

Original Paper

Characteristics of Men Who Have Sex With Men in Southern Africa Who Seek Sex Online: A Cross-Sectional Study

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Abstract

Background: Use of the Internet for finding sexual partners is increasing, particularly among men who have sex with men (MSM). In particular, MSM who seek sex online are an important group to target for human immunodeficiency virus (HIV)/sexually transmitted infection (STI) interventions because they tend to have elevated levels of sexual risk behavior and because the Internet itself may serve as a promising intervention delivery mechanism. However, few studies have examined the correlates of online sexual partner seeking among MSM in sub-Saharan Africa.

Objective: These analyses aim to describe the prevalence of using the Internet to find new male sexual partners among MSM in two southern African countries. In addition, these analyses examine the sociodemographic characteristics, experiences of discrimination and stigma, mental health and substance use characteristics, and HIV-related knowledge, attitudes, and behaviors among MSM associated with meeting sex partners online.

Methods: MSM were enrolled into a cross-sectional study across two sites in Lesotho (N=530), and one in Swaziland (N=322) using respondent-driven sampling. Participants completed a survey and HIV testing. Data were analyzed using bivariate and multivariable logistic regression models to determine which factors were associated with using the Internet to meet sex partners among MSM.

Results: The prevalence of online sex-seeking was high, with 39.4% (209/530) of MSM in Lesotho and 43.8% (141/322) of MSM in Swaziland reporting meeting a new male sexual partner online. In the multivariable analysis, younger age (adjusted odds ratio [aOR] 0.37, 95% confidence interval [CI] 0.27-0.50 per 5 years in Lesotho; aOR 0.68, 95% CI 0.49-0.93 in Swaziland), having more than a high school education (aOR 18.2, 95% CI 7.09-46.62 in Lesotho; aOR 4.23, 95% CI 2.07-8.63 in Swaziland), feeling scared to walk around in public places (aOR 1.89, 95% CI 1.00-3.56 in Lesotho; aOR 2.06, 95% CI 1.23-3.46 in Swaziland), and higher numbers of male anal sex partners within the past 12 months (aOR 1.27, 95% CI 1.01-1.59 per 5 partners in Lesotho; aOR 2.98, 95% CI 1.51-5.89 in Swaziland) were significantly associated with meeting sex partners online in both countries. Additional country-specific associations included increasing knowledge about HIV transmission, feeling afraid to seek health care services, thinking that family members gossiped, and having a prevalent HIV infection among MSM in Lesotho.

Conclusions: Overall, a high proportion of MSM in Lesotho and Swaziland reported meeting male sex partners online, as in other parts of the world. The information in this study can be used to tailor interventions or to suggest modes of delivery of HIV prevention messaging to these MSM, who represent a young and highly stigmatized group. These data suggest that further research assessing the feasibility and acceptability of online interventions will be increasingly critical to addressing the HIV epidemic among MSM across sub-Saharan Africa.

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KEYWORDS

Internet; HIV; male homosexuality; southern Africa; social stigma; sexual behavior

Introduction

Globally, the Internet is becoming an increasingly popular platform for meeting new sexual partners, particularly among men who have sex with men (MSM) [1-6]. Recent studies conducted among MSM in Europe and North America indicate that 34-50% report having met a sexual partner online [1,2,4,5]. In particular, MSM who use the Internet to find sexual partners are an important group to target for human immunodeficiency virus (HIV)/sexually transmitted infection (STI) interventions because they tend to have elevated levels of sexual risk behavior and because the Internet itself may serve as a promising intervention delivery mechanism. For example, risk behaviors associated with using the Internet to find sexual partners include increased levels of methamphetamine use [1], higher numbers of sexual partners [1,4,7], and a higher frequency of unprotected anal intercourse [1,4,5,8-10].

