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Gender-based Violence and HIV Sexual Risk Behavior: Alcohol Use and Mental Health Problems as Mediators among Women in Drinking Venues, Cape Town

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Abstract

Gender-based violence is a key determinant of HIV infection among women in South Africa as elsewhere. However, research has not examined potential mediating processes to explain the link between experiencing abuse and engaging in HIV sexual risk behavior. Previous studies suggest that alcohol use and mental health problems may explain how gender-based violence predicts sexual risk. In a prospective study, we examined whether lifetime history of gender-based violence indirectly affects future sexual risk behavior through alcohol use, depression and post-traumatic stress disorder (PTSD) in a high-risk socio-environmental context. We recruited a cohort of 560 women from alcohol drinking venues in a Cape Town, South African township. Participants completed computerized interviews at baseline and 4 months later. We tested prospective mediating associations between gender-based violence, alcohol use, depression, PTSD, and sexual risk behavior. There was a significant indirect effect of gender-based violence on sexual risk behavior through alcohol use, but not mental health problems. Women who were physically and sexually abused drank more, which in turn predicted more unprotected sex. We did not find a mediated relationship between alcohol use and sexual risk behavior through the experience of recent abuse or mental health problems. Alcohol use explains the link between gender-based violence and sexual risk behavior among women attending drinking venues in Cape Town, South Africa. Efforts to reduce HIV risk in South Africa by addressing gender-based violence must also address alcohol use.

Keywords

South Africa; gender-based violence; HIV; HIV risk; sexual risk; alcohol use; mental health; mediation; women

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INTRODUCTION

More than any country in the world, South Africa has the highest number of people living with HIV/AIDS, with an estimated 5.6 million people in 2009. The HIV/AIDS epidemic in this country is primarily driven by heterosexual sex, and women comprise the majority of HIV infections (UNAIDS, 2009). Thus, it is important to examine the factors that drive heterosexual risk behavior among women in South Africa. Gender-based violence has long been recognized and continues to be a strong factor in determining women's HIV risk within sub-Saharan Africa and in South Africa in particular (Campbell, 2002; Dunkle et al., 2004; Dworkin & Ehrhardt, 2007; García-Moreno & Watts, 2000; Ghanotakis et al., 2009; Maman et al., 2000; UNAIDS, WHO, 2005). Intimate relationship violence directed at women is prospectively associated with HIV infection in women. For example, Jewkes and colleagues showed that among women in South Africa, those who were HIV negative at a baseline assessment were more likely to become HIV infected if they experienced violence from a male partner compared to women who did not experience such violence (Jewkes et al., 2010). Thus, research has confirmed a link between gender-based violence and HIV infection. Unfortunately, little is known about the conditions and mechanisms that may *explain* this relationship. That is, research has not examined mediating processes by which gender-based violence may be indirectly affecting sexual risk behavior and ultimately, HIV infection. Two potential mediating factors in explaining the relationship between intimate partner violence and HIV risk are alcohol use and mental health problems.

Violence, alcohol use, and mental health represent a co-occurring triad in relation to HIV risk (Meyer et al., 2011). Syndemic Theory has described how the co-occurrence of multiple risk factors (e.g., abuse, substance use, depression) compounds risk for HIV infection (Singer, 2009; Singer & Clair, 2003). The Substance Abuse, Violence, and AIDS (SAVA) model, derived from Syndemic Theory, explains how the simultaneous prevalence of these risk factors and epidemics interact and mutually reinforce one another (Singer, 1996). For example, research has shown how alcohol use is associated with mental health problems (Thornton et al., 2012). For example, drinking may be used as a coping behavior with the aim of reducing stress and negative emotions (Bizzarri et al., 2009; Currie et al., 2001; Gonzalez et al., 2008; Grant et al., 2009). In addition, individuals with alcohol problems are at an increased risk of depression (Fergusson et al., 2009) and PTSD symptoms, or an exacerbation of such symptoms (Kofoed et al., 1993). Further, both alcohol use and mental health problems are also associated with gender-based violence. Women who experience violence often engage in alcohol use. The WHO's multi-country study on women's health and domestic violence showed that across countries alcohol use was a robust correlate with experiences of violence (Abramsky et al., 2011). Further, violent victimization is associated with poor mental health. Women who experience violence from a male sex partner experience significant mental health problems, sometimes lasting for years after the incidents (Wang & Rowley, 2007). Data from large population-based surveys in countries around the world have shown that experiencing gender-based violence is associated with higher rates of mental disorders, including depression and post-traumatic stress disorder (PTSD) (Ludermir et al., 2008; Rees et al., 2011). Studies in South Africa have also provided evidence that support this relationship. One study by Sikkema and colleagues (2011) has shown that among heavy drinkers in Cape Town, South Africa, lifetime experiences of physical violence from a sex partner are associated with both a greater likelihood of depression and PTSD. However, limited research has examined how alcohol use, mental health problems, and violence may not only co-occur or be linked, but also how these three may be causally related through a single or multiple processes.

In addition to gender-based violence, drinking and poor mental health are each associated with sexual high risk behavior. In fact, alcohol use is among the most prevalent behaviors

associated with sexual risk for HIV (Kalichman et al., 2007; Morojele et al., 2006; Weinhardt & Carey, 2000). Consumption of alcohol increases risk via a number of mechanisms, including reducing social and sexual inhibitions, risk-related expectations, and the psychogenic effects of alcohol on decision-making (Cook & Clark, 2005). Research has also shown that poor mental health, including depression and PTSD, is associated with greater sexual risk behaviors. For example, among urban STI clinic patients, depressed individuals had more lifetime sex partners and were more likely to have sex while “high” on drugs or drunk on alcohol, even after controlling for substance use (Hutton et al., 2004). In addition, among men who have sex with men, research has shown that having PTSD symptoms was positively associated with engaging in unprotected anal sex (Reisner et al., 2009). Finally, among African American women, higher depression was associated with higher HIV risk behaviors, including unprotected sex and having sex with an injection drug user (Klein et al., 2008). In their study, Sikkema and colleagues (2011) showed that among female patrons of alcohol-serving venues, depression and PTSD were both positively associated with sexual risk behavior.

