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Anxiety and depression strongly associated with sexual risk behaviors among networks of young men in Dar es Salaam, Tanzania

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Abstract

This study tested the association between mental health scores and sexual risk behaviors among male members of social groups known as “camps” in Dar es Salaam, Tanzania. Anxiety and depression were measured using the HSCL-25 and condom use and sexual partner concurrency were assessed through self-report. 1113 sexually active men with an average age of 27 years were included in the analyses. Higher anxiety and depression scores were significantly associated with both condom use (Anxiety AOR=0.58, 95% CI: 0.44, 0.77; Depression AOR=0.60, 95% CI: 0.47, 0.77) and concurrency (Anxiety AOR=2.32, 95% CI: 1.73, 3.12; Depression AOR=2.08, 95% CI: 1.60, 2.70). The results of this study provide information salient to the development of effective HIV prevention interventions targeting populations with high burdens of anxiety and depression. The feasibility and effect of integrating mental health promotion activities into HIV prevention interventions should be explored.

Keywords

HIV; Mental Health; Sexual Risk; Young Men; Tanzania

INTRODUCTION

Seven percent of the population of Tanzania’s commercial capital, Dar es Salaam, is living with HIV (Tanzania Ministry of Health and Social Welfare, 2011), and youth are particularly vulnerable to infection with 40 percent of new infections in Tanzania occurring among 16–

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24 year olds (ICF International, 2013). Young men are important targets in preventing HIV transmission as gender norms position them to control the terms and conditions of sexual relationships (Barker & Ricardo, 2005), and encourage them to engage in high risk sexual behaviors such as inconsistent condom use and sexual partner concurrency (Dunkle et al., 2006; ICF International, 2013; Martin et al., 1999; Noar & Morokoff, 2002; Raj et al., 2006). To date, few studies have attempted to understand the unique predictors of risky sexual behaviors among young men in low resource settings such as Tanzania (UNAIDS, 2005; Pettifor et al., 2013). A better understanding of predictors of sexual risk in young men at high risk of HIV infection in Dar es Salaam is needed to inform effective HIV prevention strategies in this population.

Key predictors of HIV infection in sub-Saharan Africa include, but are not limited to, condom use and sexual partner concurrency (CDC, 2011). These risk behaviors are of particular relevance for young men in Tanzania as the majority of the young men in Dar es Salaam report condom use at last sex, but this proportion declines from 92% among 15-year-olds to 70% among 19-year-olds (Yamanis et al., 2013), indicating a decreasing motivation for condom use through adolescence. Among the same population the proportion reporting concurrent sexual partnerships increases with age, with 5% reporting concurrency at age 15 to 44% reporting concurrency by age 19 (Yamanis et al., 2013), making condom use and sexual concurrency important target risk behaviors in this population.

Anxiety and depression can influence sexual risk through multiple mechanisms including substance use (Turner, Latkin, Sonenstein, & Tandon, 2011), maladaptive coping mechanisms to deal with stress (Bachanas et al., 2002), and impaired decision making (Bennett & Bauman, 2000). Many previous studies of the relationship between mental health and sexual risk are from high income contexts (Elkington, Bauermeister, & Zimmerman, 2010; Lundberg et al., 2011; Nduna, Jewkes, Dunkle, Shai, & Colman, 2010; Sterk, Theall, & Elifson, 2006; Traube, Holloway, & Zhang, 2013). Further, many of studies of this relationship from sub-Saharan contexts are from university (Agardh, Cantor-Graae, & Ostergren, 2012; Othieno, Okoth, Peltzer, Pengpid, & Malla, 2015; Pengpid, Peltzer, & Skaal, 2013) or HIV-positive, clinic-based populations (Earnshaw et al., 2014; Musisi et al., 2014). We need more evidence of the link to between mental health and sexual risk in sub-Saharan Africa, particularly among marginalized populations at high risk of HIV-transmission. A better understanding of this relationship is integral to our ability to design interventions to prevent sexual risk in this context. The current study builds on the existing body of research by examining the relationship between mental health and sexual risk through a study of young men in Dar es Salaam, Tanzania. Using data from young men participating in an HIV prevention trial, we evaluated the relationships between mental health indicators of anxiety and depression and two sexual risk behaviors, condom use and sexual partner concurrency. The results of the proposed research will inform the development of effective HIV and sexual risk prevention interventions generalizable to the growing population of male youth in sub-Saharan urban areas.

