

Prospective Study of the Mental Health Consequences of Sexual Violence Among Women Living With HIV in Rural Uganda

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Abstract

The association between sexual violence and depression is well known, but the temporal aspects of the association have not been well established. We analyzed data from a cohort of 173 HIV-positive women in rural Uganda who were interviewed every 3 months for a median of 1.8 years of follow-up. The method of generalized estimating equations (GEE) was used to model the marginal expectation of depression symptom severity (Hopkins Symptom Checklist for Depression), mental health–related quality of life (MOS-HIV Mental Health Summary), and heavy drinking (Alcohol Use Disorders Identification Test) as a function of self-reported forced-sex victimization in the 3 months prior to interview. Estimates were adjusted

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for variables known to confound the association between victimization and mental health status. To assess any potential reciprocal relationships, we reversed the temporal ordering of the exposures and outcomes and refitted similar GEE models. In multivariable analyses, victimization was associated with greater depression symptom severity ($b = 0.17$; 95% CI = [0.02, 0.33]) and lower mental health–related quality of life ($b = -5.65$; 95% CI = [-9.34, -1.96]), as well as increased risks for probable depression (adjusted relative risk [ARR] = 1.58; 95% CI = [1.01, 2.49] and heavy drinking (ARR = 3.99; 95% CI = [1.84, 8.63]). We did not find strong evidence of a reciprocal relationship. Our findings suggest that forced sex is associated with adverse mental health outcomes among HIV-positive women in rural Uganda. Given the substantial mental health–related impacts of victimization, effective health sector responses are needed.

Keywords

HIV, domestic violence, rape, Uganda, depressive disorder

Introduction

Violence against women is common worldwide (Abrahams et al., 2014; Devries, Mak, Garcia-Moreno, et al., 2013), and gender-inequitable norms about violence against women are widely held (Babalola, 2014; Lawoko, 2008; Tavrow, Withers, Obbuyi, Omollo, & Wu, 2013). It is well known that stressful life events are among the strongest predictors of liability to major depressive disorder (Kendler, Karkowski, & Prescott, 1999). Consistent with this literature, there have been many cross-sectional studies describing the association between victimization and depressed mood among women (Beydoun, Beydoun, Kaufman, Lo, & Zonderman, 2012; Resick, 1993). Collectively, these studies provide strong evidence to corroborate etiologic theories of depression in which stressful life events play a central role (Avison & Turner, 1988; Kendler et al., 1999; Kendler, Kessler, Neale, Heath, & Eaves, 1993; Pearlin, 1989; Pearlin, Lieberman, Menaghan, & Mullan, 1981; Turner, 2003). Another body of literature has focused specifically on the role of domestic violence as a stressor (Campbell, Kub, & Rose, 1996; Clements & Sawhney, 2000).

Persons who engage in avoidant coping strategies to deal with stressful life events, such as heavy drinking (Cooper, Frone, Russell, & Mudar, 1995; Cooper, Russell, & George, 1988), may be particularly vulnerable to developing symptoms of depression (Fergusson, Boden, & Horwood, 2009;

Mukamal, Kawachi, Miller, & Rimm, 2007). Consistent with theoretical predictions, a study of battered women in the U.S. demonstrated that avoidant coping was associated with greater dysphoria, while emotion-focused coping was associated with less dysphoria (Clements & Sawhney, 2000). However, longitudinal studies on the mental health impacts of victimization have tended to focus primarily on diagnoses of depressive and anxiety disorders and/or symptoms of depression and posttraumatic stress (Devries, Mak, Bacchus, et al., 2013)—to the exclusion of other important relevant outcomes such as mental health–related quality of life and heavy drinking, all of which are important outcomes to examine in their own right (Hanson, Sawyer, Begle, & Hubel, 2010).