Altogether, gender-based violence, alcohol use, mental health problems, and sexual risk behavior are known to have significant associations with one another. In the current study, we aim to show a prospective mediating process of these relationships. We surveyed a cohort of women recruited from informal drinking venues in a Cape Town, South Africa Township at two time points. High rates of drinking are found in these venues, and they are places where individuals often meet sex partners (Kalichman et al., 2007; Morojele et al., 2006). Thus, these venues represent an intersection of women’s risk for relationship violence and HIV infection (Weir et al., 2003).

In an effort to better elucidate how gender-based violence, alcohol use and mental health problems each relate to HIV sexual risk behavior, we examined two alternate models. In the first model, we predicted that gender-based violence would be prospectively associated with sexual risk behavior through alcohol use and mental health problems. We therefore predicted that there is an indirect effect of gender-based violence on sexual risk that is mediated by alcohol use, depression, and PTSD. In this model, we examined alcohol use and mental health problems as simultaneous mediators, thereby allowing us to examine whether both independently predict sexual risk behavior. In the alternative model, we examined whether higher alcohol use prospectively predicts later higher sexual risk behavior, as mediated by recent experience with gender-based violence and mental health problems. To our knowledge, this is the first study to prospectively examine the mediating processes by which gender-based violence affects risk for HIV infection in a high HIV prevalence setting.

METHOD

Participants and Setting

Participants were a cohort of women attending shebeens in a peri-urban township in Cape Town, South Africa. The township is located within 20 kilometers of Cape Town’s central business district and consists of people of mixed race (i.e., Coloureds) and Black Africans. A relatively new township, the community was established in 1990 and is one of the first townships in South Africa to racially integrate. Large numbers of indigenous Black Africans started settling in and around the township during the 1990’s after government policies of racial segregation during Apartheid ended. The township sampled for this study, therefore, offers the opportunity to survey women of varying cultures residing within one South African community.

Venue Selection

Using an adaptation of the Priorities for Local AIDS Control Efforts (PLACE) community mapping methodology (Weir et al., 2002), we located and defined alcohol serving establishments in the township for the current study. Alcohol serving venues were systematically identified by approaching a total of 509 members of the community at public places such as bus stands and markets, and asking them to identify places where people go to drink alcohol. Venues were eligible if they had space for patrons to sit and drink, reported >50 unique patrons per week, had >10% female patrons, and were willing to have the research team visit periodically over the course of a year.

Cohort Recruitment

Women were recruited from the 12 study venues. Following a week of regular observations in the venues, during which time research staff gained familiarity with the setting and patrons, the staff invited female patrons in the venue to be part of a cohort study to examine drinking and sexual behavior over the course of one year. Informed consent was obtained from those interested in participating. Women were eligible to participate if they were (a) at least 18 years of age; (b) drank in the venue and (c) lived in the township. Screening was conducted by project enrollment staff located in a research field office established in the township. Women who did not meet study entry criteria were replaced by another woman until the sample quota (n=40) was met for each drinking venue. A total of 604 women were approached to participate and given an appointment card to come to the study office to provide informed consent and complete a baseline assessment. Almost all (560, 92.7%) came for the initial appointment and enrolled in the study.

Procedure

Women in the prospective cohort were assessed at two time points: baseline and four months later. Data collection took place from June 2009 through September 2011. Assessment measures were administered at a community-based research site located within a community center in the township using audio computer-assisted self-interview (ACASI) delivered in English, Xhosa, and Afrikaans, the three languages spoken by persons in the township. Research has shown that ACASI procedures yield reliable responses in sexual behavior interviews (Gribble et al., 1999; Turner et al., 1996). Participants were given a grocery store voucher (150ZAR, or approximately 20USD) at each time point in exchange of their participation. All study procedures were approved by the ethical review boards of Stellenbosch University, the University of Connecticut, and Duke University.

Measures

Measures were adapted from previous research conducted in South Africa. All of the measures were translated and back-translated to produce parallel forms in the three languages of administration.

Demographics—Participants were asked to report age, education, ethnicity, employment, marital status, having children, having electricity, having indoor tap water, and having a refrigerator.

Gender-based Violence—Women's experience of physical abuse was assessed using items from the widely used, valid, and reliable Revised Conflict Tactics Scale (Straus et al., 1996). Specifically, we asked participants to respond 'yes' or 'no' to whether they experienced the following from a sex partner: *"kicked, bit, or punched you," "beat you," "hit you with something,"* and *"used a knife or gun on you."*

Women's experience of sexual abuse was assessed using items adapted from the Koss et al. (1987) Sexual Experiences Scale. Specifically, to assess experiences of sexual coercion, we asked participants if a male sex partner had ever: "*used force to make you have sex,*" "*made you have anal sex when you did not want to,*" "*made you use drugs or get drunk just so they could force you to have sex,*" and "*forced you to have sex with multiple men on one occasion, that is, have you been gang raped.*" Participants responded 'yes' or 'no' to each item. This measure has been successfully adapted and used in previous research in South Africa (Kalichman & Simbayi, 2004).

At baseline, all relationship abuse items were framed to ask about lifetime history of abuse (i.e., with the item stem, "Has a sex partner ever...?"). At Time 2, items were framed for the previous 4 months to correspond with the follow-up assessment interval. We coded violence into at least one episode versus none. We used this dichotomous measure in our model testing (i.e., 0 = 0 episodes, 1 = 1 episodes).

Sexual Risk Behavior—We assessed our Time 2 outcome variable of sexual risk behavior as percent unprotected sex acts in the previous month. Participants used an open-response format to report the number of the following during the past month: times of unprotected vaginal sex (i.e., without condoms), protected vaginal sex, unprotected anal sex, and protected anal sex. We used this format and time-frame to provide optimal recall and to avoid anchored responses (Napper et al., 2010). We created the variable "percent unprotected sex acts" by dividing total number of condom unprotected vaginal and anal intercourse by total protected and unprotected vaginal and anal acts. For this variable, only women who reported sexual intercourse in the previous month were given a score.