METHODS

Study Setting

The data presented here are taken from *A Multilevel Intervention to Reduce HIV Risk among Networks of Men in Tanzania* (1R01MH098690-01), a cluster randomized controlled trial assessing the efficacy of a combined microcredit and health leadership intervention to reduce HIV risk. Participants in this study are male members of 59 “camps” within 4 wards of Dar es Salaam (Yamanis, Maman, Mbwambo, Earp, & Kajula, 2010). These camps were identified by the study team as groups occupying designated physical spaces where young men meet to socialize (Yamanis et al., 2010). Camps are stable social units; those included in the trial have been in existence for an average of eight years. Men typically belong to only one camp and often pay membership fees to belong to that camp (Yamanis et al., 2010). Most camp members are not formally employed and spend several hours each day at their camp (Yamanis et al., 2010).

Sample and Data Collection

Four wards in Dar es Salaam characterized by high risk for HIV among young people were selected for recruitment (Manzese, Tandale, Mwananyamala, and Mabibo). Eligible camps were identified using PLACE (Priorities for Local AIDS Control Efforts) methodology, a venue-based sampling method which was developed to identify venues where individuals at high risk for HIV transmission and acquisition meet new sexual partners (Weir et al., 2003). To be eligible for inclusion in the trial, camps had to have between 20 and 80 members, have been in existence for at least one year prior to the baseline assessment, and report no violent incidents during which a weapon was used within the past 6 months. Using the PLACE method the study team identified 303 eligible camps from which 60 camps were randomly selected for inclusion in the trial. One camp later withdrew from the trial, leaving 59 camps.

Camp leaders provided rosters of all current camp members, and study staff approached all individuals listed on camp rosters to verify their eligibility. In order to be eligible for participation in the trial, participants had to be 15 years of age or older, have been a camp member for more than 3 months, visit the camp at least once a week, and plan on residing in Dar es Salaam for the next 30 months. All eligible camp members were invited to participate in the trial, and participants were asked to provide written consent to participate in the baseline behavioral assessment. Consenting camp members completed a questionnaire administered using Computer Assisted Personal Interviewing (CAPI) by trained interviewers. 1249 male participants completed the baseline assessment in September through December, 2013.

Measures

Mental health variables were measured using the Hopkins Symptom Checklist-25 (HSCL-25) (Parloff, Kelman, & Frank, 1954), specifically a version of the scale previously translated into Kiswahili and tested in Tanzania (Lee, Kaaya, Mbwambo, Smith-Fawzi, & Leshabari, 2008). This measure inventories symptoms of anxiety and depression in 25 items (10 related to anxiety, 15 to depression) rated on a 4-point Likert-type scale. The scale has been previously validated in Tanzania (Kaaya et al., 2002; Lee et al., 2008). Anxiety scores

were calculated by taking the mean of the 10 anxiety-related items in the HSCL-25, which showed good internal consistency (Cronbach's alpha = 0.94). Depression scores were calculated by taking the mean of the 15 depression-related items in the HSCL-25, which also showed good internal consistency (Cronbach's alpha = 0.91). Where depression and anxiety are described dichotomously in the results, the recommended cutoff to identify likely clinical cases of 1.75 was used (Winokur, Winokur, Rickels, & Cox, 1984).

A categorical condom use variable was calculated from a self-report of condom use over the 3 most recent sexual partners (number of sex acts over the most recent month of the relationship, and number of times condoms used for each partner). Using the proportion of reported sex acts where condoms were used, participants were assigned to one of three categories: "never use" (0% use), "some use" (greater than 0%, less than 100%), or "always use" (100%). This categorical approach was used to reduce the susceptibility to recall bias which would be reflected in a continuous proportion of reported condom use, while avoiding the loss of information which would result from dichotomizing condom use, as discouraged by Noar et al. (2006). To measure sexual partner concurrency, participants were asked to if they had sex with anyone other than the partner in question during any of these relationships. Participants reporting any instance of simultaneous sexual relationships were coded as displaying concurrency. This measure was developed following best practices recently recommended by USAID (Zelaya, Go, Davis, & Celentano, 2012).