Conceptual Framework

While selection bias has been thoughtfully considered (and generally excluded) as a potential explanation for the correlation between stressful life events and poor mental health (Aneshensel, 1992; Dohrenwend, 1974; Thoits, 1981, 2006), few of the studies in the literature reviewed above have been based on longitudinal data with the ability to ensure temporal ordering between the exposure and outcome (Tsai, Weiser, Dilworth, Shumway, & Riley, 2015). Cerda, Digangi, Galea, and Koenen (2012) reviewed 35 longitudinal studies on the relationship between violence and depression, anxiety, and substance abuse and assessed only 6 of these to be truly prospective studies with the psychiatric outcomes assessed subsequent to the violence exposures. Furthermore, in their recently published systematic review and meta-analysis, Devries, Mak, Bacchus, et al. (2013) identified no longitudinal studies of victimization and incident depression from sub-Saharan Africa.

Even less research in this area has focused on understanding the potential *reciprocal relationship* between mental health and victimization (Devries, Mak, Bacchus, et al., 2013), a possibility raised by Foa, Cascardi, Zoellner, and Feeny (2000) in their conceptual model of partner violence. For example, women with depressive disorders may selectively affiliate with partners of similar mental health status who themselves are at greater risk of perpetrating abuse (Stith, Smith, Penn, Ward, & Tritt, 2004; Van Dorn, Volavka, & Johnson, 2012). Alternatively, symptoms of depression may compromise women's ability to leave abusive relationships, thereby placing them at greater risk of further victimization (Barnett, 2001). These hypotheses are consistent with several analyses of data on adolescent girls from the U.S. National Longitudinal Study of Adolescent Health: Not only was abuse by an intimate partner associated with subsequent depression and suicidal ideation (Exner-Cortens, Eckenrode, & Rothman, 2013; Roberts, Klein, & Fisher,

2003) but also worsening mood preceded subsequent abuse by an intimate partner (Lehrer, Buka, Gortmaker, & Shrier, 2006; Roberts et al., 2003). In addition, the prevalence of victimization among persons with psychiatric disorders and/or in psychiatric care exceeds the rate in the general population (Howard et al., 2010; Maniglio, 2009; Roy, Crocker, Nicholls, Latimer, & Ayllon, 2014). Finally, also consistent with this line of inquiry is experimental evidence showing that reductions in symptoms of posttraumatic stress and depression can prospectively decrease the probability of subsequent revictimization (Iverson et al., 2011). Given these related strands of research, it is possible that studies that do not exclude the potentially reciprocal associations between mental health problems and subsequent risk of partner violence may overestimate the extent to which partner violence is associated with adverse mental health outcomes.

Research aimed at understanding these potentially reciprocal associations has important policy and programmatic significance for women living with HIV, who may be even more vulnerable to abuse compared with women without HIV (Maman et al., 2002; Were et al., 2011), particularly in the setting of serostatus disclosure to intimate partners (Medley, Garcia-Moreno, McGill, & Maman, 2004). Their vulnerability is further underscored by the fact that HIV is highly stigmatized throughout sub-Saharan Africa, including Uganda (Tsai, 2015; Chan et al., 2015). Depression is associated with suffering and reduced quality of life (Wells et al., 1989) as well as worsened HIV-related outcomes, including HIV treatment nonadherence and HIV disease progression (Burack et al., 1993; Ickovics et al., 2001; Tsai et al., 2010). Given the public health significance of HIV and violence against women in sub-Saharan Africa, and given the existing gaps in the literature, we used data from an ongoing HIV cohort in rural Uganda to better understand the impacts of forced-sex victimization on depression symptom severity, mental health-related quality of life, and heavy drinking. A secondary aim of this analysis was to understand the potentially reciprocal associations among these variables.

Method

Cultural Context

The study site was located in Mbarara, Uganda. Mbarara District is located southwest of the country's capital city and is reachable by a 5-hr automobile drive. Mbarara town (population 82,000) is the district's primary commercial hub, but most residents of the district live in outlying rural areas where the local economy is largely based on subsistence agriculture. In this setting, there is a relatively high prevalence of food insecurity and depression among

people living with HIV (Kaharuza et al., 2006; Tsai et al., 2011). There are fewer than 40 psychiatrists in clinical practice, serving an overall population exceeding 35 million.