Alcohol Use—To assess alcohol use, we used the Alcohol Use Disorder Identification Test (AUDIT; Saunders et al., 1993). This is a 10-item self-report instrument that includes quantity and frequency of alcohol use and was designed to identify individuals for whom the use of alcohol places them at risk for developing alcohol problems or who are experiencing alcohol related problems (Conigrave et al., 1995) and has been used in South Africa (Bekker & Van Velden, 2004). Items rated 0 to 4 were summed to create a continuous index of alcohol use used in our main analyses. For sample description purposes, we used the standard cut-off of 8 to identify those with alcohol problems (Saunders et al., 1993).

Mental Health—We assessed mental health as depressive and post-traumatic stress symptomatology. We assessed depression with the Center for Epidemiological Studies-Depression (CES-D) scale. This scale includes 20 items asking participants to report on depressive symptomatology (Radloff, 1977). Specifically, participants were asked "During the past week, including today, how often did you feel the following ways?" Example items include, "During the past week my sleep was restless;" and "During the past week I could not get going." Responses were measured on a 4-point Likert scale from 0= *0 days*, 1= *1–2 days*, 2= *3–4 days*, and 3= *5–7 days*. Items were summed to create an index of depressive symptoms. Participants were screened as positive for depression if their score was at or above 16. This cut-off score suggests symptoms of depression in the general population (Radloff, 1977) and has been used by researchers in South Africa (Nduna et al., 2010). In our analyses predicting sexual risk behavior, CES-D was entered as a continuous variable. The CES-D scale was internally consistent with $\alpha = .90$.

Post-traumatic stress symptomatology was measured using a 17-item screener used to identify symptoms in the past month (Weathers et al., 1993). Items asked whether the respondent had experienced difficulties related to a traumatic experience. An example item is, "In the past month, how much have you been bothered by repeated, disturbing memories, thoughts or images of a stressful experience?" Responses were measured on a 5-point Likert

scale with 0=*not at all*, 1=*a little bit*, 2=*moderately*, 3=*quite a bit*, and 4=*extremely*. Consistent with epidemiological evidence, civilian participants who scored at least 30 on the sum of the items were considered to have a positive screen for PTSD (Weathers et al., 1993). In our analyses predicting sexual risk behavior, PTSD was entered as a continuous variable. The PTSD scale was internally consistent with $\alpha = .95$.

Analysis Plan

Data were analyzed in three stages. First, we examined sociodemographic characteristics of the women in the cohort, as well as their alcohol use, mental health, and experiences of gender-based violence. Second, we tested our prediction that gender-based violence (i.e., 0 episodes vs. 1 episodes) would be associated with alcohol use, mental health problems (depression and PTSD), and sexual risk behavior.

Finally, we tested our primary hypotheses by conducting tests of mediation. That is, we followed steps to examine the relationship between the initial variable and the mediators, between the mediators and the outcome variable, then tested the indirect effect (Kenny et al., 1998). We conducted model tests using structural equation modeling in Amos (Version 19). We tested a model in which lifetime history of gender-based violence (measured at Time 1) predicts sexual risk behavior at Time 2 (i.e., percent unprotected sex in the previous month) through the proposed mediators alcohol use (measured proximal to sexual behavior at Time 2), CES-D (measured at Time 1), and PTSD symptoms (measured at Time 1) (Figure 1). Since the CES-D scale assessed symptoms in the past week and PTSD assessed symptoms on the past month, we used baseline assessments in our model testing to avoid temporal overlap with our Time 2 outcome variable sexual risk behavior (i.e., percent unprotected sex acts in the previous month). The advantage of this multiple mediator analysis is that all three proposed mediators are accounted for together in the model. Therefore, we can determine whether the mediation is independent of the effect of the other proposed mediators. To test for a significant indirect effect of gender-based violence on sexual risk through the proposed mediators, we used the bootstrapping technique (Bollen & Stine, 1990; Shrout & Bolger, 2002). This is a nonparametric method of computing a sampling distribution by re-sampling with replacement over many trials. We bootstrapped 2,000 samples with a bias-corrected 95% confidence interval. In order to conduct bootstrapping there must be no missing data. Therefore, we imputed missing values using regression imputation to attempt to replicate the covariance matrix yielded with all variables in the model correlated. Because our aim was to assess a significant indirect effect of gender-based violence on sexual risk behavior, we did not assess model fit. Instead, of importance was the magnitude of the indirect effect and significance testing of the indirect effect. We also examined an alternative model to better understand the prospective associations between gender-based violence, alcohol use, and sexual risk behavior.

RESULTS

Description of the sample

A total of 560 women completed measures at Time 1. Follow-up rate at Time 2 was 96% (n=539). Comparisons of the women who completed both assessments (n=539) with the women who were lost to follow-up (n=21) showed that the two groups were generally similar (Table 1). However, women who completed both assessments were significantly older and there was a trend for them to be more likely to be Coloured than Black compared to the women who were lost to follow-up. There were no differences between the two groups in their alcohol use, mental health (i.e., CES-D and PTSD) and sexual risk behavior (i.e., percent unprotected sex acts in the previous month) at baseline.

Table 1 displays sociodemographic characteristics of the sample measured at Time 1. The mean age was 34 years old ($SD=11.6$). The majority of the cohort was Coloured, unmarried, unemployed, and had electricity, running water, and a refrigerator in the home. As expected, the women in our cohort reported heavy drinking (see Table 1). A total of 37.9% of the women reported frequent drinking (at least 2 days a week). When they did drink, 45.7% of the women reported consuming at least 5 drinks at a time. Binge drinking (i.e., consuming 6 or more alcoholic drinks in one episode) was also common, with 37.7% of the women reporting binge drinking at least weekly. Mental health among our sample was poor. A majority of the sample (71.3%) screened positive for depression. In addition, 24% of the women screened positive for PTSD.