In light of these observations, one study measured the acceptability of using Internet-based HIV testing among MSM in Canada and identified perceived benefits to this delivery method including privacy and convenience [11]. Another study conducted in the United States identified high levels of interest for multiple sexual health education topics delivered via the Internet [12]. Further, studies have pointed to the Internet's ability to enhance the discussion of HIV status and negotiate safer sex practices between partners before meeting [13-15], potentially because the anonymity of the Internet appears to facilitate more direct and less stigmatizing discussions of these complex issues. Finally, additional research suggests that use of the Internet for seeking HIV/STI information is common among MSM using the Internet to find sexual partners [16], further suggesting the potential effectiveness for the Internet to serve as a mechanism to deliver HIV/STI prevention.

However, the majority of research to date assessing the prevalence of, factors associated with, and potential interventions directed towards MSM using the Internet to find sex partners has occurred primarily in higher income settings such as the United States and Europe. Less is known about the Internet sex-seeking behaviors of MSM in sub-Saharan Africa, despite the high and consistent risk for HIV among MSM in this region [17]. In addition, stigma and discrimination may also play a particularly important role in Internet sex-seeking behavior due to high levels of homophobia [18-21], which may dissuade MSM from finding sex partners in other venues such as bars or clubs. Of the limited research conducted in sub-Saharan Africa, one study found that using the Internet to find sex partners was associated with testing positive for HIV

among MSM in Malawi [21]. Further, having a higher level of education and increased numbers of recent sexual partners were associated with having met sex partners on the Internet among MSM in Cameroon [22]. However, there is a need for additional research to understand the feasibility of Internet-based intervention efforts in sub-Saharan Africa, especially given evidence to suggest that Internet use is growing in the region [23], and particularly among adolescents [24,25].

Because there is evidence suggesting that using the Internet to find sexual partners is associated with risk behaviors among MSM and that the Internet could serve as a promising HIV intervention delivery mechanism, and due to the lack of studies assessing Internet use among MSM in southern Africa, these analyses aim to describe the prevalence of using the Internet to find new male sexual partners online among MSM in two southern African countries. Furthermore, these analyses examine the demographic characteristics, experiences of discrimination and stigma, mental health and substance use characteristics, and HIV-related characteristics among MSM associated with meeting sex partners via the Internet. Taken together, these findings may be used to inform the development of tailored online HIV prevention interventions in southern Africa.

Methods

Study Population and Sampling Methods

Data were collected from February-September 2014 in Maseru and Maputsoe in Lesotho and July-December 2011 in Manzini, Swaziland. Participants were recruited in-person using respondent-driven sampling (RDS) [26,27]. Sampling methods are described in detail elsewhere [28]. In brief, initial recruits or "seeds" recruited peers who then recruited additional peers and so forth, until the desired sample size was reached. Each recruiter could recruit up to three peers. In Maseru, 9 seeds recruited participants through up to 13 waves of accrual, and 7 seeds in Maputsoe recruited participants through up to 17 waves. In Swaziland, 5 seeds recruited participants through up to 14 waves of accrual. In all study sites, equilibrium was reached for several sociodemographic characteristics including age, sexual orientation, and education. Equilibrium was defined using two criteria: (1) close approximation (± 0.03) of the sample proportion and corresponding equilibrium proportion [26], and (2) comparison of the required number of recruitment waves estimated using the respondent driven sampling analysis tool (RDSAT) with the actual number of recruitment waves in the RDS sample [29]. Specifically, the number of recruitment waves estimated to reach equilibrium in RDSAT had to be smaller

than the number of waves in the RDS sample for equilibrium to be considered.

MSM were eligible to participate if they were aged 18 years or older, assigned male sex at birth, capable of providing informed consent, and reported having receptive or insertive anal intercourse with another man in the past 12 months. No exclusions were made on the basis of ethnicity, gender identity, or history of HIV testing and diagnosis.

In Swaziland, 4 participants did not answer the question pertaining to meeting partners online and were excluded, resulting in a final sample of 322. All participants in Lesotho answered the question pertaining to meeting partners online ($n=530$). Participants were reimbursed the equivalent of up to approximately US \$10 for their time and travel to the study site. In addition, participants were compensated the equivalent of up to approximately US \$2 for each eligible participant they recruited into the study. All participants provided informed oral consent prior to data collection. Data collection was approved by the Institutional Review Board of the Johns Hopkins Bloomberg School of Public Health, the Lesotho National Health Research Ethics Committee, and the Ministry of Health Scientific Ethics Committee in Swaziland.