Although Uganda generally provides legal protections for women and has undertaken to meet obligations imposed by international and regional human rights instruments (Seelinger, 2010), the prevailing system of gender relations favors men, with women occupying a subordinate position in both economic and sexual decision making (Blanc & Wolff, 2001; Nyanzi, Nyanzi, Wolff, & Whitworth, 2005; Seelinger, 2010; Wolff, Blanc, & Gage, 2000). In the Ugandan Demographic and Health Surveys, a majority of both men and women provide responses consistent with approval of partner violence under different hypothetical scenarios (Speizer, 2010). Accordingly, violence against women is common. In household surveys with varying definitions of partner violence, the prevalence of lifetime exposure to partner violence varied from 25% to 54% (Karamagi, Tumwine, Tylleskar, & Heggenhougen, 2006; Koenig et al., 2003; Osinde, Kaye, & Kakaire, 2011), and the prevalence of lifetime exposure to forced sex varied from 24% to 37% (Karamagi et al., 2006; Koenig et al., 2004). Both alcohol use (Emusu et al., 2009; Karamagi et al., 2006; Koenig et al., 2004; Koenig et al., 2003) and economic dependence on men (Emusu et al., 2009; Miller et al., 2011) have consistently been identified as risk factors for partner violence. In addition, partner violence appears to be more common in rural areas (Karamagi et al., 2006; Speizer, 2010).

Study Design and Data Collection

Data for this study were drawn from the Uganda AIDS Rural Treatment Outcomes (UARTO) study, a cohort of treatment-naïve people living with HIV initiating treatment in rural Uganda. Upon enrollment, study participants were seen at pretreatment baseline and every 3 to 4 months for blood draws and structured interviews to assess changes in health status and psychosocial well-being. Research assistants who spoke the local language (Runyankore) conducted study interviews in a private research office near the clinic. Consistent with local etiquette and custom, at the conclusion of each interview participants were offered a nominal incentive for their time, such as 1 kg of sugar or a bar of soap.

Measures

The primary outcomes of interest were depression symptom severity, mental health-related quality of life, and heavy drinking. To measure depression

symptom severity, we used a version of the depression subscale of the Hopkins Symptom Checklist (HSCL-D; Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974) that was modified for the local context by Bolton and Ndogoni (2000). This locally adapted version of the HSCL-D has been shown to have good reliability, construct validity, and criterion-related validity when administered in general population samples and among people living with HIV, both in Uganda (Bolton, 2001; Psaros et al., 2015; Tsai et al., 2012) and elsewhere in sub-Saharan Africa (Tsai, 2014). Probable (symptomatic) depression was defined at the conventional threshold, HSCL-D ≥ 1.75 (Winokur, Winokur, Rickels, & Cox, 1984). To measure mental health-related quality of life, we used the Medical Outcomes Study-HIV Health Survey (MOS-HIV) Mental Health Summary (Wu et al., 1991), also modified for the local context. This locally adapted version of the MOS-HIV has also been shown to have good reliability and construct validity among people living with HIV in Uganda (Mast et al., 2004; Stangl, Bunnell, Wamai, Masaba, & Mermin, 2012). Heavy drinking was defined as a positive screen on the three-item consumption subset of the AUDIT-C (Bradley et al., 2003; Bush, Kivlahan, McDonell, Fihn, & Bradley, 1998).

The primary exposure of interest was self-report of forced-sex victimization in the 3 months prior to interview, assessed using the question, "Did someone such as your spouse, partner, or anyone else ever force you to have sex when you did not want to? By force, I mean either using physical force or threatening to harm you physically or emotionally?" The conduct of all interviews was consistent with ethical and safety recommendations promulgated by the World Health Organization (2001). Specifically, all research assistants were trained on how to administer surveys for gathering sensitive information and provided assurances of confidentiality. The survey was framed generally as an investigation into the health and life experiences of people living with HIV, not as a study about violence against women. Only one eligible woman per household was interviewed. Research assistants referred study participants to local counseling resources for acute psychological distress. During the study period, there were four cases in which such action was needed, but it is not known whether these instances were specifically related to the study participants being asked about victimization (or whether they were due to unrelated issues).