Table 2 displays the frequency of types of abuse experienced by the women in our sample during their lifetime. The most common type of physical abuse was being beaten (41.3%), followed by being kicked, bit, or punched by a sex partner. A sex partner using a knife or gun was the least commonly reported type of physical abuse (8.9%). Sexual abuse was less common than physical abuse. The most common type of sexual abuse was a partner using force to have sex (18.4%), followed by a partner using force to have anal sex (8.2%). Gang rape was a relatively rare reported occurrence (3.4%).

Overall, gender-based violence was a widely shared experience among the majority of the women in our cohort. A total of 315 women (56.3%) reported experiencing at least one episode of gender-based violence in their lifetime at Time 1. At Time 2 (i.e., 4 months later), 38.4% ($n=215$) of the women who completed both assessments reported experiencing at least one episode of violence in the previous 4 months (i.e., recent gender-based violence). We compared the women who experienced no gender-based violence in their lifetime to the women who experienced at least one episode of violence. We found that the two groups did not differ in their sociodemographic characteristics except that women who experienced gender-based violence were less likely to have a refrigerator in the home (Table 3). We accounted for this difference in our analyses since lacking this type of basic necessity is often indicative of daily stressors and lower socioeconomic status.

Prospective associations

We conducted tests to examine whether gender-based violence is prospectively associated with alcohol use, mental health problems (depression and PTSD) and sexual risk behavior. Results are presented in Table 4. As predicted, higher amounts of alcohol use, CES-D, PTSD, and sexual risk behavior were all significantly associated with a greater likelihood of experiencing gender-based violence during the lifetime. Gender-based violence was associated with Time 1 sexual risk behavior. We therefore controlled for both home refrigerator and Time 1 sexual risk behavior in our model testing.

Model Testing

We tested models predicting Time 2 sexual risk behavior. At Time 2, participants reported having an average of 2.48 ($SD=4.90$) unprotected vaginal sex acts, and an average of 0.66 ($SD=2.24$) unprotected anal sex acts in the previous month. We hypothesized that lifetime history of gender-based violence would be prospectively predictive of higher sexual risk behavior as a function of higher alcohol use and poor mental health. We tested our predictions by estimating the model displayed in Figure 1. Importantly, we included having a refrigerator in the home (entered as a dichotomous predictor, yes or no) and sexual risk behavior measured at Time 1 (percent unprotected sex in the previous month) as covariates in the model by specifying their correlation with gender-based violence and estimating each of their direct effects on the Time 2 sexual risk behavior outcome in the model (not displayed). Results supported our prediction that there is an indirect effect of gender-based

violence on sexual risk behavior through alcohol use. However, the effect was not mediated by mental health variables. Standardized path estimates of the model are shown in Figure 1. Both having a refrigerator in the home and Time 1 sexual risk behavior predicted Time 2 sexual risk behavior. Women who did have a refrigerator in the home reported more unprotected sex than women who did not ($\beta = .06, p < .10$) and those who reported higher percent unprotected intercourse at Time 1 also did so at Time 2 ($\beta = .64, p < .001$). After accounting for these effects, we found that lifetime history of gender-based violence significantly predicted the proposed mediators alcohol use ($\beta = .22, p < .001$), CES-D ($\beta = .28, p < .001$), and PTSD symptoms ($\beta = .27, p < .001$). Specifically, ever experiencing gender-based violence was predictive of more alcohol use, more depressive symptoms, and more symptoms of post-traumatic stress. We also found that alcohol use ($\beta = .15, p < .001$) significantly predicted percent unprotected sex. CES-D ($\beta = .004, p = .91$) and PTSD ($\beta = .01, p = .70$) did not predict sexual risk behavior. Thus, with both simultaneously accounted for, higher alcohol use, but not mental health problems, was prospectively associated with more unprotected sex. With all three variables accounted for gender-based violence did not significantly predict percent unprotected sex ($\beta = .03, p = .40$).

Bootstrapping results showed that there was a significant indirect effect (*Estimate* = .02, *SE* = .008), with a 95% confidence interval that did not contain zero (.009 to .041, $p = .002$). Therefore, we can conclude that the magnitude of the indirect effect of gender-based violence on sexual risk is significantly different from zero. We computed the magnitude of the indirect effect through each proposed mediator using separate Sobel tests (Sobel, 1982). Consistent with our model testing, results showed that there was a significant indirect effect through alcohol use ($Z = 2.90, p < .01$), but not CES-D ($Z = .99, p = .32$) or PTSD ($Z = .36, p = .72$). We also computed the proportion of the total effect (i.e., the sum of the direct effect of gender-based violence and the indirect effects through the mediators) explained by the mediators (1-direct effect/total effect). Results showed that 55.85% of the total effect of gender-based violence on sexual risk behavior was mediated. Finally, the squared multiple correlation for percent unprotected intercourse for this model was .436. Thus, the model explained 43.6% of the variance in percent unprotected sex in our sample.

Alternative Model

An important question is not only whether gender-based violence predicts sexual risk through alcohol use and mental health problems, but also whether alcohol use may predict sexual risk through gender-based violence and mental health problems. That is, to determine whether in the present study women who drank more were also more likely to experience gender-based violence and experience higher depression and PTSD symptoms, which in turn could predict higher sexual risk behavior. To examine this, we tested a model in which lifetime history of gender-based violence predicted Time 2 sexual risk behavior through alcohol use (same as our original model), but did not include depression or PTSD as potential mediators here in this alternative model since they were not significant mediators in our original model. We also tested paths whereby Time 1 alcohol use directly predicts the outcome percent unprotected sex (a direct effect of alcohol on sexual risk) and indirectly predicts sexual risk through recent gender-based violence (i.e., experienced in the previous four months; measured at Time 2), and Time 2 depression and PTSD symptoms. Again, we controlled for having a refrigerator and Time 1 sexual risk behavior.