Data Collection and Key Measures

During the study visit, trained interviewers administered a structured questionnaire including topics on demographics, social stigma and negative experiences with health care workers and other members of society, social cohesion, mental health and illicit substance use, sexual history, and HIV-related knowledge, attitudes, and behaviors. The primary outcome variable of interest was whether the participant reported meeting new male sexual partners on the Internet. In Lesotho, this was measured by asking, "Where (in what type of place) do you meet new male sexual partners?" Participants were read a list of possible places, and those who responded yes to "online" were indicated as having met male sex partners online. Participants could choose more than one place. In Swaziland, participants were asked, "In the past 12 months, how often have you used the Internet to look for male sexual partners?" and response options were "did not go", "once a month or less", "about once a week", "several times a week", "about once a day", and "several times a day". Those who reported having ever met a partner on the Internet were indicated as having met male sex partners online.

Stigma was measured by a series of "yes" or "no" questions that assessed whether the participant ever felt excluded from family gatherings, that family members gossiped or made discriminatory remarks, rejected by friends, or scared to walk around in public places because of their gender identity or sexual orientation, and if they knew of safe places in their community to socialize with other MSM or had ever been tortured because of their gender identity or sexual orientation. Torture could include both physical abuse such as being beaten or forced to have sex, as well as verbal abuse. In Lesotho, participants were additionally asked if they had ever overheard someone saying discriminatory things about MSM, if they did not feel protected by police, or were ever verbally harassed or blackmailed because of their gender identity or sexual orientation [19-21,30]. Health

care stigma was measured by asking participants if they ever avoided (in Lesotho only) or felt afraid to go to health care services because they were worried that someone may learn that they have sex with men, or if they ever felt that they were not treated well in a health center because someone knew they had sex with men.

In Lesotho, depression was assessed using the Patient Health Questionnaire [31], and a positive screen was defined as receiving a score of 10 or greater. In Swaziland, a positive depressive symptoms screen was indicated by answering "yes" to the question, "Have you felt sad or had a depressed mood for more than 2 weeks at a time in the last 3 years?" and suicidal ideation was assessed by asking the participant if he had ever felt like he wanted to end his life. In both countries, drug use was assessed by asking the participant if he had injected any illicit drugs or used any non-injection drugs that were not prescribed to him for health reasons in the past 12 months.

HIV knowledge was assessed by asking participants what type of sex puts them most at risk for HIV, what type of anal sex (ie, insertive or receptive) puts them most at risk for HIV, and what is the safest lubricant to use during anal sex. Attitude towards HIV was measured by asking if they worried about HIV in the past 12 months. Finally, HIV-related behaviors were measured by asking participants if they had ever tested for HIV (in Lesotho) or tested within the past 12 months (in Swaziland), if they had any unprotected anal intercourse (receptive or insertive) in the past 12 months, if they had transactional sex (eg, sex in exchange for drugs or money) with a male partner in the past 12 months, and how many male anal sex partners they had in the past 12 months.

After completing the questionnaire, trained nurse counselors performed blood draws to test for HIV using the Determine Rapid Test (Alere). If tested positive, the sample was then tested using the Unigold Rapid Test (Trinity Biotech). Confirmatory testing was performed for discrepant or indeterminate HIV rapid tests in accordance with national guidelines [32,33].

Statistical Analysis

RDS-adjusted prevalence estimates for having met a sex partner online at each study site were generated using RDSAT [29]. In a sensitivity analysis, we performed RDS-adjusted bivariate and multivariable logistic regression analyses across each study site by weighting based on the outcome variable. However, because results were convergent and data from the two Lesotho sites were pooled, we present only the unadjusted results [34,35]. Variables were entered into the final logistic multivariable regression model based on a priori knowledge of existing potential confounders and the results of the bivariate analysis. These analyses were performed using SAS software version 9.4.

