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Exploring the relationships among food insecurity, alcohol use, and sexual risk taking among men and women living in South African townships

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Abstract

South African townships have among the highest rates of HIV infection in the world. Considerable research on understanding the high rates of HIV transmission in this country has identified alcohol use as a critical factor in driving the HIV epidemic. Although the relationship between alcohol use and sexual risk-taking is well documented, less is known about how other factors, such as food insecurity, might be important in understanding alcohol's role in sexual risk-taking. Furthermore, prior research has highlighted how patterns of alcohol use and sexual risk-taking tend to vary by gender. We examined how food insecurity is related to both alcohol use and sexual risk-taking. We administered anonymous community surveys to men ($n=1137$) and women ($n=458$) residing within four contiguous Black African townships outside of Cape Town, South Africa. In multivariate linear regression, we found that food insecurity was related to having higher numbers of male sex partners and condom-protected sex acts among women only. These relationships, however, were fully mediated by women's alcohol use. Among men, we found that food insecurity was negatively related to unprotected sex; that is, men with greater food security reported more unprotected sex acts. Unlike the results found among women, this relationship was not mediated by alcohol use. Food insecurity appears to be an important factor in understanding patterns of sexual risk-taking in regards to gender and alcohol use, and may serve as an important point of intervention for reducing HIV transmission rates.

Keywords

Community assessment; regression; mediation; gender

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Introduction

South Africa has one of the most severe HIV/AIDS epidemics in the world; 5.7 million South Africans are infected and there are 1,500 new HIV infections daily (WHO, 2010). The overall national prevalence of HIV in South Africa is 11%, and prevalence among people living in townships is 21% (Shisana et al., 2005). Townships are informal settlements in urban settings originally designated during apartheid for non-whites only. Today townships continue to be characterized by extreme poverty with 57% unemployment (Duval Smith, 2011); poor infrastructure for shelter, electricity and sanitation (Fihlani, 2010); and among the highest rates of violence in the world (Jewkes et al., 2009). Dire economic, political, and social conditions have led to an environment in which multiple risk factors for HIV infection are prevalent (Le Marcis & Ebrahim-Vally, 2005; Wood & Jewkes, 1997).

One such factor is heavy alcohol use which typically occurs in shebeens (informal drinking establishments) and taverns within many townships in South Africa (Kalichman, Simbayi, Jooste, & Cain, 2007; Kalichman, Simbayi, Jooste, Vermaak, & Cain, 2008a; Schneider, Norman, Parry, Bradshaw, & Pluddemann 2007; Suliman, Seedat, Williams, & Stein, 2010). Reports of heavy alcohol use have been linked to greater sexual risk-taking among both men and women in South African townships (Kalichman, Simbayi, Jooste, Vermaak, & Cain, 2008b; Pitpitan et al., 2012b), and the country has one of the highest per capita rates of alcohol consumption in the world among those who do consume alcohol (Parry, 2010; Rehm et al., 2003). Likewise, patterns of detrimental alcohol use (e.g. heavy episodic drinking or six or more drinks per occasion) tend to be greater in South Africa (Gruenewald et al., 2002) than in other parts of the world (Rehm et al., 2003). Parry et al., (2005) reported that, among South African drinkers, 28% of men and 10% of women screen positive for alcoholism. Furthermore, when focusing on alcohol consumption specifically in townships we observe high rates of alcohol use and abuse. For example, Scott-Sheldon et al. (2012) found that among drinkers, 60% of men and women reported five or more drinks per occasion at least weekly (Scott-Sheldon et al., 2012).

Additionally, food insecurity, defined as the limited availability of, access to and quality of one's food, may also be an important consideration in understanding risks for HIV (Tsai, Hung, & Weiser, 2012). In studies outside of South Africa, food insecurity has been linked to greater sexual risks among women (Parry, Patra, & Rehm, 2011; Rollins, 2007; Weiser et al., 2007). It is believed that food insecurity drives sexual risk-taking and HIV infection through three main pathways. The first of these pathways is behaviorally, because food insecurity can lead to procuring food in ways that place one at risk for HIV, such as exchanging sex for food. The second is nutritionally, because food insecurity and associated macro- and micro-nutrient deficiencies lead to immunologic decline and greater susceptibility to HIV. The third is through the association of food insecurity with mental health, because food insecurity is linked to depression, which may undermine sexual decision making and lead to declines in immune functioning (Weiser et al., 2011). Although, food insecurity within South African households is under-studied, it affects a substantial number of South Africans. In 2008, as many as one in four individuals in a national South African survey reported food insecurity (Labadarios et al., 2011). This percentage is down from 52% reported in both 1999 and 2005, suggesting that government policies relating to

food supplementation, food fortification and school food programs have improved food security. However, large numbers of individuals continue to report food insecurity, and women in particular are disproportionately affected (Altman, Hart, & Jacobs, 2009).