The results from this model are displayed in Figure 2. Consistent with our previous model, gender-based violence predicted more alcohol use, which in turn predicted higher sexual risk behavior, and again this indirect effect was significant (*Estimate* = .04, *SE* = .01, 95% CI: .02 to .06, $p < .001$). Results also showed that alcohol use at Time 1 significantly predicts a greater likelihood of experiencing recent gender-based violence ($\beta = .01, p < .05$), higher depression ($\beta = .85, p < .001$), and PTSD symptoms ($\beta = .06, p < .001$). Interestingly, alcohol

use at Time 1 predicted *lower* percent unprotected sex ($\beta = -.01, p < .001$). This result is in contrast to the result from the first model that showed that Time 2 alcohol use predicted higher sexual risk behavior. These different results may suggest that more temporally proximal higher alcohol use is associated positively with unprotected sex, whereas less proximal alcohol use is not. In addition, recent gender-based violence predicted less sexual risk behavior ($\beta = -.08, p < .01$), and higher PTSD symptoms predicted more sexual risk behavior ($\beta = .03, p < .05$). Depression was not related to sexual risk behavior ($\beta = 0, p = .94$). However, there was not an indirect effect of alcohol use on sexual risk behavior through the three variables recent gender-based violence, depression, and PTSD ($Estimate = 0.001, SE = .001, 95\% CI: -.001 \text{ to } .003, p = .23$). These results suggest that experience of gender-based violence and mental health problems do not explain the relationship between alcohol use and sexual risk behavior.

DISCUSSION

The current study examined prospective mediating associations between gender-based violence, alcohol use, mental health problems, and sexual risk behavior among women from informal drinking venues in Cape Town, South Africa. We found that alcohol use is a link between gender-based violence and sexual risk, but gender-based violence does not mediate the link between alcohol use and sexual risk for the women in our study. In other words, experiencing gender-based violence is predictive of higher sexual risk behavior that is explained by more alcohol use. However, gender-based violence does not explain the link between alcohol use and sexual risk behavior. To our knowledge, this is the first study of its kind to show the mediating link between experiencing violence and sexual risk behavior among women.

Many of the women in our study experienced serious difficult life circumstances. Gender-based violence was not an uncommon experience among the women in our sample. Indeed, more than half of the women experienced at least one episode of physical or sexual abuse. Not surprisingly then, mental health was quite poor in this sample, with the majority of the women experiencing symptoms of depression. Individuals who have severe depressive symptoms may have little interest in sexual behavior (Garvey, 1985; Mathew & Weinman, 1982). This may explain why we did not find mental health problems to prospectively predict sexual risk behavior in our study. The lack of association may also be explained by the fact that alcohol use was also accounted for in the model. This points to the importance of simultaneously examining alcohol use and mental health problems when studying HIV risk. Alcohol may be used to cope with stress and negative emotions. Therefore, the relationship between alcohol use and mental health problems should be accounted for in research examining their associations with sexual risk behavior.

The association between alcohol use and gender-based violence is complex and the direction of the relationship is not very well understood. For instance, women who drink may have sex partners who also drink, which has been shown by previous research to relate to an increased likelihood of violence (Seedat et al., 2009). Other research suggests that women who are abused may be more likely to drink than non-abused women, suggesting that women who experience gender-based violence may use alcohol to cope with abuse. Both patterns suggest that the relationship between alcohol use and gender-based violence is bidirectional; abuse may lead women to drink, and drinking may contribute to women being abused. Results from the current study provide support for this bidirectional relationship. Reporting drinking at baseline predicted gender-based violence experienced in four months, and women who experienced lifetime gender-based violence reported drinking more than women who did not experience such violence. It was alcohol use, in turn, that explained

sexual risk behavior. However, gender-based violence did not explain the link between alcohol use and sexual risk behavior.

The limitations of the current study should be considered when interpreting the findings. Given the potentially sensitive or stigmatizing questions that were included in the survey, self-report responses could have had the potential to be biased by social desirability. The participant incentive of 150 Rand may have increased women's chances of reporting that they qualified for the study, when they did not actually qualify (particularly with regards to whether they lived in the township). Our measure of gender-based violence was categorical (e.g., ever experiencing violence or not), and thus cannot speak to how varying and repeated experiences with violence relate to the outcomes of interest. Future research should examine the potential complexities of the relationships between repeated and different forms violence with substance use and mental health. Our measure also did not assess psychological or emotional abuse. While we did have an item that asked about whether a partner ever swore at the participant, we had concerns that this item would not fully capture psychological abuse. However, we re-tested the two models including this item and it did not change any of the patterns of results. Finally, our non-random sample consisted of South African women from informal drinking venues in a single township in Cape Town. Whereas this sample was suitable for the current study's aims, we have no knowledge about whether the findings are generalizable to the larger population. Thus, future research should examine whether alcohol use mediates the relationship between gender-based violence and sexual risk behavior using other samples and in other socioenvironmental settings. Lastly, in order to fully understand the relational phenomenon of gender-based violence, future research should examine not only characteristics of the women, but also of their male partners (e.g., type of partner, length of relationship, his HIV status).

The link between gender-based violence and sexual risk behavior was explained by alcohol use in the current study. To our knowledge, this mediating process has not yet been shown in the literature. Furthermore, whereas Time 2 alcohol use predicted higher sexual risk behavior, Time 1 alcohol use predicted lower sexual risk behavior. This discrepant finding may have different implications regarding alcohol-focused interventions for women, and suggests that behavior change efforts should target alcohol use that takes place closer in time to sexual risk behavior. Future research should closely examine this nuanced relationship. Although the results should be considered in light of the current sample and setting, they have important implications for HIV prevention. Gender-based violence must be urgently addressed in HIV prevention, but addressing it alone may not impact risks for HIV infection, in and of itself. Instead, HIV prevention that takes into account gender-based violence must also directly address alcohol use. Some example strategies proposed by the World Health Organization include increasing the price of alcohol, reducing availability, and increasing restrictions on alcohol marketing (WHO, 2010). Reducing alcohol consumption among abused women is vital to ultimately reducing sexual risk behavior.