Results

Sociodemographic Characteristics of Study Sample

The prevalence of seeking partnerships on the Internet was high, with 39.4% (209/530) of MSM in Lesotho and 43.8% (141/322) of MSM in Swaziland reporting meeting a new male sexual partner online (Table 1). Among those who were asked what

website they primarily used for meeting partners, the majority in Swaziland reported using Facebook (data not shown). Participants tended to be young overall, with a median age of 23 in Lesotho and 22 in Swaziland. A larger proportion of participants identified as gay or homosexual in Swaziland (202/320, 63.1%) as compared with Lesotho (215/519, 41.4%).

In addition, more participants in Lesotho (111/529, 21.0%) reported ever being married to or cohabiting with a female partner as compared with Swaziland (12/318, 3.8%). The median MSM network size was similar across Lesotho (10) and Swaziland (12).

Table 1. Prevalence of sociodemographic characteristics and meeting sex partners online among MSM study participants in Lesotho and Swaziland.

Characteristics	Lesotho (N=530)	Swaziland (N=322)
Age in years, median (interquartile range)	23 (20-27)	22 (20-26)
Gender, n (%)		
Male	487 (91.9)	232 (72.7)
Female/intersex	43 (8.1)	87 (27.3)
Sexual orientation, n (%)		
Gay	215 (41.4)	202 (63.1)
Bisexual	286 (55.1)	114 (35.6)
Heterosexual	18 (3.5)	4 (1.3)
Education completed, n (%)		
Primary school or less	100 (18.9)	110 (34.2)
Secondary/High school	347 (65.6)	135 (41.9)
More than high school	82 (15.5)	77 (23.9)
Marital status, n (%)		
Single/never married	418 (79.0)	306 (96.2)
Ever married or cohabited	111 (21.0)	12 (3.8)
Network size, median (interquartile range)	10 (5-20)	12 (6-30)
Met male sex partner online, n (%)	209 (39.4)	141 (43.8)
RDS-adjusted % (95% CI)	35.7 (28-46) ^a	39.2 (31-49)
RDS-adjusted % (95% CI)	26.1 (17-36) ^b	

^aMaseru.

^bMaputsoe.

Sociodemographic Characteristics Associated With Meeting a Sex Partner Online

Older age was associated with being less likely to use the Internet to find new male sex partners among MSM in Lesotho (odds ratio [OR] 0.57, 95% confidence interval [CI] 0.47-0.70 per 5 years) (Table 2). In addition, participants who identified as female/intersex were more likely to use the Internet for male sex partners in Lesotho (OR 3.53, 95% CI 1.82-6.86). In both

countries, reporting secondary/high school (OR 5.88, 95% CI 3.03-11.39 in Lesotho; OR 2.02, 95% CI 1.19-3.41 in Swaziland) and more than a high school level of education (OR 13.31, 95% CI 6.17-28.73 in Lesotho; OR 2.83, 95% CI 1.54-5.18 in Swaziland) were positively associated with using the Internet to find sex partners. Finally, reporting a larger network of MSM was also associated with using the Internet to find sex partners in Lesotho (OR 1.25, 95% CI 1.12-1.40 per 10 MSM).

Table 2. Bivariate associations between sociodemographic characteristics and meeting sex partners online, among MSM in Lesotho and Swaziland.

