

# Mental health and HIV sexual risk behaviour among University of Limpopo students

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**Background.** Little attention has been paid to the role of poor mental health among young people with regard to HIV risk behaviour and HIV prevention in Africa.

**Objective.** To determine the association between mental health, substance use and HIV sexual risk behaviour among a sample of university students in South Africa.

**Methods.** A cross-sectional survey was conducted among undergraduate students who were recruited conveniently from public campus venues at the University of Limpopo Medical University of Southern Africa (Medunsa) campus. The sample included 722 university students (57.6% men and 42.4% women) with a mean age of 21.7 years (standard deviation  $\pm 8.8$ ).

**Results.** Of the 722 students, 39.5% reported depression, 23.4% screened positive for post-traumatic stress disorder (PTSD), 22% reported hazardous or harmful alcohol use, 33% reported  $\geq 2$  sexual partners in the past 12 months, 50% reported inconsistent condom use, 46% reported unknown HIV status of a sexual partner and 20% reported alcohol use in the context of sex in the past 3 months. In multivariate analysis, HIV risk behaviour was associated with, among men, hazardous or harmful alcohol use and having screened positive for PTSD, and among women, being in the 4th or more year of study and current cannabis use.

**Conclusion.** Poor mental health, including substance use, was found to be associated with HIV risk behaviour. Co-ordinated mental health and sexual and reproductive health services that meet the needs of university students would be desirable.

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In the last national population-based survey in South Africa (SA) in 2008, HIV prevalence was estimated at 10.5%, 17.4% for women and 3.3% for men among young people aged 18 - 24 years.<sup>[1]</sup> Based on antenatal data, the prevalence was 12.0% among 15 - 24-year-olds

in 2010.<sup>[2]</sup> Poor mental health is a major cause of morbidity in middle-income countries, with depression constituting the heaviest disease burden.<sup>[3]</sup> The HIV epidemic contributes to increased depression rates both in persons who live with HIV<sup>[4]</sup> and those indirectly affected by HIV/AIDS.<sup>[5]</sup> Several reviews of the general population indicate a possible relationship between poor mental health, including substance use, and HIV risk behaviour, such as multiple sexual partners and unprotected sex.<sup>[6-13]</sup>

Studies conducted among university students found that anxiety,<sup>[14]</sup> depression,<sup>[14,15]</sup> psychological distress,<sup>[15]</sup> alcohol use,<sup>[15-20]</sup> drug use,<sup>[19,20]</sup> and traumatic experiences<sup>[21]</sup> (in particular childhood abuse, physical abuse, and especially sexual abuse<sup>[22]</sup>) were associated with various forms of HIV risk behaviour. Currently, there are not sufficient data on university students regarding the association between mental disorders, substance use and HIV sexual risk behaviour within the SA context.

We therefore aimed to determine the association between mental health, substance use and HIV sexual risk behaviour among

undergraduate students of the University of Limpopo Medical University of Southern Africa (Medunsa) campus.

## Methods

### Sample and procedure

A cross-sectional survey design was used. An anonymous, self-administered questionnaire was used to collect data. Undergraduate students from the Medunsa campus were recruited into the study as they were entering 2 public venues (tents erected between lecture halls and campus residences). A student health promotion study had previously been advertised on the campus for university students. The study protocol was approved by the University of Limpopo Medunsa Research and Ethics Committee. A convenience sample of 732 undergraduate students participated in the survey. After eliminating unusable or incomplete questionnaires, analyses presented in this paper were conducted on a sample of 722 participants.

### Measures

#### Traumatic experiences

Participants were asked if they had ever been hit by a sexual partner; forced to have sex; physically abused as a child; sexually abused as a child; or been diagnosed as HIV-positive. Traumatic experience items were coded as yes/no.<sup>[23]</sup>

### Post traumatic stress disorder (PTSD)

A 7-item screener ( $\alpha=0.77$ ) was used to identify PTSD symptoms that the respondents had experienced in the preceding month.<sup>[23,24]</sup> Items asked whether the respondent had experienced difficulties related to a traumatic experience (e.g. 'Did you begin to feel more isolated and distant from other people?', 'Did you become jumpy or get easily startled by ordinary noises or movements?'). Consistent with epidemiological evidence, participants who answered at least 4 of the questions affirmatively were considered to have a positive screen for PTSD.<sup>[23,24]</sup>

### Depressive symptoms

We assessed depressive symptoms using the 10-item version of the Center for Epidemiologic Studies Depression Scale (CES-D).<sup>[25]</sup> While the CES-D 10-item survey has not been directly compared with clinical diagnosis of major depression, the CES-D 20-item survey has been reported to average a sensitivity of 80% and a specificity of 70% compared with formal diagnostic interview.<sup>[26]</sup> In accordance with Andresen *et al.*,<sup>[25]</sup> the possible range of the 10-item scale is 0 - 30, and a cut-off score of  $\geq 10$  indicates significant depressive symptoms. The Cronbach's  $\alpha$  reliability coefficient of this 10-item scale was 0.72 in this study.

