/10.1037/sah0000205>
- Oldenburg CE, Biello KB, Colby D et al (2014) Stigma related to sex work among men who engage in transactional sex with men in Ho Chi Minh City, Vietnam. *Int J Public Health* 59:833–840. <https://doi.org/10.1007/s00038-014-0562-x>
- Palar K, Frongillo EA, Escobar J et al (2018) Food insecurity, internalized stigma, and depressive symptoms among women living with HIV in the United States. *AIDS Behav* 22:3869–3878
- Pantelic M, Steinert JI, Park J, Mellors S, Murau F (2019) ‘Management of a spoiled identity’: systematic review of interventions to address self-stigma among people living with and affected by HIV. *BMJ Glob Health* 4:e001285
- Rael CT, Davis A (2017) Depression and key associated factors in female sex workers and women living with HIV/AIDS in the Dominican Republic. *Int J STD AIDS* 28:433–440. <https://doi.org/10.1177/0956462416651374>
- Rao D, Desmond M, Andrasik M, Rasberry T, Lambert N, Cohn SE, Simoni J (2012) Feasibility, acceptability, and preliminary efficacy of the unity workshop: an internalized stigma reduction intervention for African American women living with HIV. *AIDS Patient Care STDs* 26:614–620
- Rinehart R, Rao D, Amico RK et al (2019) Experienced HIV-related stigma and psychological distress in Peruvian sexual and gender minorities: a longitudinal study to explore mediating roles of internalized HIV-related stigma and coping styles. *AIDS Behav* 23:661–674
- Rueda S, Mitra S, Chen S et al (2016) Examining the associations between HIV-related stigma and health outcomes in people living with HIV/AIDS: a series of meta-analyses. *BMJ Open* 6:e011453
- Scorgie F, Nakato D, Harper E et al (2013) ‘We are despised in the hospitals’: sex workers’ experiences of accessing health care in four African countries. *Cult Health Sex* 15:450–465
- Shen H, Zou H, Huang S et al (2016) Depression and HIV risk behaviors among female sex workers in Guangdong, China: a multicenter cross-sectional study. *BioMed Res Int* 2016:6986173. <https://doi.org/10.1155/2016/6986173>
- Stangl AL, Lloyd JK, Brady LM, Holland CE, Baral S (2013) 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* 16:18734
- Swendeman D, Jana S, Ray P, Mindry D, Das M, Bhakta B (2015) Development and pilot testing of daily interactive voice response (IVR) calls to support antiretroviral adherence in India: a mixed-methods pilot study. *AIDS Behav* 19(Suppl 2):142–155. <https://doi.org/10.1007/s10461-014-0983-9>
- Takada S, Weiser SD, Kumbakumba E et al (2014) The dynamic relationship between social support and HIV-related stigma in rural Uganda. *Ann Behav Med* 48:26–37
- Turan B, Budhwani H, Fazeli PL, Browning WR, Raper JL, Mugavero MJ, Turan JM (2017a) How does stigma affect people living with HIV? The mediating roles of internalized and anticipated HIV stigma in the effects of perceived community stigma on health and psychosocial outcomes. *AIDS Behav* 21:283–291
- Turan B, Hatcher AM, Weiser SD, Johnson MO, Rice WS, Turan JM (2017b) Framing mechanisms linking HIV-related stigma, adherence to treatment, and health outcomes. *Am J Public Health* 107:863–869
- White D, Wilson KS, Masese LN et al (2016) Alcohol use and associations with biological markers and self-reported indicators of unprotected sex in human immunodeficiency virus-positive female sex workers in Mombasa, Kenya. *Sex Transm Dis* 43:642–647. <https://doi.org/10.1097/olq.0000000000000502>
- WHO (2017) Depression and other common mental disorders: global health estimates. World Health Organization, Geneva
- Yuen WW, Tran L, Wong CK, Holroyd E, Tang CS, Wong WC (2016) Psychological health and HIV transmission among female sex workers: a systematic review and meta-analysis. *AIDS Care* 28:816–824. <https://doi.org/10.1080/09540121.2016.1139038>