The relationship between alcohol use and food insecurity is also understudied, yet appears to be an important component in understanding the broader background of factors relating to HIV transmission. Further study of this relationship is critical for designing effective HIV prevention interventions (Korsten, 1989). Alcohol and food insecurity may affect HIV transmission through both biological and psychosocial routes. The interaction between nutrition and alcohol use has been linked to alcohol-related immune suppression. Heavy alcohol use in combination with poor nutrition can cause damage to one's immune response to infection (Romeo, 2007; Warnberg, Diaz, Gonzalex-Gross, & Marcos, 2007; Watzl & Watson, 1992). Moreover, experiences with both food insecurity and alcohol may contribute to a syndemic (Pitpitan et al., 2012a) – i.e., multiple related epidemics that increase one's likelihood of experiencing negative health outcomes, including HIV (Singer & Clair, 2003). Therefore, the relationship between alcohol and food insecurity is important to assess when evaluating risk factors for HIV.

Gender has also been highlighted as a key factor in understanding how alcohol and food insecurity may each affect risks for HIV (Jewkes & Morrell 2010; Kalichman et al., 2005; Shisana, Rice, Zunga, & Zuma, 2010). In a study of South African male and female alcohol users, Morojele et al. (2006) found that male peers encouraged heavy drinking and sex with multiple partners as a symbol of masculinity. However, among women heavy drinking was considered taboo and largely characterized as a response to abusive home lives. Women were more likely than men to report concerns about unwanted and risky sexual acts when they had been drinking. In regards to food insecurity, considerable research has documented that women in low income countries experience much higher rates of food insecurity than men (Bennett et al., 2005; Parry, Rehm, Poznyak, & Room, 2009; Weiser et al., 2007). This relationship has been largely attributed to the greater likelihood that women with limited resources assume a greater share of the burden of caring for children and elderly family members. This finding in turn was associated with a greater depletion of resources, including food. In a Uganda-based study, researchers found that the effects of food insecurity were more pronounced among female heads-of-households than male, as females had fewer alternative resources to gather food, including remarriage opportunities, land and livestock ownership, and reduced access to government provided food resources (Kanyamurwa & Ampek, 2007).

Study Objectives

For the current study, we used measures of alcohol use, food insecurity, and sexual risk to elucidate the relationships among these HIV-related risk factors among men and women living near shebeens and taverns in South African townships. We hypothesized that experiencing greater severity of food insecurity in the past four months would predict greater recent sexual risk-taking, and that level of recent alcohol use would be an important explanatory variable in this relationship. We hypothesized that these relationships would be stronger for women than men. We first sought to establish the relationships between sexual

risk behavior and both food insecurity and alcohol use. Second, we assessed the nature of these relationships for both men and women in order to determine the strength of these relationships by gender. Third, we used mediation analyses to determine how alcohol use affects the strength of the relationship between food insecurity and sexual risk behavior.

Methods

Participants

Participants were 1137 men and 458 women recruited to participate in a cross sectional anonymous survey from June 2008 to December 2010. All participants were 18 years of age or older.

Research Setting and Procedures

Community-based surveys were conducted in 12 separate neighborhoods within four contiguous Black African Townships approximately 4km wide and located 20km outside of Cape Town's business district. Neighborhoods were defined as an area approximately 0.5 km wide that contained at least one shebeen (bar) serving more than 75 patrons. Using methods described by Weir, Morroni, Coetzee, Spencer, and Boerma (2002), we conducted community assessments to identify 12 shebeens located at least one kilometer from each other. All shebeens were visited, and owners and patrons were assessed to determine shebeen attributes. Field workers were eight men and women from communities similar to our selected areas who spoke both Xhosa and English. Field workers approached both people on the street, and those socializing and drinking in the neighborhood shebeens, and asked if they would be willing to complete a survey that could help their community. Those who agreed to participate (95%) were administered a nine page anonymous survey that most completed in 15 to 20 minutes. Surveys were self-administered in either English or Xhosa but were interviewer-assisted (3%) when a person needed additional reading assistance. Participants were compensated for their time and effort with a non-monetary item (i.e., a keychain or shopping bag). All surveys and study procedures were approved by the University of Connecticut and Human Sciences Research Council Institutional Review Boards.