	Lesotho		Swaziland	
	OR	95% CI	OR	95% CI
Age, per 5 years	0.57	0.47-0.70 ^a	0.91	0.72-1.15
Gender				
Male	Ref	—	Ref	—
Female/intersex	3.53	1.82-6.86 ^a	1.48	0.90-2.42
Sexual orientation				
Gay	Ref	—	Ref	—
Bisexual	0.51	0.35-0.73 ^a	0.76	0.48-1.21
Heterosexual ^b	0.20	0.06-0.70 ^a	—	—
Education completed				
Primary school or less	Ref	—	Ref	—
Secondary/High school	5.88	3.03-11.39 ^a	2.02	1.19-3.41 ^a
More than high school	13.31	6.17-28.73 ^a	2.83	1.54-5.18 ^a
Marital status				
Single/never married	Ref	—	Ref	—
Ever married or cohabited	0.76	0.49-1.18	0.93	0.29-2.99
Network size, per 10 MSM	1.25	1.12-1.40 ^a	1.03	0.99-1.07

^a $P < .05$.^bSample size was not large enough to generate OR in Swaziland.

Social and Health Care Stigma and Mental Health Factors

In Lesotho, meeting new male sex partners online was significantly associated with feeling that family members gossiped or made discriminatory remarks about the participant's sexual orientation or gender identity (OR 4.86, 95% CI 2.80-8.43), feeling excluded by family members (OR 2.53, 95% CI 1.29-4.97), hearing discriminatory remarks about MSM (OR 2.34, 95% CI 1.48-3.72), being verbally harassed (OR 2.48, 95% CI 1.73-3.55), feeling scared to walk around in public (OR 3.20, 95% CI 1.94-5.30), and being tortured (OR 4.17, 95% CI 1.46-11.86) (Table 3). In Swaziland, feeling rejected by friends

(OR 2.17, 95% CI 1.38-3.41) and feeling scared to walk around in public (OR 1.79, 95% CI 1.14-2.79) were associated with meeting a new male sex partner online. Finally, meeting sex partners online was associated with being afraid to seek health care services (OR 3.32, 95% CI 1.91-5.76), avoiding services (OR 2.43, 95% CI 1.28-4.62), and being treated poorly by a health care worker (OR 3.48, 95% CI 1.30-9.31) in Lesotho.

There was only one statistically significant association detected between mental health and substance use measures and meeting sex partners online (Table 4). In Lesotho, screening positive for depression was associated with using the Internet to meet sex partners (OR 1.77, 95% CI 1.11-2.83).

Table 3. Bivariate associations between stigma and meeting sex partners online, among MSM in Lesotho and Swaziland.

Explanatory variable	Lesotho			Swaziland		
	n ^a	OR	95% CI	n ^a	OR	95% CI
Social stigma						
Family exclusion	38	2.53	1.29-4.97 ^b	81	1.11	0.67-1.84
Family gossiped	71	4.86	2.80-8.43 ^b	157	1.39	0.90-2.17
Friend rejection	100	1.33	0.86-2.06	176	2.17	1.38-3.41 ^b
No safe place to socialize with other MSM	160	1.05	0.72-1.54	200	1.09	0.69-1.73
Heard discriminatory remarks about MSM	413	2.34	1.48-3.72 ^b	—	—	—
Did not feel protected by police	18	2.50	0.96-6.57	—	—	—
Felt scared to walk around in public	77	3.20	1.94-5.30 ^b	145	1.79	1.14-2.79 ^b
Verbally harassed	214	2.48	1.73-3.55 ^b	—	—	—
Blackmailed	100	0.93	0.59-1.45	—	—	—
Tortured	18	4.17	1.46-11.86 ^b	129	1.20	0.77-1.88
Health care stigma						
Afraid to seek services	63	3.32	1.91-5.76 ^b	177	1.07	0.69-1.67
Avoided services	42	2.43	1.28-4.62 ^b	—	—	—
Treated poorly	19	3.48	1.30-9.31 ^b	54	0.86	0.48-1.56

^an refers to the number of participants who indicated “yes” for the explanatory variable.

^b $P < .05$.

HIV Knowledge, Attitudes, and Behaviors and Prevalent HIV Infection

Overall, a greater knowledge about HIV transmission was associated with meeting sex partners online (Table 4). In particular, knowing that water-based lubrication is the safest to use during anal sex was significantly associated with finding partners online in both countries (OR 3.01, 95% CI 2.09-4.32 in Lesotho; OR 1.66, 95% CI 1.05-2.61 in Swaziland). In addition, knowing the correct answer to all three questions assessing HIV transmission knowledge was associated with meeting partners online in Lesotho (OR 2.72, 95% CI 1.55-4.79). Among those who had never been diagnosed with HIV, being worried about HIV infection was significantly

associated with meeting partners online in Lesotho (OR 1.69, 95% CI 1.04-2.76).