Statistical Analysis

Given the repeated-measures study design, we used the method of generalized estimating equations (GEE; Liang & Zeger, 1986) to model the marginal expectation of the mental health-related outcomes as a function of forced-sex victimization within the previous 3 months. We assumed the

Gaussian distribution for outcome variables measured on the continuous scale (depression symptom severity and mental health–related quality of life), with an identity link function between the outcome variable and linear predictor. For regressions where the outcome variable was binary (probable depression and heavy drinking), we assumed the Poisson distribution with a log link function. To inform the selection of the working correlation structure, we estimated the correlations between HSCL-D measurements obtained from participants at each time point during the first year of follow-up. The estimated product-moment correlation coefficients ranged from 0.39 to 0.64, but most were located in a narrow range between 0.39 and 0.46. Therefore, we selected an exchangeable working correlation structure. To guard against potential misspecification we used robust estimates of variance (Huber, 1967; White, 1980). Under the conventional assumptions of GEE, missing observations were considered to be missing completely at random.

We adjusted the estimates for sociodemographic and clinical variables measured at baseline, including age, educational attainment, marital status, sexual relationship power (Pulerwitz, Gortmaker, & DeJong, 2000), household asset wealth (Filmer & Pritchett, 2001), heavy drinking (Bradley et al., 2003; Bush et al., 1998), social support (Antelman et al., 2001; Broadhead, Gehlbach, de Gruy, & Kaplan, 1988), and CD4+ T-lymphocyte cell count <200 cells/mL. In addition, all regression models adjusted for the baseline value of the outcome variable. For regression models in which the outcome variable was measured on the continuous scale, the estimated regression coefficient was interpreted as the level change in the outcome attributable to forced-sex victimization. The exponentiated coefficients from the Poisson regression models were reported as risk ratios (Zou, 2004).

To determine whether there was a reciprocal relationship between mental health and victimization outcomes, we reversed the temporal ordering of the exposures and outcomes and refitted similar GEE regression models. Namely, we predicted subsequent exposure to forced-sex victimization as a function of 3-month-lagged depression symptom severity, probable depression, mental health–related quality of life, or heavy drinking. These regression models adjusted for baseline history of forced-sex victimization but otherwise followed the same specifications as described above. All analyses were conducted using the Stata statistical software package (version 13.1, StataCorp, College Station, Texas).

Ethical Review

All participants provided written informed consent, either with a signature or, if there were cultural literacy reasons why a signature was not appropriate, a

thumbprint. Ethical approval for all study procedures was obtained from the Committee on Human Research, University of California at San Francisco; the Partners Human Research Committee, Massachusetts General Hospital; and the Institutional Review Committee, Mbarara University of Science and Technology. Consistent with national guidelines, we received clearance for the study from the Uganda National Council for Science and Technology and from the Research Secretariat in the Office of the President.

Results

From September 2007 to November 2011, 173 women initiating HIV treatment were enrolled into the UARCO cohort and followed over a median of 1.8 years. During the study period, 7 women died (within a median of 3.6 months after treatment initiation) and 11 were permanently lost to follow-up. Compared with other participants, these women had a similar baseline rate of victimization (5.6% vs. 4.5%; Pearson $\chi^2 = 0.04$, $p = .84$) and similar level of depression symptom severity (1.70 vs. 1.69; $t = 0.12$, $p = .90$), but a lower level of mental health–related quality of life (34.8 vs. 40.5; $t = 1.85$, $p = .07$).

Summary statistics are described in Table 1. The median age was 32 years, few women had a secondary education, and most had a CD4+ T-lymphocyte cell count < 200 cells/mL at treatment initiation. The median Sexual Relationship Power Scale of 2.2 suggests that most women had the subjective experience of lacking control in their sexual relationships. At baseline, the median HSCL-D value was 1.6 (interquartile range [IQR], 1.3-2.0), with 57 women (33%) meeting screening criteria for probable depression. Twenty-six women (15%) reported that they had ever experienced forced sex, 8 women (5%) reported that they had been victimized during the 3 months prior to the baseline interview. During follow-up there were a total of 18 incidents of victimization (reported by 16 women), with a total exposure rate of 6 per 100 person-years.