Measures

Measures used included demographic characteristics: age, education (no schooling, grade 3 - grade 11, grade 12 (graduated) or attended college), ethnicity (Coloured, Black-African), employment (Yes/No), marital status (Yes/No), alcohol frequency, alcohol intoxication, alcohol binge drinking, food insecurity, and sexual risk behaviors.

Food insecurity—We used nine items from the Household Food Insecurity Access Scale (Coates, Swindale, & Bilinsky, 2007). These items included “Did you worry that your household would not have enough food?”, “Was there ever no food to eat of any kind in your household because of a lack of resources to get food?”, and “Did you or any household member go a whole day and night without eating anything because there was not enough food?”. Participants reported how often they experienced each situation in the past four months: never, rarely, sometimes or often. The possible range for this variable was 0–27,

with 0 being experiencing no food insecurity and 27 meaning experiencing all nine events often. In regards to interpreting food insecurity scores, prior research and current definitions consider food insecurity on a scale of severity based on the number of food insecurity indicators that individuals report experiencing (Labadarios et al., 2011; USDA, 2013).

Alcohol use—Alcohol was assessed using items adapted from the AUDADIS-IV (Grant et al., 2003). Participants reported how often they had drunk alcohol in the past 30 days. Heavy episodic drinking was measured by participants reporting how often they drank five or more drinks on one occasion. Responses to these items included: never, once in past 30 days, 2–3 times in the past 30 days, once a week, 2 times a week, 3–4 times a week, and nearly every day.

Sexual risk behaviors—Participants reported their number of male and female sex partners in the past month and the number of times they had vaginal and anal intercourse with and without condoms. All sex behavior questions used open response formats, where participants wrote a number in a black space. We selected a one-month time frame and open response formats to improve recall accuracy and elicit unanchored responses (Napper, Fisher, Reynolds, & Johnson, 2010).

Data Analyses

Data analyses were conducted separately by gender. All analyses were conducted with food insecurity treated as a continuous variable in order to preserve variance. However, for presentation and interpretation purposes, we separated men and women into low and high food insecurity categories based on a median split (a score of 10). In our initial analyses, we used generalized linear modeling with a Poisson distribution to examine the relationships between demographic characteristics, alcohol use, sexual behaviors and food insecurity among men and women. We report risk ratios (RR) with 95% confidence intervals. We then conducted multivariable regression modeling with food insecurity as an independent variable (IV) and sexual behaviors as dependent variables (DVs). All DVs were entered simultaneously into models. For models 1 (women) and 2 (men), food insecurity was treated as IV and sexual behaviors (number of partners, condom protected sex acts and unprotected sex acts) were treated as DVs. We report test statistics (*F value*) including effect sizes (η_p^2). We next conducted mediation analyses in which we entered alcohol use as the mediator to assess the extent to which it accounts for the relationship between food insecurity and sexual risk-taking. We conducted mediation analyses in order to determine whether alcohol use was an explanatory factor in understanding the potential relationship between food insecurity and sexual risk behaviors. We report path coefficients and bootstrap confidence intervals (bias corrected) for the indirect effect path (Baron & Kenny, 1986; Preacher & Hayes, 2008). The multivariate models controlled for community, age and education. We used IBM® SPSS® Statistics, Version 21 (IBM Corp, 2012).

Results

Table 1 displays the results from both women ($n=458$) and men ($n=1137$) who participated in the study. Scores on food insecurity ranged from 1–27, with a median=10. Average age of

participants was 32. Nearly all (98%, $n=1566$) participants were indigenous Black African, 78% were unmarried and 53% were unemployed. Twelve percent of the sample reported being HIV positive. Among both men and women, lower levels of educational attainment and greater rates of unemployment and being unmarried were associated with increased food insecurity. Among both men and women, increased food insecurity was associated with reporting HIV positive status (Table 1).

Food Insecurity

The majority of both men and women were most likely to report that they had: experienced a lack of variety of food due to limited resources, eaten food that they did not want to eat due to lack of resources to gather other foods, eaten a smaller meal than was needed because there wasn't enough food, and eaten fewer meals in a day because there wasn't enough food at least once in the past four months (see Table 2). Furthermore, approximately one-third of respondents reported that they or someone in their household went an entire day and night without eating because they lacked sufficient food. There were no significant differences in patterns of food insecurity by gender.