Covariates included in all analyses include age, education level, and economic status. Age was calculated based on reported date of birth, though reported age in years was used if the birthdate was not reported. Participants reported the highest level of education they had completed based on eight possible categories (no education, Standard 4 or less, Standard 5–7, Form 1, Form 2, Form 3, Form 4, Greater than Form 4). For analysis, education responses were collapsed into three categories: primary school or less (responses: no education, Standard 4 or less, Standard 5–7); some secondary school (responses: Form 1, Form 2, Form 3); or secondary school completed or greater (responses: Form 4, Greater than Form 4). Socioeconomic status (SES) was evaluated through a 10 item asset index, the Filmer Pritchett Wealth Index (2001). Using principle components analysis, a composite score was created for each participant by which they were categorized into one of 3 terciles based on the entire sample of men and women. The lowest 33% of participants were classified as "lowest SES", the highest 33% were classified as "highest SES" and the remainder were classified as "middle SES" (Vyas & Kumaranayake, 2006). All continuous variables were grand mean centered for regression analyses.

Analyses

All analyses were conducted in SAS v 9.4 and used a 2-sided significance level of 0.05. The following two hypotheses were tested: 1) *Participants reporting worse mental health (higher levels of anxiety, depression) will report less frequent condom use than participants reporting better mental health;* 2) *Participants reporting worse mental health will be more likely to report engaging in sexual partner concurrency than participants reporting better mental health.* Due to the clustered data structure, individual- and camp-level sources of variation in condom use and concurrency were accounted for in all analyses through the use

of multilevel modeling. All multilevel models were fit using *proc glimmix*, with a logit link for the dichotomous outcome of concurrency and a cumulative logit link for the three-level outcome of condom use. Random slopes models were fit for each of the four relationships to be tested between the mental health predictors (anxiety, depression) and the sexual behavior outcomes (condom use, concurrency) while adjusting for sociodemographic covariates. Anxiety and depression were modeled separately due to prohibitive levels of multicollinearity in the sample (correlation between anxiety and depression scores = 0.76).

Ethical Review

The study was approved by the ethical review committees at the University of North Carolina at Chapel Hill and Muhimbili University of Health and Allied Sciences in Dar es Salaam, Tanzania. Individual written informed consent was obtained from all study participants.

RESULTS

1249 men were interviewed at baseline, of whom 1113 (89%) reported being sexually active. These 1113 men were included in the analyses presented below.

Descriptive Statistics

Sexually active men interviewed at baseline had an average age of 27 years (range: 15 to 59). 16 men (1.4%) reported ever having sex with men. Over half had a primary school education or less (59%), nearly a third had graduated from secondary school (31%), and the remaining 11% had some secondary school but had not graduated. A quarter of the men had ever been married (25%) and 38% had children.

Men had an average score of 1.4 for both anxiety and depression symptoms. 21% displayed symptoms of depression and 19% displayed symptoms of anxiety based on common clinic cutoffs (score ≥ 1.75). 15% of men showed symptoms of both anxiety and depression. A third of reported always using condoms (33%), 53% reported never using condoms, and the remaining 14% reported using condoms sometimes. 20% of men reported partner concurrency.

Anxiety models

The random intercepts models for anxiety (Table 2) indicated that anxiety was significantly associated with both condom use and concurrency. Specifically, men with higher levels of anxiety reported lower levels of condom use and were more likely to report concurrency than men with lower levels of anxiety. For each one-unit gain in anxiety, there was an estimated 44% decrease in the odds of a higher level of condom use (AOR=0.58; 95% CI: 0.44, 0.77). For each one-unit gain in anxiety, the estimated odds of sexual concurrency more than doubled (AOR=2.32, 95% CI: 1.73, 3.12).

Among covariates, age and ever having been married were significantly associated with condom use, but not with concurrency. With increasing age, men had slightly lower odds of reporting a higher level of condom use (AOR=0.95; 95% CI: 0.93, 0.98). Men who reported

ever marrying had 63% lower odds than men who had never married of reporting a higher level of condom use (AOR=0.36; 95% CI: 0.24, 0.53) Men who had some secondary-level education were 77% more likely than those with primary school education or less to report concurrency (AOR=1.77; 95%CI: 1.04, 3.00). No other covariates were significantly associated with condom use or concurrency.