Across the study period, forced-sex victimization in the 3 months prior to interview was associated with a 0.20-point greater HSCL-D score (95% confidence interval [CI] = [0.01, 0.39]). After adjustment for the covariates and the baseline HSCL-D score, the estimate remained statistically significant ($b = 0.17$; 95% CI = [0.02, 0.33]; Table 2). Relative to the standard deviation of the HSCL-D at baseline, this translated to an effect size of $0.17/0.54 = 0.31$. Similarly, after multivariable adjustment, victimization was associated with an increased risk of subsequent probable depression (adjusted relative risk [ARR] = 1.58; 95% CI = [1.01, 2.49]) and heavy drinking (ARR = 3.99; 95% CI = [1.84, 8.62]). Victimization was also associated with lower subsequent

Table 1. Summary Statistics.

Variable	Median (IQR) or Number (%)
Hopkins Symptom Checklist for Depression	1.6 (1.3-2)
Probable depression (HSCL-D \geq 1.75)	57 (33%)
MOS-HIV Mental Health Summary score	42 (32-48)
AUDIT-C positive screen for hazardous drinking	18 (10%)
Lifetime forced-sex victimization	26 (15%)
Forced-sex victimization in the previous 3 months	8 (5%)
Age, years	32 (26-37)
Formal educational attainment	
None	38 (22%)
Primary	102 (59%)
Secondary or more	33 (19%)
Married	62 (36%)
CD4 + T-lymphocyte cell count < 200 cells/mL	106 (61%)
Social Support Scale	3.9 (3.5-4)
Sexual Relationship Power Scale	2.2 (1.8-2.8)

Note. IQR = interquartile range; HSCL-D = Hopkins Symptom Checklist for Depression; MOS-HIV = Medical Outcomes Study-HIV Health Survey; AUDIT-C = three-item consumption subset of the Alcohol Use Disorders Identification Test.

mental health–related quality of life ($b = -5.65$; 95% CI = $[-9.34, -1.96]$), or $5.65/12.53 = 0.45$ standard deviation units.

We reversed the temporal ordering of the exposures and outcomes and then estimated the association between depression symptom severity and forced-sex victimization over the subsequent 3 months (after adjusting for covariates and baseline history of victimization). Each additional point on the HSCL-D score was associated with an increased risk of subsequent victimization, but the estimate was not statistically significant (ARR = 1.50; 95% CI = $[0.67, 3.39]$). Across the other outcomes, the estimated coefficients on the exposure variable were similarly not statistically significant (p values ranged from .08 to .71).

Discussion

In this longitudinal study of Ugandan women living with HIV followed over 2 years, we found that experience of forced-sex victimization was associated with a subsequent increased level of depression symptom severity, increased

Table 2. Estimated Associations between Forced-Sex Victimization and Subsequent Mental Health–Related Outcomes.

	HSCL-D	Probable Depression (HSCL-D \geq .75)	MOS-HIV Mental Health Summary	Positive AUDIT-C Screen for Hazardous Drinking
	<i>b</i> (95% CI)	ARR (95% CI)	<i>b</i> (95% CI)	ARR (95% CI)
Forced-sex victimization in prior 3 months	0.17 [0.02, 0.33]	1.58 [1.01, 2.49]	-5.65 [-9.34, -1.96]	3.99 [1.84, 8.63]
Baseline covariates				
Age, per 5 years	0.02 [-0.01, 0.05]	1.13 [0.98, 1.31]	-0.44 [-1.28, 0.41]	1.00 [0.71, 1.41]
Formal educational attainment				
None	Ref	Ref	Ref	Ref
Primary	0.001 [-0.07, 0.07]	0.87 [0.59, 1.29]	0.32 [-1.96, 2.61]	0.56 [0.21, 1.46]
Secondary or greater	0.01 [-0.10, 0.11]	1.01 [0.53, 1.93]	-0.25 [-3.15, 2.65]	1.22 [0.40, 3.74]
Married	0.12 [0.05, 0.18]	1.92 [1.34, 2.77]	-1.83 [-3.81, 0.15]	1.01 [0.44, 2.28]
Household asset index	-0.01 [-0.03, -0.001]	0.96 [0.89, 1.04]	0.50 [0.03, 0.96]	1.10 [0.92, 1.30]
CD4+ T-lymphocyte cell count < 200 cells/mL	-0.03 [-0.09, 0.03]	0.99 [0.72, 1.36]	0.41 [-1.46, 2.28]	1.05 [0.46, 2.38]
Social Support Scale	0.05 [-0.01, 0.10]	1.05 [0.82, 1.33]	-0.93 [-2.64, 0.78]	1.30 [0.63, 2.65]
Sexual Relationship Power Scale	-0.001 [-0.002, 0.001]	1.00 [0.99, 1.01]	0.02 [-0.005, 0.05]	1.01 [0.99, 1.02]
HSCL-D	0.33 [0.26, 0.40]			
Probable depression (HSCL-D \geq 1.75)		5.93 [3.78, 9.31]		
MOS-HIV Mental Health Summary			0.36 [0.25, 0.48]	
Positive AUDIT-C screen for hazardous drinking	0.10 [-0.01, 0.21]	1.76 [1.14, 2.71]	-0.85 [-3.84, 2.14]	49.5 [18.3, 134]