### Alcohol consumption

The 10-item alcohol use disorders identification test (AUDIT)<sup>[27]</sup> assesses alcohol consumption level (3 items), symptoms of alcohol dependence (3 items), and problems associated with alcohol use (4 items). Heavy episodic drinking is defined as the consumption of  $\geq 6$  standard drinks ( $\geq 10$  g alcohol) on a single occasion.<sup>[27]</sup> In SA a standard drink is 12 g alcohol. Because AUDIT is reported to be less sensitive at identifying risk drinking in women,<sup>[28]</sup> the cut-off point of binge drinking for women (4 units) was 1 unit less than for men (5 units), as recommended by Freeborn *et al.*<sup>[28]</sup> Responses to items in the AUDIT are rated on a 4-point Likert scale from 0 to 4, for a maximum score of 40 points. Higher AUDIT scores indicate more severe levels of risk; scores of  $\geq 8$  indicate a tendency to problematic drinking or hazardous or harmful drinking.<sup>[27]</sup> Cronbach's  $\alpha$  for the AUDIT in this sample was 0.91, indicating excellent reliability. Hazardous drinking is defined as a quantity or pattern of alcohol consumption that places a person at risk for adverse health events, while harmful drinking is defined as alcohol consumption that results in adverse events (e.g. physical or psychological harm).<sup>[29]</sup>

### Tobacco use

Two questions were asked about the use of tobacco products: (i) Do you currently use one or more of the following tobacco products: cigarettes, snuff, chewing tobacco, cigars, etc.? Response options were 'yes' or 'no'. (ii) In the past month, how often have you used one or more of the following tobacco products: cigarettes, snuff, chewing tobacco, cigars, etc.? Response options were 'once or twice', 'weekly', 'almost daily' and 'daily'.

### Cannabis use

Cannabis use was assessed using 2 items: use in the preceding 12 months and use in the preceding 30 days.

### HIV risk behaviour index

An HIV risk behaviour index was developed based on a literature review<sup>[23,30,31]</sup> and assessed 4 components of HIV risk: number of sexual partners; protected or unprotected sexual intercourse; alcohol use in the context of sex; and awareness of HIV status of sexual partner. HIV risk behaviour, therefore, was assessed with 4 items: number of sexual partners in the past 12 months, condom use consistency in the past 3 months with primary partner, alcohol use in the context of sex in the past 3 months and knowledge of HIV status of main sexual partner. HIV risk behaviour items were dichotomised into (i)  $\geq 2$  sexual partners in the past 12 months, (ii) inconsistent (not every time) condom use, (iii) had consumed alcohol in the context of sex, and (iv) unknown HIV status of a sexual partner. All 4 items were added up to form an HIV risk behaviour index, with scores ranging from 0 to 4. Similar HIV risk behaviour indices have been used previously in SA.<sup>[23,30,31]</sup> Since there was no normal distribution, the HIV risk behaviour index was dichotomised: 0 - 1 = 0; 2 - 4 = 1.

### Socioeconomic data

We classified students according to whether they lived on or off campus. Socioeconomic background was assessed by having students rate their family background as 'wealthy' (within the highest 25% in SA, in terms of wealth), 'quite well off' (within the 50 - 75% range for their country), 'not very well off' (within the 25 - 50% range from SA), or 'quite poor' (within the lowest 25% in their country). We subsequently divided the students into 'poorer' ('not very well off' and 'quite poor') and 'wealthier' ('wealthy', 'quite well off') categories.

### Data analysis

The data were analysed using SPSS (version 20.0). First, gender differences were analysed for all variables using chi-square tests. Since there were significant gender differences on a number of variables, subsequent models were analysed separately for men and women. Second, logistic-regression analyses were done to identify traumatic experiences that were associated with a positive screen for PTSD and a positive screen for depression in bivariate analysis.<sup>[21]</sup> Third, logistic regression was used to identify factors that were associated with HIV risk behaviour. Predictor variables were entered in a single step.