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References

- Abramsky T, Watts CH, Garcia-Moreno C, Devries K, Kiss L, Ellsberg M, Jansen HA, et al. What factors are associated with recent intimate partner violence? findings from the WHO multi-country study on women's health and domestic violence. *BMC Public Health*. 2011; 11:109. [PubMed: 21324186]

- Bekker D, Van Velden D. Alcohol misuse in patients attending a defence force general medical clinic. *South African Family Practice*. 2004; 45(2):10–15.
- Bizzarri JV, Rucci P, Sbrana A, Miniati M, Raimondi F, Ravani L, Massei GJ, et al. Substance use in severe mental illness: self-medication and vulnerability factors. *Psychiatry research*. 2009; 165(1–2):88–95. [PubMed: 19054572]
- Bollen KA, Stine R. Direct and indirect effects: Classical and bootstrap estimates of variability. *Sociological methodology*. 1990; 20(1):15–140.
- Campbell JC. Health consequences of intimate partner violence. *Lancet*. 2002; 359(9314):1331–1336. [PubMed: 11965295]
- Conigrave KM, Hall WD, Saunders JB. The AUDIT questionnaire: Choosing a cut-off score. *Addiction*. 1995; 90(10):1349–1356. [PubMed: 8616463]
- Cook RL, Clark DB. Is there an association between alcohol consumption and sexually transmitted diseases? A systematic review. *Sexually Transmitted Diseases*. 2005; 32(3):156–164. [PubMed: 15729152]
- Currie SR, Hodgins DC, el-Guebaly N, Campbell W. Influence of depression and gender on smoking expectancies and temptations in alcoholics in early recovery. *Journal of substance abuse*. 2001; 13(4):443–458. [PubMed: 11775075]
- Dunkle KL, Jewkes RK, Brown HC, Gray GE, McIntyre JA, Harlow SD. Gender-based violence, relationship power, and risk of HIV infection in women attending antenatal clinics in South Africa. *Lancet*. 2004; 363(9419):1415–1421. [PubMed: 15121402]
- Dworkin SL, Ehrhardt AA. Going beyond “ABC” to include “GEM”: Critical reflections on progress in the HIV/AIDS epidemic. *American Journal of Public Health*. 2007; 97(1):13–18. [PubMed: 17138923]
- Fergusson DM, Boden JM, Horwood LJ. Tests of causal links between alcohol abuse or dependence and major depression. *Archives of General Psychiatry*. 2009; 66(3):260–266. [PubMed: 19255375]
- García-Moreno C, Watts C. Violence against women: Its importance for HIV/AIDS. *AIDS (London, England)*. 2000; 14(Suppl 3):S253–S265.
- Garvey MJ. Decreased libido in depression. *Medical Aspects of Human Sexuality*. 1985
- Ghanotakis E, Mayhew S, Watts C. Tackling HIV and gender-based violence in South Africa: how has PEPFAR responded and what are the implications for implementing organizations? *Health Policy and Planning*. 2009; 24(5):357–366. [PubMed: 19505995]
- Gonzalez A, Zvolensky MJ, Vujanovic AA, Leyro TM, Marshall EC. An evaluation of anxiety sensitivity, emotional dysregulation, and negative affectivity among daily cigarette smokers: Relation to smoking motives and barriers to quitting. *Journal of psychiatric research*. 2008; 43(2):138–147. [PubMed: 18417153]
- Grant VV, Stewart SH, Mohr CD. Coping-anxiety and coping-depression motives predict different daily mood-drinking relationships. *Psychology of addictive behaviors: journal of the Society of Psychologists in Addictive Behaviors*. 2009; 23(2):226–237. [PubMed: 19586139]
- Gribble JN, Miller HG, Rogers SM, Turner CF. Interview mode and measurement of sexual behaviors: Methodological issues. *The Journal of Sex Research*. 1999:16–24.
- Hutton HE, Lyketos CG, Zenilman JM, Thompson RE, Erbeling EJ. Depression and HIV risk behaviors among patients in a sexually transmitted disease clinic. *The American Journal of Psychiatry*. 2004; 161(5):912–914. [PubMed: 15121659]
- Jewkes RK, Dunkle K, Nduna M, Shai N. Intimate partner violence, relationship power inequity, and incidence of HIV infection in young women in South Africa: A cohort study. *Lancet*. 2010; 376(9734):41–48. [PubMed: 20557928]
- Kalichman SC, Simbayi LC. Sexual assault history and risks for sexually transmitted infections among women in an African township in Cape Town, South Africa. *AIDS Care*. 2004; 16:681–689. [PubMed: 15370057]
- Kalichman, Seth C, Simbayi LC, Kaufman M, Cain D, Jooste S. Alcohol use and sexual risks for HIV/AIDS in sub-Saharan Africa: Systematic review of empirical findings. *Prevention Science: The Official Journal of the Society for Prevention Research*. 2007; 8(2):141–151. [PubMed: 17265194]