Note. HSCL-D = Hopkins Symptom Checklist for Depression; *b* = regression coefficient; CI = confidence interval; ARR = adjusted risk ratio; MOS-HIV = Medical Outcomes Study-HIV Health Survey; AUDIT-C = three-item consumption subset of the Alcohol Use Disorders Identification Test.

risks of probable depression and heavy drinking, and reduced mental health–related quality of life. The estimated associations were statistically significant, small to moderately sized in magnitude, and based on validated outcome measures. We did not find strong evidence of a reciprocal relationship. Our findings have important implications for policy and programming for women living with HIV in sub-Saharan Africa.

The association between violence and poor mental health outcomes is well known (Tsai, 2013). In addition to our use of longitudinal data to inform understanding about the direction of the association, our analysis makes several unique contributions to this literature. First, our analysis is based on data gathered from a highly vulnerable population, women living with HIV in rural Uganda. Second, we used outcome measures with strong evidence of reliability, construct validity, and criterion-related validity in the local setting. Our analysis extends the literature to other relevant mental health–related outcomes, including hazardous alcohol consumption and quality of life. Third, we failed to find strong evidence of a reciprocal relationship: while we did find strong evidence that prior victimization was associated with worsened mental health, we did not find strong evidence that poor mental health was associated with a greater risk of subsequent victimization.

The lack of a reciprocal association (between poor mental health and subsequent victimization) observed in our study stands in contrast to previous studies. It is unclear, however, whether our findings actually contradict prior conceptual and empirical work. Most of the longitudinal studies in this area of research have focused on the role of posttraumatic stress rather than depression (Krause, Kaltman, Goodman, & Dutton, 2006; Kuijpers, van der Knaap, & Winkel, 2012; Perez & Johnson, 2008). Posttraumatic stress disorder and major depressive disorder are frequently comorbid (Kessler, Chiu, Demler, Merikangas, & Walters, 2005), and their symptoms frequently co-occur. However, the two disorders are distinctly different constructs (Blanchard, Buckley, Hickling, & Taylor, 1998; Shalev et al., 1998), likely with different risk profiles for subsequent victimization. Furthermore, the previously cited studies by Roberts et al. (2003) and Lehrer et al. (2006) correlating worsened mood and subsequent abuse were based on data collected from adolescents in the U.S. Cultural differences in the presentation of affective disorders in sub-Saharan Africa, both in the general population (Tomlinson, Swartz, Kruger, & Gureje, 2007) and among persons living with HIV (Tsai, 2014), may also be accompanied by behavioral differences that could potentially explain the contrasting findings.

At the level of population health, violence and abuse against women directly and indirectly reproduce the same norms and gender-unequal power relations that give rise to these patterns of victimization in the first place

(Bourgois, 1996; Shannon et al., 2012). Romero-Daza, Weeks, and Singer (2003) first described this phenomenon in the setting of victimization, mental health, and sex- and drug-related HIV transmission risk among commercial sex workers. Subsequent researchers have modeled these indirect effects using multilevel data to show that the proximate context of violence against women, or norms about violence against women, can have corrosive effects on women's reproductive health, independent of the direct effects of experiencing victimization. These contextual effects appear to be robust across a variety of reproductive health-related outcomes, such as condom use (Tsai & Subramanian, 2012), unintended pregnancy (Pallitto & O'Campo, 2005), and birth spacing (Hung, Scott, Ricciotti, Johnson, & Tsai, 2012).