## Results

### Sample characteristics

The sample included 722 university students (57.6% men and 42.4% women) with a mean age of 21.7 years (SD  $\pm 8.8$ ). Most students resided on campus (82.2%), 44.7% were first-year students, and 55% were from a poorer family background; and 22% were hazardous or harmful alcohol users. A large group of students indicated that they had significant depressive symptoms (39.5%), 23.4% screened positive for PTSD, 14.2% were current (past month) tobacco users and 11.6% were current cannabis users. Both women and men indicated that they were subjected to partner violence and abuse as a child. Few (1.3%) indicated that they were HIV-positive. High rates of HIV risk behaviour were reported (33% reported  $\geq 2$  sexual partners in the past 12 months, 50% inconsistent condom use, 46% unknown HIV status of a sexual partner and 20% alcohol use in the context of sex in the past 3 months) (Table 1).

**Table 1. Sample characteristics**

Variable	Total (N=722) n %	Men (N=416) n %	Women (N=306) n %	$\chi^2$
Socio-demographics				
Age (years), range 18 - 41	21.7 (8.8)			
Year of study				
1st	278 (44.7)	136 (38.2)	142 (53.4)	14.67
2nd/3rd	236 (37.9)	148 (41.6)	88 (33.1)	
≥4th	108 (17.4)	72 (20.2)	36 (13.5)	
Family background				
Wealthier	322 (45.0)	165 (40.1)	157 (51.6)	
Poorer	393 (55.0)	246 (59.9)	147 (48.4)	9.33 <sup>†</sup>
Substance use				
AUDIT (≥8)	158 (22.0)	133 (32.0)	25 (8.3)	57.79*
Current cannabis use	78 (11.6)	64 (16.5)	14 (5.0)	21.00*
Current tobacco use	98 (14.2)	87 (21.9)	11 (3.7)	46.04*
Mental health				
Screened positive for depression	285 (39.5)	152 (36.5)	133 (43.5)	3.54
Screened positive for PTSD	169 (23.4)	90 (21.6)	79 (25.8)	1.72
Traumatic experiences				
Ever been hit by a sexual partner	49 (6.9)	23 (5.6)	26 (8.6)	2.53
Ever been forced to have sex	72 (10.0)	38 (9.2)	34 (11.3)	0.86
Physically abused as a child	59 (8.2)	27 (6.5)	32 (10.5)	3.73
Sexually abused as a child	32 (4.5)	6 (1.4)	26 (8.6)	20.94*
HIV-positive	9 (1.3)	6 (1.4)	3 (1.0)	0.29
HIV risk				
≥2 sexual partners	231 (32.9)	180 (44.4)	51 (17.1)	58.13*
Inconsistent condom use	297 (50.3)	171 (47.4)	126 (54.8)	3.09
Alcohol in the context of sex	122 (19.6)	91 (24.8)	31 (12.2)	15.24*
Unknown HIV status of sexual partner	293 (45.5)	211 (54.5)	82 (31.9)	31.85*

AUDIT = alcohol use disorders identification test; PTSD = post-traumatic stress disorder.

\* $p < 0.001$ .

<sup>†</sup> $p < 0.01$ .

### Predictors of mental health

Tables 2 and 3 summarise the univariate logistic regression analyses predicting a positive screen for PTSD and depression, respectively. Among men, PTSD was associated with having been physically abused as a child. Depression was associated with reporting intimate partner violence, forced sex and physical child abuse. For women, intimate partner violence, forced sex and physical and sexual child abuse were associated with PTSD. Depression was associated with sexual partner violence.

### Predictors of HIV sexual risk behaviour

In bivariate analyses among men, hazardous or harmful alcohol use, current tobacco use and screening positive for PTSD were associated with HIV risk behaviour, and in multivariate analysis hazardous or harmful alcohol use and screening positive for PTSD were associated with HIV risk behaviour. In bivariate analyses among women,

hazardous or harmful alcohol use, current tobacco and cannabis use and being in the 4th or more year of study were associated with HIV risk behaviour, and in multivariate analysis being in the fourth or more year of study and current cannabis use were associated with HIV risk behaviour.