Depression models

The random intercepts models for depression (Table 3) indicated that depression was significantly associated with both condom use and concurrency. Specifically, men with higher levels of depression reported lower levels of condom use and were more likely to report concurrency than men with lower levels of depression. For each one-unit gain in depression, there was an estimated 40% decrease in the odds of a higher level of condom use (AOR=0.60; 95% CI: 0.47, 0.77). For each one-unit gain in depression, the estimated odds of sexual concurrency more than doubled (AOR=2.08, 95% CI: 1.60, 2.70).

Among covariates, age and ever having been married were significantly associated with condom use, but not with concurrency. With increasing age, men had slightly lower odds of reporting a higher level of condom use (AOR=0.95; 95% CI: 0.93, 0.98). Men who reported ever marrying had 64% lower odds than men who had never married of reporting a higher level of condom use (AOR=0.36; 95% CI: 0.25, 0.54) Men who had some secondary-level education were 80% more likely than those with primary school education or less to report concurrency (AOR=1.80; 95%CI: 1.06, 3.05). No other covariates were significantly associated with condom use or concurrency.

DISCUSSION

All hypotheses were supported; both anxiety and depression were significantly associated with condom use and sexual partner concurrency. Men with higher anxiety or depression scores reported lower levels of condom use, and were more likely to report sexual concurrency than men with lower anxiety or depression scores. These cross-sectional findings contribute to our understanding of the relationship between mental health and sexual risk behaviors in sub-Saharan Africa. To build evidence of the direction of a possible causal relationship between mental health and sexual risk in this context, longitudinal studies are needed. Though longitudinal studies of this key relationship have been conducted in other settings, indicating mental health as a prospective predictor of sexual risk (Elkington et al., 2010; Islam & Laugen, 2015; Nduna et al., 2010; O’Cleirigh et al., 2013; Seth et al., 2011), none of these studies were conducted in sub-Saharan Africa to our knowledge. We need more evidence to establish whether the direction and strength of the association between mental health and sexual risk observed in western contexts holds in sub-Saharan African populations as this understanding has important implications for the transmission of HIV/AIDS so that appropriate interventions will be applied.

To date many interventions addressing individuals’ sexual risk have done so through efforts to influence elements of the rational decision-making process including skills, knowledge, and attitudes (Alexander, Jemmott, Teitelman, & D’Antonio, 2015; Picot et al., 2012; Townsend, Mathews, & Zembe, 2013; Zajac et al., 2015). Our findings suggest that

addressing underlying mental health risks may be an important additional strategy to promote sexual risk reduction among high risk young men. Evidence from previous HIV prevention trials show behavioral interventions with women which are able to improve mental health are also more effective in preventing HIV infection (Lennon, Huedo-Medina, Gerwien, & Johnson, 2012). Trial participants with poor mental health are also more likely to drop out from studies than other participants (DiFranceisco et al., 1998; Kim, Peragallo, & DeForge, 2006), further indicating the need to integrate mental health promotion into HIV prevention interventions to promote retention in care and prevention interventions.

Our results indicate a dual burden of poor mental health and HIV risk behaviors, suggesting that screening for common mental health disorders should be integrated into HIV treatment and testing services in areas where referral services are available, as such patients may also have a high burden of mental health. In the case where there are few resources for referral of potential cases of anxiety and depression, there are promising approaches to mental health care feasible in low resource settings like Tanzania. Such approaches include training mental health nurses to perform mental health screening and provide basic treatment (Pappin, Wouters, Booyesen, & Lund, 2015; Wagner et al., 2014), and even training lay health workers to screen for common mental health disorders and to refer individuals meeting screening criteria to counseling (Chibanda et al., 2011; Iheanacho et al., 2015; Petersen, Hancock, Bhana, & Govender, 2014).

There are important limitations to this study. Causal conclusions should be made with caution without further evidence of a longitudinal relationship between mental health and sexual risk. The cross-sectional nature of the data does not allow us to establish the temporality in the supported relationships between mental health and sexual risk behaviors. Future studies should evaluate these relationships using longitudinal data to further evaluate the temporal direction of the relationship between mental health and sexual. It should also be considered that respondents' willingness to report sexual risk behaviors may have been associated with the social acceptability of such an acknowledgment. In addition, reports of sexual risk behaviors were retrospective, and thus recall bias may be an issue. However, the coding of the condom use and concurrency variables were designed to minimize the influence of recall bias, as discussed in the Methods. Finally, the HSCL-25 scale used to measure anxiety and depression was developed in a different cultural context than the study setting. Given that this scale has been previously validated in Tanzania as mentioned above (Kaaya et al., 2002; Lee et al., 2008), we feel comfortable with the theoretical validity of the scale's measurement of anxiety and depression in this population.