There were no associations detected between meeting sex partners on the Internet and ever receiving an HIV test, reporting any recent unprotected anal intercourse, or engaging in transactional sex in either country. However, across both countries reporting a greater number of male anal sex partners in the past 12 months was associated with meeting sex partners online (OR 1.30, 95% CI 1.07-1.56 per 5 partners in Lesotho; OR 2.24, 95% CI 1.20-4.19 per 5 partners in Swaziland). Finally, testing positive for HIV was significantly associated with having met partners online in Lesotho (OR 1.50, 95% CI 1.04-2.17).

Table 4. Bivariate associations between HIV-related variables and meeting sex partners online, among MSM in Lesotho and Swaziland.

Explanatory variable	Lesotho			Swaziland		
	n ^a	OR	95% CI	n ^a	OR	95% CI
Mental health						
Depressed	84	1.77	1.11-2.83 ^b	208	1.18	0.74-1.87
Suicidal ideation, ever	—	—	—	141	1.37	0.88-2.13
Substance use						
Any illicit drug use, past 12 months	89	0.79	0.49-1.28	113	1.52	0.96-2.40
HIV-related knowledge, attitudes, and behaviors						
Anal sex is riskier than vaginal or oral sex	138	2.28	1.54-3.39 ^b	80	0.87	0.52-1.44
Receptive anal sex is riskier than insertive	267	0.78	0.55-1.11	96	1.00	0.62-1.62
Water-based lubricant is the safest to use during anal sex	219	3.01	2.09-4.32 ^b	134	1.66	1.05-2.61 ^b
All of the above	57	2.72	1.55-4.79 ^b	23	0.81	0.34, 1.94
Worried about HIV ^c	84	1.69	1.04-2.76 ^b	150	1.14	0.72-1.82
Tested for HIV ^d	366	1.57	0.97-2.56	161	1.08	0.68-1.70
Any unprotected AI, past 12 months	267	1.34	0.95-1.91	143	1.31	0.81-2.12
Transactional sex with male, past 12 months	170	1.11	0.77-1.61	84	0.83	0.50-1.38
Five additional male AI partners, past 12 months, median (IQR)	3 (1-4)	1.30	1.07-1.56 ^b	2 (1-3)	2.24	1.20-4.19 ^b
Laboratory testing						
Positive for HIV	173	1.50	1.04-2.17	55	1.07	0.60-1.92

^an refers to the number of participants who indicated “yes” for the explanatory variable.

^b $P < .05$.

^cAmong those who have never been told that they have HIV.

^dRefers to ever in Lesotho and past 12 months in Swaziland.

Factors Independently Associated With Meeting Sex Partners Online

In the multivariable analysis, younger age, increased level of education, feeling scared to walk around in public places, and higher numbers of male anal sex partners were significantly associated with meeting sex partners online in both countries

(Table 5). Additional country-specific associations included increasing knowledge about HIV transmission (adjusted odds ratio [aOR] 1.29, 95% CI 1.02-1.64), feeling afraid to seek health care services (aOR 2.31, 95% CI 1.15-4.65), feeling that family members gossiped (aOR 3.42, 95% CI 1.76-6.67), and having a prevalent HIV infection (aOR 2.45, 95% CI 1.41-4.24) in Lesotho.

Table 5. Factors independently associated with meeting sex partners online, among MSM in Lesotho and Swaziland (variables entered into single logistic regression model for each country).