### Discussion

Among a sample of SA university students, this study found a high prevalence of poor mental health (depression and PTSD symptoms, and substance use), and high HIV risk behaviour (multiple sexual partners, unprotected sex, alcohol in the context of sex and unknown HIV status of a sexual partner). The prevalence of depression, PTSD and hazardous or harmful use was similar to other studies in SA,<sup>[32]</sup> the prevalence of HIV risk behaviour (≥2 sexual partners in the past 12 months and inconsistent condom use) seemed to be higher than in a large recent youth survey (18 - 24-year-olds) in SA,<sup>[33]</sup> and the

**Table 2. Logistic regression analyses predicting a positive screen for PTSD**

Event	Men (N=416)		Women (N=306)	
	n (%)	OR (95% CI)	n (%)	OR (95% CI)
Ever been hit by a sexual partner	4 (17.4)	0.74 (0.25 - 2.25)	12 (46.2)	2.78 (1.23 - 6.32) <sup>‡</sup>
Ever been forced to have sex	13 (34.2)	2.03 (0.99 - 4.14)	19 (55.9)	4.59 (2.20 - 9.58) <sup>*</sup>
Physically abused as a child	11 (40.7)	2.77 (1.24 - 6.21) <sup>*</sup>	16 (50.0)	3.32 (1.57 - 7.01) <sup>†</sup>
Sexually abused as a child	1 (16.7)	0.73 (0.08 - 6.33)	14 (53.8)	3.96 (1.74 - 9.00) <sup>*</sup>
HIV-positive	2 (33.3)	1.85 (0.33 - 10.27)	0 (0)	0

PTSD = post-traumatic stress disorder; OR = odds ratio; CI = confidence interval.

<sup>\*</sup>p<0.001.

<sup>†</sup>p<0.01.

<sup>‡</sup>p<0.05.

**Table 3. Logistic regression analyses predicting a positive screen for depression**

Event	Men (N=416)		Women (N=306)	
	n (%)	OR (95% CI)	n (%)	OR (95% CI)
Ever been hit by a sexual partner	15 (65.2)	3.46 (1.43 - 8.37) <sup>†</sup>	12 (46.2)	1.11 (0.50 - 2.50)
Ever been forced to have sex	22 (57.9)	2.61 (1.33 - 5.15) <sup>†</sup>	20 (58.8)	2.70 (1.25 - 5.86) <sup>‡</sup>
Physically abused as a child	18 (66.7)	3.86 (1.69 - 8.84) <sup>*</sup>	14 (43.8)	1.52 (0.64 - 3.58)
Sexually abused as a child	2 (33.3)	0.87 (0.16 - 4.82)	10 (38.5)	1.03 (0.37 - 2.86)
HIV-positive	3 (50.0)	1.76 (0.35 - 8.45)	2 (66.7)	2.60 (0.23 - 28.99)

OR = odds ratio; CI = confidence interval.

<sup>\*</sup>p<0.001.

<sup>†</sup>p<0.01.

<sup>‡</sup>p<0.05.

**Table 4. Logistic regression analyses predicting HIV risk behaviour**

Factor	Men (N=416)		Women (N=306)	
	Crude OR (95% CI)	Adjusted OR (95% CI)	Crude OR (95% CI)	Adjusted OR (95% CI)
<b>Socio-demographics</b>				
Age	1.02 (0.97 - 1.08)	1.01 (0.94 - 1.08)	1.00 (0.97 - 1.02)	1.03 (0.93 - 1.15)
<b>Year of study</b>				
1st	1.00	1.00	1.00	1.00
2nd/3rd	1.42 (0.89 - 2.27)	1.32 (0.77 - 2.24)	1.57 (0.78 - 3.16)	1.46 (0.63 - 3.40)
≥4th	1.50 (0.85 - 2.67)	1.63 (0.83 - 3.20)	4.36 (1.93 - 9.83) <sup>*</sup>	3.93 (1.45 - 10.67) <sup>‡</sup>
<b>Family background</b>				
Poorer	1.00		1.00	
Wealthier	0.80 (0.54 - 1.19)		1.33 (0.76 - 2.34)	
<b>Substance use</b>				
AUDIT (≥8)	2.68 (1.75 - 4.10) <sup>*</sup>	2.41 (1.45 - 3.99) <sup>*</sup>	6.26 (2.67 - 14.63) <sup>*</sup>	2.59 (0.74 - 9.09)
Current tobacco use	2.29 (1.40 - 3.74) <sup>*</sup>	1.51 (0.85 - 2.66)	12.78 (3.12 - 47.52) <sup>*</sup>	3.26 (0.52 - 20.59)
Cannabis use in preceding month	1.66 (0.97 - 2.85)		8.25 (2.65 - 25.72) <sup>*</sup>	6.15 (1.27 - 29.80) <sup>‡</sup>
<b>Mental health</b>				
Screened positive for depression	1.12 (0.75 - 1.67)		1.13 (0.64 - 1.99)	
Screened positive for PTSD	1.65 (1.03 - 2.65) <sup>‡</sup>	1.82 (1.06 - 3.11) <sup>‡</sup>	1.54 (0.84 - 2.83)	

OR = odds ratio; CI = confidence interval; AUDIT = alcohol use disorders identification test; PTSD = post-traumatic stress disorder.