- Kenny DA, Kashy DA, Bolger N. Data analysis in social psychology. *The handbook of social psychology*. 1998; 1:233–265.
- Klein H, Elifson KW, Sterk CE. Depression and HIV risk behavior practices among at risk women. *Women & Health*. 2008; 48(2):167–188.
- Kofoed L, Friedman MJ, Peck R. Alcoholism and drug abuse in patients with PTSD. *The Psychiatric Quarterly*. 1993; 64(2):151–171. [PubMed: 8391146]
- Koss MP, Gidycz CA, Wisniewski N. The scope of rape: Incidence and prevalence of sexual aggression and victimization in a national sample of higher education students. *Journal of Consulting and Clinical Psychology*. 1987; 55(2):162. [PubMed: 3494755]
- Ludermir AB, Schraiber LB, D'Oliveira AFPL, França-Junior I, Jansen HA. Violence against women by their intimate partner and common mental disorders. *Social Science & Medicine*. 2008; 66(4):1008–1018. [PubMed: 18178299]
- Maman S, Campbell J, Sweat MD, Gielen AC. The intersections of HIV and violence: directions for future research and interventions. *Social Science & Medicine*. 2000; 50(4):459–478. [PubMed: 10641800]
- Mathew RJ, Weinman ML. Sexual dysfunctions in depression. *Archives of Sexual Behavior*. 1982; 11(4):323–328. [PubMed: 7149967]
- Meyer JP, Springer SA, Altice FL. Substance abuse, violence, and HIV in women: a literature review of the syndemic. *Journal of Women's Health (2002)*. 2011; 20(7):991–1006.
- Morojele NK, Kachieng'a MA, Mokoko E, Nkoko MA, Parry CDH, Nkowane AM, Moshia KM, et al. Alcohol use and sexual behaviour among risky drinkers and bar and shebeen patrons in Gauteng province, South Africa. *Social Science & Medicine*. 2006; 62(1):217–227. [PubMed: 16054281]
- Napper LE, Fisher DG, Reynolds GL, Johnson ME. HIV Risk Behavior Self- Report Reliability at Different Recall Periods. *AIDS and Behavior*. 2010; 14(1):152–161. [PubMed: 19475504]
- Nduna M, Jewkes RK, Dunkle KL, Shai NPJ, Colman I. Associations between depressive symptoms, sexual behaviour and relationship characteristics: A prospective cohort study of young women and men in the Eastern Cape, South Africa. *Journal of the International AIDS Society*. 2010; 13(1):1–8. [PubMed: 20205768]
- Radloff LS. The CES-D Scale: A self report depression scale for research in the general. *Applied psychological measurement*. 1977; 1(3):385–401.
- Rees S, Silove D, Chey T, Ivancic L, Steel Z, Creamer M, Teesson M, et al. Lifetime prevalence of gender-based violence in women and the relationship with mental disorders and psychosocial function. *JAMA: The Journal of the American Medical Association*. 2011; 306(5):513–521. [PubMed: 21813429]
- Reisner SL, Mimiaga MJ, Safren SA, Mayer KH. Stressful or traumatic life events, post-traumatic stress disorder (PTSD) symptoms, and HIV sexual risk taking among men who have sex with men. *AIDS Care*. 2009; 21(12):1481–1489. [PubMed: 20024727]
- Saunders JB, Aasland OG, Babor TF, de la Fuente JR, Grant M. Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO Collaborative Project on Early Detection of Persons with Harmful Alcohol Consumption- II. *Addiction (Abingdon, England)*. 1993; 88(6):791–804.
- Seedat M, Van Niekerk A, Jewkes R, Suffla S, Ratele K. Violence and injuries in South Africa: Prioritising an agenda for prevention. *Lancet*. 2009; 374(9694):1011–1022. [PubMed: 19709732]
- Shrout PE, Bolger N. Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological methods*. 2002; 7(4):422. [PubMed: 12530702]
- Sikkema KJ, Watt MH, Meade CS, Ranby KW, Kalichman SC, Skinner D, Pieterse D. Mental health and HIV sexual risk behavior among patrons of alcohol serving venues in Cape Town, South Africa. *Journal of Acquired Immune Deficiency Syndromes*. 2011; 57(3):230–237. [PubMed: 21372724]
- Singer M. A Dose of Drugs, A Touch of Violence, A Case of AIDS: Conceptualizing the Sara Syndemic. *Free Inquiry in Creative Sociology*. 1996; 24:99–110.
- Singer, M. Introduction to syndemics: a critical systems approach to public and community health. Jossey-Bass Inc Pub.; 2009.
- Singer M, Clair S. Syndemics and Public Health: Reconceptualizing Disease in Bio- Social Context. *Medical Anthropology Quarterly*. 2003; 17(4):423–441. [PubMed: 14716917]

- Sobel ME. Asymptotic confidence intervals for indirect effects in structural equation models. *Sociological methodology*. 1982; 13:290–312.
- Straus MA, Hamby SL, Boney-McCoy S, Sugarman DB. The revised conflict tactics scales (CTS2). *Journal of family issues*. 1996; 17(3):283.
- Thornton LK, Baker AL, Lewin TJ, Kay-Lambkin FJ, Kavanagh D, Richmond R, Kelly B, et al. Reasons for substance use among people with mental disorders. *Addictive Behaviors*. 2012; 37(4): 427–434. [PubMed: 22197045]
- Turner CF, Ku L, Sonenstein FL, Pleck JH. Impact of ACASI on reporting of male-male sexual contacts: Preliminary results from the 1995 National Survey of Adolescent Males. Library of Congress Cataloging-in-Publication Data. 1996:171.
- UNAIDS. UNAIDS report on the global AIDS epidemic 2010 (p. 364). 2009. Retrieved from http://www.unaids.org/globalreport/Global_report.htm.
- UNAIDS, WHO. AIDS epidemic update 2005. 2005 Retrieved from http://www.unaids.org/epi/2005/doc/report_pdf.asp.
- Wang, SK.; Rowley, E. Rape: how men, the community and the health sector respond. Geneva: Sexual Violence Research Initiative and World Health Organization; 2007. Retrieved from <http://www.svri.org/rape.pdf>.
- Weathers, FW.; Litz, BT.; Herman, DS.; Huska, JA.; Keane, TM., et al. annual meeting of the International Society for Traumatic Stress Studies. San Antonio, TX: 1993. The PTSD Checklist (PCL): Reliability, validity, and diagnostic utility.
- Weinhardt LS, Carey MP. Does alcohol lead to sexual risk behavior? Findings from event-level research. *Annual Review of Sex Research*. 2000; 11:125–157.
- Weir SS, Morroni C, Coetzee N, Spencer J, Boerma JT. A pilot study of a rapid assessment method to identify places for AIDS prevention in Cape Town, South Africa. *Sexually Transmitted Infections*. 2002; 78(Suppl 1):i106–i113. [PubMed: 12083428]
- Weir, Sharon S.; Pailman, C.; Mahlalela, X.; Coetzee, N.; Meidany, F.; Boerma, JT. From people to places: Focusing AIDS prevention efforts where it matters most. *AIDS (London, England)*. 2003; 17(6):895–903.
- WHO. Call for action to reduce the harmful use of alcohol. (n.d.). WHO. Retrieved April 19, 2012, from http://www.who.int/mediacentre/news/releases/2010/alcohol_20100521/en/index.html.

- Women from drinking venues in a Cape Town township engaged in higher sexual risk behavior if they were abused by men.
- There was a significant indirect effect of gender-based violence on sexual risk behavior through alcohol use, but not mental health problems.
- There was no mediated relationship between alcohol use and sexual risk behavior through the experience of recent abuse or mental health problems.