Explanatory variable	Lesotho		Swaziland	
	aOR	95% CI	aOR	95% CI
Age, per 5 years	0.37	0.27-0.50 ^a	0.68	0.49-0.93 ^a
Secondary/High school	6.15	2.74-13.78 ^a	2.46	1.38-4.39 ^a
More than high school	18.18	7.09-46.62 ^a	4.23	2.07-8.63 ^a
Female/other gender	2.03	0.87-4.74	1.50	0.85-2.65
Ever married or cohabited	2.15	1.23-3.76 ^a	1.77	0.49-6.43
Ever felt scared to walk around in public	1.89	1.00-3.56 ^a	2.06	1.23-3.46 ^a
Ever felt that family members gossiped	3.42	1.76-6.67 ^a	1.29	0.79-2.11
Ever felt afraid to go to health care services	2.31	1.15-4.65 ^a	0.98	0.58-1.64
Increasing knowledge of HIV transmission ^b	1.29	1.02-1.64 ^a	1.01	0.76-1.35
Five additional male AI partners, past 12 months	1.27	1.01-1.59 ^a	2.98	1.51-5.89 ^a
Tested positive for HIV	2.45	1.41-4.24 ^a	1.39	0.68-2.84

^a $P < .05$.

^bRefers to number of HIV-related knowledge questions answered correctly.

Discussion

Principal Findings

In this study of MSM across two countries in southern Africa, we found that a high proportion reported using the Internet to meet new male sex partners, and the prevalence was similar to that observed among MSM across North America and Europe [1,2,4,5]. Southern African MSM who reported social and health care stigma, were younger, more educated, were knowledgeable about HIV transmission, and reported a greater number of recent anal sex partners were more likely to report using the Internet to meet male sex partners. Within Lesotho, MSM who had larger MSM networks screened positive for depression and tested positive for HIV were also more likely to meet partners online. These findings have implications for the future development of Internet-based HIV interventions.

Recent online HIV intervention efforts directed towards MSM are summarized in a 2007 literature review [36]. These efforts include feasibility studies of Internet- and mobile phone-based programs primarily designed to reduce HIV risk behavior, with overall high levels of feasibility noted thus far. However, most of this work has been conducted in the United States or Europe with limited focus on sub-Saharan Africa. One likely significant difference between populations of MSM in higher income settings as compared to MSM in sub-Saharan Africa is the level of stigma and discrimination. In particular, male homosexual acts are criminalized in Swaziland, and in Lesotho sodomy is still prohibited as a common-law offense [37]. Not only are stigma and discrimination likely to be higher in these countries, but these results suggest that those MSM who use the Internet to meet sex partners report even higher levels of stigma and discrimination than their peers. This suggests that there may be opportunities via Internet-based methods to link these

individuals to social support networks, including cyber-support networks, to help increase skills for coping with stigma. For example, one study conducted among racial/ethnic minority MSM in Los Angeles, CA, indicated that social media-based HIV prevention interventions can increase community cohesion and facilitate discussions about HIV-related stigma and discrimination [38,39]. In contrast, because reporting a larger MSM network was also associated with Internet sex-seeking in Lesotho, existing Internet social networks could be used to deliver HIV interventions or to facilitate linkage to HIV testing and care in health care venues that are sensitive to the needs of MSM. The finding that larger sexual networks are associated with using the Internet to meet new sex partners has been identified previously by studies in higher income settings [1,8,40] and indicates that much of the knowledge attained from these studies might be applicable to Internet-using MSM in southern Africa. However, additional feasibility studies are needed for Internet-based HIV interventions among MSM in sub-Saharan Africa, including where and how these men access the Internet.

The finding that younger, more educated and informed individuals were using the Internet to meet sex partners may be reflective of the population subgroups who have better access to the Internet in general. However, the Internet may be particularly relevant to younger MSM in building and establishing peer networks that support sexual health and empowerment, in part because adolescence is an important time for development of self-acceptance and sexual identity [4,41,42]. Because of the positive association between existing HIV transmission knowledge and Internet sex-seeking, Internet-based interventions to increase HIV knowledge may be less effective for MSM using the Internet to find partners. Instead, efforts might be better focused towards the Internet's ability to facilitate

safer sex negotiation and serostatus disclosure [13,14]. For example, MSM could be encouraged to disclose their HIV status on their online profile or to discuss their HIV status and preferences for condom use with potential sex partners before meeting. However, there is some concern for the potential misrepresentation of HIV status among those who have never tested or have tested positive, possibly as a result of HIV stigma or fear of losing sexual partners [43]. Because the Internet allows for the opportunity to interact with greater numbers of sexual partners, safer sex negotiation may be even more important as the opportunity for exposure to HIV and STIs is increased.