Alcohol Use and Food Insecurity

Thirty percent of women and 61% of men reported consuming alcohol at least twice a week (see Table 3). Furthermore, 19% of women and 43% of the men reported binge drinking on at least a weekly basis. Among women, alcohol intake frequency and heavy episodic drinking were higher among participants reporting greater food insecurity. Relationships between alcohol use and food insecurity, however, were not significant among men.

Sexual Risks and Food Insecurity

Several sex behaviors (number of male sex partners, vaginal and anal sex with condoms, and vaginal sex without condoms) were associated with food insecurity (see Table 4). There were no differences in number of female sex partners among men, but women who reported more male sex partners reported increased food insecurity. Women who reported more condom-protected vaginal and anal sex acts also reported higher food insecurity, whereas their rates of unprotected vaginal and anal sex acts were not associated with food insecurity. Among men, participants who reported more unprotected vaginal sex acts were more likely to report less food insecurity.

Multivariable Regression Models

Separate multivariable regression models for men and women simultaneously examined the relationships between sexual behaviors and food insecurity while controlling for significant demographic variables and community where participants were recruited (see Table 5). Among women, higher levels of food insecurity were associated with reporting greater numbers of male sex partners and condom-protected sex acts. Among men, greater food insecurity was associated with a reduction in unprotected sex acts. In Figure 1, we further explore these findings by entering alcohol use (a composite score of alcohol frequency and consumption) as a mediator variable. Among women, alcohol use fully mediated the relationships between food insecurity, number of male partners and number of condom

protected sex acts. Among men, however, food insecurity was statistically unrelated to alcohol use and, therefore, did not mediate this relationship.

Discussion

Our study underscores the importance of assessing alcohol use and food insecurity to better understand sexual risk-taking. In particular, our findings show how these relationships vary by gender. Overall, occurrences of food insecurity were common among study participants, with most men and women reporting at least some problems with food accessibility. However, contrary to prior research, we did not observe significant differences in food insecurity by gender. Among women but not men, we observed a relationship between elevated alcohol use and elevated food insecurity. In regards to sex risk behavior, we found evidence that sexual risks were associated with food insecurity among women. More specifically, food insecure women reported more male sex partners but not lower rates of unprotected sex acts. In contrast, protected sex acts were associated with greater food insecurity. Among men, however, there was some evidence that sexual risk-taking, namely unprotected vaginal sex, was associated with decreased food insecurity.

The prevalence of food insecurity was not surprising given the low socioeconomic status of many participants. We expected, however, that women would report greater food accessibility problems than men. It is possible that the high rates of unemployment, and therefore limited income, resulted in sparse resources for both genders to secure food. Economically depressed environments likely engender multiple barriers to food accessibility affecting all participants, regardless of gender. Another explanation for this finding may be the relatively young age of the sample population. Prior research has found that relative to men, women tend to spread available resources, including food, across multiple family members within their care. Caring for multiple family members across generations, however, may be more likely to occur as age increases, and therefore, account for the lack of gender differences in food accessibility. Finally, although rates of food insecurity were similar across gender, associations between food insecurity and other constructs did vary by sex, suggesting that food insecurity may affect men and women differently.

We observed gender differences in alcohol use patterns as they related to food insecurity. The current data showed that women who had increased food insecurity also had limited resources. Alcohol, however, was relatively easy to obtain in shebeens, and men were willing to exchange it for sex. In work by Watt et al. (2002), they found that in shebeens alcohol is commonly exchanged for sex and contributed to the “undervaluing and commoditization” of women. Therefore, it is possible that women who have difficulties in securing food may find that alcohol is more easily obtainable and gravitate towards opportunities to seek out alcohol rather than food. These results may also explain why we observed the relationship between food insecurity and alcohol among women and not men, because exchanging sex for goods tended to be more commonly reported by women than men (Watt et al., 2012). Alcohol use was associated with food insecurity, however, even after controlling for respondents’ significant demographic factors.