Limitations

Interpretation of our findings is subject to several important limitations. First, we assessed only the experience of forced-sex victimization. Previously published data from Uganda suggest that broader definitions of exposure to violence may yield greater estimates of the total prevalence and incidence of violence against women by both primary partners and nonprimary partners (Kouyoumdjian et al., 2013). However, there is substantial overlap between exposure to sexual violence and other types of partner violence (Coker, Smith, McKeown, & King, 2000; Dunkle et al., 2004; Tsai et al., 2015), suggesting that our estimates of association are unlikely to be biased away from the null. Second, the possibility of underreporting should be considered. The lifetime prevalence of forced sex estimated in our study is lower than has been estimated in other studies conducted in Uganda (Karamagi et al., 2006; Koenig et al., 2004). Third, our regression models assumed that the entire effect of victimization on subsequent mental health outcomes was contained in the exposure measurement at a given time point. While relatively short, this 3-month lag is consistent with prior work on stressful life events and the timing of depressive onsets (Hammen, 2005; Kendler et al., 1999). Our models did not capture effects of cumulative exposures (e.g., such as those that might be expected to occur in the setting of revictimization), but there were too few incidents of revictimization reported in our data set to permit investigation of these other associational structures. Fourth, even though our regression models ensured temporal ordering between exposure to victimization and depression, a spurious association could still result if victimization and depressed mood, even if temporally ordered in relation to each other, were both determined by an unobserved third variable (e.g., child abuse) that preceded them in time. Data on childhood physical or sexual abuse, which are relatively common in Uganda (Brown et al., 2009), were not obtained

during this study and could represent potentially important confounding variables (Whitfield, Anda, Dube, & Felitti, 2003). However, we did adjust for baseline levels of the mental health outcomes, which would tend to mitigate this concern (i.e., if the confounding effect of child abuse is assumed to operate through its effects on mental health during adolescence or adulthood). Fifth, the absolute number of sexual violence events was small. Small cell sizes would have undermined our ability to detect statistically significant associations, thereby biasing our estimates toward the null. Sixth, we did not use outcome measures specifically developed for use in the local setting, an approach that has been adopted by other researchers in the field (Betancourt et al., 2011). However, our (Western-derived) measures were adapted for use in the local setting, an approach that has also been used by others (Ertl et al., 2010). Relatedly, although our outcome measures were based on validated scales, we did not have access to diagnoses consistent with the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-IV*; American Psychiatric Association, 1994). Therefore, some caution in the unevaluated transfer of cutoff scores is warranted. Finally, our study did not incorporate a qualitative component, which could have yielded a far richer understanding of different forms of sexual coercion (e.g., including verbal harassment and nonpenetrative touching; Wagman et al., 2009) as well as of the impacts of sexual violence on women's mental health and quality of life. Qualitative methods have also been used to validate survey instruments used for assessing partner violence exposure (Green, Chung, Daroowalla, Kaltman, & DeBenedictis, 2006), which may have been fruitful in this instance given the limitations of the single-item screener.

Conclusion

With these caveats in mind, an important implication of our findings is that interventions to reduce violence against women should be pursued not only because of the moral imperative to do so but also because they can potentially have substantive impacts on health and mental health. For example, being victimized was associated with a greater than five-point difference on the MOS-HIV Mental Health Summary score. In previously published studies among persons living with HIV, a score difference of this magnitude was shown to be approximately equivalent to development of cytomegalovirus disease (Wu, Revicki, Jacobson, & Malitz, 1997) or to the difference between asymptomatic HIV infection and progression to AIDS (Revicki, Sorensen, & Wu, 1998). Screening for partner violence (MacMillan et al., 2009), or screening followed by brief counseling (Hegarty et al., 2013), has not demonstrated sufficiently robust effects on preventing victimization or improving

women's emotional well-being to warrant universal implementation. It is possible that structural interventions (Tsai, 2012) may reduce violence against women by altering the context in which men and women negotiate sex, but few such interventions have been rigorously tested using either experimental or quasi-experimental methods (Aizer, 2010; Pronyk et al., 2006). Given the substantial mental health-related impacts of victimization, new and feasible health sector responses must be formulated.

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Declaration of Conflicting Interests

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