Conclusion

This study contributes to our understanding of the association between mental health and sexual risk behaviors. The results indicate that both anxiety and depression are strongly associated with both inconsistent condom use and sexual concurrency in this population of young Tanzanian men. Further research is needed to test the longitudinal relationship between mental health and sexual risk in this context. Evaluations of integrated mental health promotion and HIV prevention interventions would provide further evidence of anxiety and depression as causal predictors of sexual risk behaviors. The results of this study

provide information salient to the development of effective HIV prevention interventions targeting populations with high burdens of anxiety and depression. The feasibility and effect of integrating mental health promotion activities into HIV prevention interventions should be explored.

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Table 1Baseline Participant Characteristics (n=1113)^a

	Total
Age (y)	26.8 ± 7.1
Age by category	
15–19	149 (13.4%)
20–24	334 (30.0%)
25–29	323 (29.0%)
30+	307 (27.6%)
Currently in school	97 (8.7%)
Education level (ref = less than primary school completed)	
Primary school or less	652 (58.7%)
Some secondary school	116 (10.5%)
Secondary school completed or greater	342 (30.8%)
Socioeconomic status	
Lowest	291 (26.2%)
Middle	435 (39.1%)
Highest	386 (34.7%)
Ever married	277 (25.0%)
Has children	423 (38.0%)
Depression score	1.4 ± 0.5
Anxiety score	1.4 ± 0.6
Depression (score > 1.75)	237 (21.3%)
Anxiety (score > 1.75)	206 (18.5%)
Both depression and anxiety (both scores > 1.75)	164 (14.7%)
Condom use	
Never	491 (52.7%)
Sometimes	133 (14.3%)
Always	308 (33.1%)
Concurrency	195 (20.2%)

^aData are expressed as No.(%) or Mean ± SD

Table 2

Anxiety models

Variables	Condom use AOR (95%CI)	Concurrency AOR (95%CI)
Anxiety score	0.58 (0.44, 0.77) ***	2.32 (1.73, 3.12) ***
Control variables		
Age	0.95 (0.93, 0.98) **	1.00 (0.97, 1.03)
Education level		
<i>Primary school or less (ref)</i>	--	--
<i>Some secondary school</i>	1.18 (0.75, 1.83)	1.77 (1.04, 3.00) *
<i>Secondary or greater</i>	1.26 (0.93, 1.69)	1.20 (0.81, 1.76)
SES		
<i>Lowest (ref)</i>	--	--
<i>Middle</i>	1.13 (0.80, 1.60)	0.72 (0.46, 1.14)
<i>Highest</i>	0.74 (0.50, 1.11)	1.16 (0.69, 1.95)
Ever married	0.36 (0.24, 0.53) ***	0.75 (0.46, 1.22)

* indicates p<.05;

** indicates p<.001;

*** indicates p<.0001

Table 3

Depression models

Variables	Condom use AOR (95%CI)	Concurrency AOR (95%CI)
Depression score	0.60 (0.47, 0.77) ***	2.08 (1.60, 2.70) ***
Control variables		
Age	0.95 (0.93, 0.98) **	1.00 (0.97, 1.03)
Education level		
<i>Primary school or less (ref)</i>	--	--
<i>Some secondary school</i>	1.17 (0.75, 1.82)	1.80 (1.06, 3.05) *
<i>Secondary or greater</i>	1.26 (0.93, 1.69)	1.19 (0.81, 1.75)
SES		
<i>Lowest (ref)</i>	--	--
<i>Middle</i>	1.12 (0.79, 1.59)	0.73 (0.46, 1.16)
<i>Highest</i>	0.72 (0.48, 1.08)	1.20 (0.72, 2.01)
Ever married	0.36 (0.25, 0.54) ***	0.70 (0.43, 1.14)

* indicates p<.05;

** indicates p<.001;

*** indicates p<.0001