For sexual risk behavior, women who experienced greater food insecurity reported both elevated rates of risk behaviors and protective behaviors compared to women reporting less food insecurity. Consistent with the relationships we observed between alcohol and food insecurity, it is possible that women who are food insecure may have more male partners from whom they are able to access resources. Exchanging sex for food may not lead to greater exposure to HIV if sex behavior is condom protected, as observed in the current study. Similar findings have been reported among youth in South Africa (Shisana et al., 2005). Research is needed to understand condom use behaviors with primary versus casual partners among women who meet sex partners in shebeens because overall rates of unprotected vaginal sex were higher than overall rates of condom-protected sex among all women. As such, it is unclear if women who experienced greater food insecurity and had more male sex partners also experienced higher rates of unprotected vaginal sex with multiple male partners. Kalichman, Watt, Sikkema, Skinner, and Pieterse (2012) identified food insecurity as being associated with higher rates of unprotected sex for both men and women. In contrast, among men in the current study, unprotected vaginal intercourse was associated with lower food insecurity. This finding suggests that, for men, sexual risk-taking may be elevated among those who have more resources. The association between food insecurity and sexual risk behavior in men remains unclear and warrants further investigation.

These findings should be viewed in light of several study limitations. Due to using a convenience sample, results are limited to men and women who are attending or who are in close proximity to shebeens and cannot be generalized to the larger South African population. Findings related to food insecurity, alcohol use, and sex behaviors are likely to vary between people who do and do not attend shebeens. In addition, data were cross sectional, which prevents reporting on causal findings. We also relied on self-report of potentially stigmatizing behaviors, which could have resulted in biased responses. Participants and their partners were not linked in the study, which precludes us from being able to draw dyadic level conclusions.

There is urgent need to address the multiple risk factors for HIV transmission that exist in South African townships. The relationships observed between food insecurity, as well as nutritional intake, and sex risk behavior merit further investigation. Furthermore, the relationship between food insecurity and other HIV transmission risk factors, such as transactional sex and intravenous drug use, needs to be examined. It is possible that increased access to food could, in indirect ways, mitigate exposure to HIV, particularly among women. Interventions that provide food or promote skills for obtaining food may have important implications beyond the immediate and obvious benefits of better nutrition. Future research should focus on both individual and system level interventions that evaluate and address the intersection of food insecurity and alcohol use when engaging in risk behavior.

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Figure 1. Alcohol use as a mediator of the relationship between food insecurity and sex behavior
 Figure 1 displays three mediation models: (1) a model among women examining alcohol use as a mediator of food insecurity and male sex partners, (2) a model among women examining alcohol use as a mediator of food insecurity and condom protected sex, and (3) a model among men examining alcohol use as a mediator of food insecurity and unprotected sex acts.

* $p < .05$. ** $p < .01$. *** $p < .001$

Table 1
Demographic characteristics among men and women reporting food insecurity in Cape Town, South Africa.

	Women ^a						Men ^b					
	Food Insecurity						Food Insecurity					
	Low			High			Low			High		
	M	SD		M	SD	RR	M	SD		M	SD	RR
Age	31.15	9.14		32.26	9.20	1.01(1.00–1.01)***	32.83	9.31		32.69	9.07	1.00(.99–1.00)
Education	2.92 ^c	.77		2.38	.66	.71(.69–.75)***	2.69 ^d	.68		2.47	.62	.84(.82–.87)***
	n	%		n	%		n	%		n	%	
Ethnicity												
Black	227	97		217	97	1.03(.98–1.09)	562	99		558	99	.99(.93–1.05)
Coloured	6	3		7	3		6	1		7	1	
Employed												
No	91	39		153	68	1.53(1.44–1.63)***	229	40		365	65	1.38(1.33–1.22)***
Married												
No	173	75		177	79	1.18(1.09–1.26)***	411	72		477	85	1.27(1.21–1.33)***
Ever HIV Tested												
Yes	175	75		158	70	1.08(1.02–1.5)*	352	62		321	57	1.08(1.05–1.13)***
HIV Status												
Positive	16	7		37	16	1.45(1.33–1.59)***	17	3		39	12	1.29(1.19–1.39)***
Negative/Unknown	217	93		188	84		553	97		528	93	

^a n=458;
^b n=1137;
^c Corresponds to having completed 12th grade.
* p<.05.
*** p<.001

Table 2
Food insecurity in the past four months among men and women in and around shebeens in Cape Town, South Africa