Figure 1.

Mediation model of gender-based violence predicting sexual risk behavior through alcohol use, CES-D, and PTSD.

Note: $^{***}p < .001$; Indirect Effect = .02, 95% CI: .009 to .041, $p < .01$; Not displayed in this model are refrigerator in the home (Yes/No) and Time 1 % unprotected sex acts in the past month that were entered as control variables each directly predicting the outcome.

Figure 2.

Alternative model where alcohol use also predicts sexual risk behavior through gender-based violence.

Note: *** $p < .001$; ** $p < .01$; * $p < .05$; Indirect effect of lifetime gender-based violence on % unprotected sex = .04, 95% CI: .02 to .06, $p < .001$; Indirect effect of alcohol use on % unprotected sex = 0. Not displayed in this model are refrigerator in the home (Yes/No) and Time 1 % unprotected sex acts in the past month that were entered as control variables each directly predicting the outcome.

Table 1

Sociodemographic and behavioral characteristics of women who were followed up and lost to follow-up at baseline.

Characteristics	Followed up (n=539)		Lost to follow-up (n=21)		χ^2
	n	%	n	%	
Race					
Black	193	36.6	11	57.9	3.57 [†]
Coloured	335	63.4	8	42.1	
Married	146	27.1	5	23.8	0.11
Employed	137	25.5	8	38.1	1.68
Children	437	81.1	15	71.4	1.21
Pregnant	31	5.8	2	9.5	0.52
Electricity	522	96.8	20	95.2	0.17
Tap Water	482	89.4	20	95.2	0.74
Refrigerator	435	80.7	14	66.7	2.51
Gender-based					
Violence					
0 or 1	270	50.1	11	52.4	0.04
> 1	269	49.9	10	47.6	
	M	SD	M	SD	t
Age (yr)	34.11	11.67	28.81	9.96	-2.37 [*]
Education (yr)	5.32	2.19	5.86	1.56	1.51
Alcohol Use (AUDIT sum)	12.37	7.15	15.78	7.50	1.40
Depression (CES-D sum)	23.21	12.30	23.14	10.32	-.02
PTSD (Mean)	1.13	.96	1.20	.99	.31
% Unprotected Sex Acts	51.9	41.1	38.8	36.0	-1.33

Notes.

[†] $p < .10$;

*
 $p < .05$,

Education: 1=Grade 7 or less, 2=Grade 8-11, 3=Grade 12, 4=Beyond Grade 12

Table 2

Cohort sociodemographic characteristics and frequency of lifetime history of physical and sexual abuse, alcohol use, and mental health problems at baseline (n=560).

	N	%
<i>Sociodemographics</i>		
Age	Mean = 33.9	SD = 11.6
Education: Standard 7 or Grade 9	188	33.6
Race		
Coloured	343	61.3
Black	204	36.4
White	11	2.0
Indian	2	<1.0
Employed	145	25.9
Married	151	27.0
Electricity	542	96.8
Tap Water	502	89.6
<i>Physical Abuse</i>		
Partner kicked, bit, or punched	218	38.9
Partner beat	231	41.3
Partner hit with something	158	29.2
Partner used a knife or gun	50	8.9
<i>Sexual Abuse</i>		
Partner used force	103	18.4
Partner forced anal sex	46	8.2
Partner used drugs or alcohol	47	8.4
Partner forced sex with multiple men on one occasion (i.e., gang rape)	19	3.4
<i>Alcohol Use</i>		
Frequency: 2 days/week	212	37.9
Quantity: 5 drinks/drinking episode	256	45.7
Binge Drinking: once a week	211	37.7
Alcohol problems (AUDIT cut-off > 8)	397	70.9
<i>Mental Health</i>		
Screened positive for depression (cut-off = 16)	399	71.3
Screened positive for PTSD (cut-off = 30)	132	23.6

Table 3

Sociodemographics by lifetime history of gender-based violence.

Characteristics	Lifetime History of Gender-based Violence				95% CI		
	No (n=245)		Yes (n=315)				
	M	SD	M	SD	OR	Lower	Upper
Age	34.59	12.14	33.38	11.24	0.99	0.98	1.01
Education	5.33	2.23	5.35	2.14	1.00	0.93	1.08
	n	%	n	%			
Race							
Black	97	39.6	107	34.0	1.30	0.92	1.84
Coloured	141	57.6	202	64.1			
Married	74	30.2	77	24.4	0.75	0.51	1.09
Employed	62	25.3	83	26.3	1.05	0.72	1.54
Children	197	80.4	255	81.0	1.04	0.68	1.58
Pregnant	12	4.9	21	6.7	1.39	0.67	2.88
Electricity	237	96.7	305	96.8	1.03	0.40	2.65
Tap Water	220	89.8	282	89.5	0.97	0.56	1.68
Refrigerator	206	84.1	243	77.1	0.64*	0.42	0.98

*Notes.** $p < .05$,

Education: 1=Grade 7 or less, 2=Grade 8–11, 3=Grade 12, 4=Beyond Grade 12

Table 4

Intercorrelations among model variables by time of assessment.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Baseline	1									
1. Lifetime History of GBV										
2. Alcohol Use	.21	***	1							
3. Depression	.28	***	.35	***	1					
4. PTSD	.27	***	.38	***	.67	***	1			
5. % Unprotected Sex Acts in the Past Month	.11	***	.11	*	.18	***	.16	**	1	
4 Months										
6. Recent GBV in Past 4 Months	.13	***	.08	.09	-.04	1				
7. Alcohol Use	.21	***	.65	***	.24	***	.09	†	.09	1
8. Depression	.30	***	.33	***	.68	***	.54	***	.12	*
9. PTSD	.29	***	.31	***	.61	***	.61	***	.10	*
10. % Unprotected Sex Acts in the Past Month	.09	†	.10	†	.17	**	.16	**	.55	***
									-.04	.16
									.10	†
									.66	***
									.13	*
									.13	*

Notes.

† $p < .10$,* $p < .05$,** $p < .01$,*** $p < .001$