<sup>\*</sup>p<0.001.

<sup>†</sup>p<0.01.

<sup>‡</sup>p<0.05.

prevalence of trauma experiences was not as high as in some previous studies in SA.<sup>[23,34]</sup>

Regarding traumatic experiences, the study did not find gender differences in physical partner violence, sexual partner violence and physical abuse as a child, yet sexual abuse as a child was significantly more common among female than male university students. Gender symmetry in intimate partner violence seems to conform to the most recent findings of the international student dating violence study, where both sexes reported similar rates of having been victims of dating violence.<sup>[35]</sup> However, other previous studies, including studies done in SA,<sup>[36-38]</sup> showed that suffering physical and sexual violence seemed to be more common among women than among men. This study only assessed minor and not severe physical partner violence, and it is possible that women under-reported minor physical partner violence, as found in some other studies,<sup>[39]</sup> including the SA university student sample of the international student dating violence study.<sup>[35]</sup> Cercone *et al.*<sup>[40]</sup> found that dating intimate partner violence is generally symmetrical at a topographical level, although significantly more women than men reported perpetration of severe physical assault.

Lifetime experiences of violence were found to be associated with depression and PTSD, as has been found among patrons of alcohol-serving venues in Cape Town.<sup>[23]</sup> Reported experiences of forced sex and sexual partner violence were associated with PTSD and depression in both men and women, as also found in a previous study in Cape Town.<sup>[23]</sup> Among women, but not among men, a history of sexual abuse as a child was associated with PTSD, but not depression. For both women and men, a history of physical abuse as a child was associated with PTSD and only for men it was associated with depression.

The study found that poor mental health, including substance use, was associated with HIV risk behaviour among this sample of SA university students. This finding concurs with previous studies among university students.<sup>[16-21]</sup> PTSD symptomatology and hazardous or harmful alcohol use were important predictors of HIV risk behaviour for men, and cannabis use was a significant predictor for women. While associations between alcohol use,<sup>[15-20]</sup> drug use<sup>[19,20]</sup> and HIV risk behaviours have previously been found among university students, the mechanisms explaining the association between alcohol use and HIV risk behaviours in this setting are not fully understood.<sup>[15]</sup> Hazardous or harmful drinking and binge drinking seem to be associated in particular with indiscriminate forms of risky sex (e.g. having multiple or casual sex partners), which is in keeping with studies of American college populations.<sup>[41,42]</sup> Weinhart and Carey<sup>[43]</sup> suggest that, 'People who use alcohol more heavily may also be more likely to engage in more sexual risk behaviour because of a specific personality trait, or a constellation of attitudes and beliefs, rather than because of a unique relationship between alcohol use and sexual risk behaviour.'

Likewise, cannabis use (among women) was found to be associated with HIV risk behaviour, which conforms with several studies.<sup>[42,44,45]</sup> This study did not find depressive symptomatology to be a predictor of HIV risk behaviour, as found in some other studies.<sup>[14,15]</sup> Further, among women, being in the fourth or more year of study was associated with HIV risk behaviour. It is possible that at the point at which they are completing university education, women are more likely in a steady relationship and thus more likely to engage in HIV

risk behaviour.<sup>[46]</sup> Overall, poor mental health, traumatic experiences, and substance use may interact synergistically to increase HIV risk behaviour.<sup>[23]</sup>

### Study limitations

Those seeking to generalise from this study's results should interpret them cautiously, as only full-time undergraduate students between the ages of 18 and 41 years were included in this study in a conveniently selected sample. It is unknown to what extent these findings can be generalised to part-time or non-resident students. The data used were obtained by self-report and could have been influenced by participants' desired responses. Although the study was anonymous, the sensitive nature of the items related to illegal drug use (cannabis) could have affected participants' responses. Moreover, this study was based on data collected in a cross-sectional survey. We cannot, therefore, ascribe causality to any of the associated factors in the study. A further limitation was that certain mental-health measures were made with brief screenings and may be interpreted only as indicators of poor mental health.<sup>[23]</sup> In addition, the study did not screen for a history of severe mental illness, which has been found to be associated with HIV risk behaviour;<sup>[47]</sup> this should be accounted for in future studies.

### Conclusion

High rates of depression, PTSD, hazardous or harmful drinking and HIV risk behaviour were found among the studied university student population. Poor mental health, including substance use, was associated with HIV risk behaviour. Co-ordinated mental health and sexual and reproductive health services to meet the needs of university students would be desirable.

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**Conflict of interest.** None.

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