	Women ^a				Men ^b				Gender χ^2
	Never	Rarely	Sometimes	Often	Never	Rarely	Sometimes	Often	
Food Insecurity Items	%	%	%	%	%	%	%	%	
Did you worry that your household would not have enough food?	37	33	28	2	40	30	28	2	1.54
Were you or any household members not able to eat the kinds of foods you prefer because of a lack of resources?	27	30	40	3	23	33	41	2	6.08
Did you or any household member have a limited variety of foods due to a lack of resources?	24	28	44	4	20	32	45	3	5.42
Did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources?	26	27	44	3	22	31	45	2	4.33
Did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	27	28	43	2	22	30	46	2	4.40
Did you or any household member have to eat fewer meals in a day because there was not enough food?	27	27	44	2	23	30	45	2	3.55
Was there ever no food to eat of any kind in your household because of a lack of resources to get food?	40	25	34	2	36	29	33	2	3.56
Did you or any household member go to sleep at night hungry because there was not enough food?	64	21	14	1	67	21	12	1	2.26
Did you or any household member go a whole day and night without eating anything because there was not enough food?	68	21	11	.1	73	19	8	1	4.67

^a n=458;

^b n=1137

Alcohol frequency and heavy episodic drinking in the past 30 days among men and women in and around shebeens in Cape Town, South Africa

Table 3

Alcohol Use	Women ^a						Men ^b					
	Food Insecurity						Food Insecurity					
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
	n	%	n	%	n	%	n	%	n	%	n	%
During the past 30 days, how many days did you drink an alcoholic beverage?	1.06(1.05–1.08)***						1.01(.99–1.02)					
Everyday	3	1	16	7			41	7	55	10		
3–4 times a week	18	8	31	14			158	28	133	24		
2 times a week	36	16	33	15			147	26	156	28		
once a week	18	8	11	5			36	6	39	7		
2–3 times past 30 days	11	5	10	5			54	10	37	7		
once in past 30 days	22	10	28	13			39	7	67	12		
Never	124	53	95	42			92	16	78	14		
In the past 30 days, how many times have you had 5 or more drinks?	1.05(1.04–1.07)***						.99(.98–1.00)					
Everyday	2	1	13	6			20	4	22	4		
3–4 times a week	11	5	19	9			112	20	94	17		
2 times a week	23	10	19	9			130	23	110	20		
once a week	20	9	13	6			46	8	56	10		
2–3 times past 30 days	9	4	9	4			22	4	32	6		
once in past 30 days	27	12	29	13			81	14	87	16		
Never	139	60	119	54			154	27	159	28		

^a n=458;

^b n=1137

*** p<.001.

Food insecurity and sex behavior in the past 30 days among men and women in and around shebeens in Cape Town, South Africa.

Table 4

	Women ^a						Men ^b					
	Food Insecurity						Food Insecurity					
	Low		High		RR		Low		High		RR	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
How many men have you had sex with?	.94	.83	1.37	1.76	1.04(1.03,06)	***	.01	.13	.01	.07	.88(.72–1.07)	
How many women have you had sex with?	.05	.27	.00	.07	n/a		1.71	1.76	1.65	1.91	1.00 (.99–1.01)	
Vaginal sex with condoms	3.70	5.57	5.18	7.74	1.01(1.01–.01)	***	6.37	8.20	6.34	7.68	1.00(.99–1.00)	
Vaginal sex without condoms	6.46	7.33	6.79	8.38	.99(.99–1.01)		8.29	7.68	6.41	7.28	.99(.99–.99)	***
Anal sex with condoms	.11	.75	.19	1.19	1.04(1.02–1.07)	**	.60	2.14	.55	2.14	.99(.98–1.02)	
Anal sex without condoms	.38	1.51	.33	1.68	1.00(.98–1.02)		.31	1.59	.40	1.73	1.01(.99–1.02)	

^a n=458;

^b n=1137

** p<.01.

*** p<.001.

Table 5
Multivariable regression models of food insecurity predicting sex behavior among men and women in Cape Town, South Africa.

Women		Men	
Model 1		Model 2	
Food Insecurity	Male Sex Partners $F(1,457)=3.90^*$ $\eta_p^2=.01$	Condom Protected Sex Acts $F(1,457)=8.78^{**}$ $\eta_p^2=.02$	Unprotected Sex Acts $F(1,457)=.63$ $\eta_p^2=.01$
		Female Sex Partners $F(1,1110)=.05$ $\eta_p^2=.01$	Condom Protected Sex Acts $F(1,1110)=.20$ $\eta_p^2=.01$
			Unprotected Sex Acts $F(1,1110)=7.12^{**}$ $\eta_p^2=.01$

Note. Both models controlled for community, age, and education.

*
 $p<.05$.
**
 $p<.01$.