In addition, these findings suggest some variability by country. For example, testing positive for HIV was associated with meeting sex partners online among MSM in Lesotho but not in Swaziland. This speaks to the importance of tailoring online interventions for different groups of MSM by region, as MSM in one region may not have the same experiences or needs as MSM in other parts of southern Africa. However, we did find consistency in several of our results across countries, suggesting that MSM who use the Internet to find sex partners are a relatively defined group with specific characteristics and needs.

Limitations

There are several limitations of these analyses. First, data were cross-sectional and as such we make no effort to infer causality. Instead, our objective was to describe the prevalence of and characteristics associated with meeting a sex partner online among MSM in southern Africa because they represent an important understudied group with many untapped opportunities for intervention. Second, comparisons made across countries must be interpreted with caution as there was some variability in the phrasing of the question regarding Internet use to find sex partners. In particular, the Lesotho questionnaire asked about current online partner seeking and the Swaziland questionnaire asked about online partner seeking within the past 12 months. In addition, data were collected in 2014 in Lesotho and 2011 in Swaziland, which could account for some variation between countries because the Internet was less popular and more expensive in 2011 as compared with 2014 in this region. However, there were similarities in the response distribution

and measures of associations between the two countries, which suggests that both questions similarly measured recent Internet use to find male sex partners.

Finally, the use of RDS requires certain underlying assumptions to be met [44]. Because of the difficulty involved with testing these assumptions, it is possible that not all assumptions were met in this study. For example, participants were not explicitly asked during the interview how they knew their recruiter. However, recruiters were instructed to recruit only MSM who they knew and who also knew them. Further, because there are limited data available regarding the total number of MSM in Lesotho and Swaziland, it is difficult to test the assumption that the recruited sample size is small relative to the overall size of the target population. In addition, there can be bias introduced in RDS by the non-random selection of individuals out of a recruiter's social network [45]. However, results from our RDS-adjusted sensitivity analysis indicated similar results to the unadjusted estimates presented here. Because equilibrium was reached for several sociodemographic characteristics in this study, this further suggests a minimal overall bias due to non-random recruitment.

Conclusions

Overall, a high proportion of MSM in southern Africa report meeting male sex partners online, as in other parts of the world. The information in this study can be used to tailor interventions to young, educated, and stigmatized MSM who were most likely to report using the Internet to find sex partners. Internet use for meeting sexual partners is likely to increase in prevalence in coming years among MSM in southern Africa, as it is currently common among younger age groups. These trends reinforce the potential value of engaging MSM in these settings through online interventions. Moreover, interventions should draw from the lessons of online engagement of MSM in other parts of the world including North America, Europe, and Asia given the similarities observed. Ultimately, these analyses suggest that further research assessing the feasibility and acceptability of online interventions will be increasingly critical to addressing the HIV epidemic among MSM in sub-Saharan Africa.

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Authors' Contributions

SS led the analysis of the secondary datasets and manuscript writing. SB conceptualized and designed the study. Implementation of the study at the Lesotho sites were led by TM and NT, with substantial support from AG, SK, and JN. Implementation of the study in Swaziland was led by XM, BS, and ZM. All authors provided critical inputs for the interpretation of results, have read, and approved the final manuscript.

Conflicts of Interest

None declared.

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Abbreviations

- AI:** anal intercourse
- aOR:** adjusted odds ratio
- HIV:** human immunodeficiency virus
- IQR:** interquartile range
- MSM:** men who have sex with men
- OR:** odds ratio
- RDS:** respondent-driven sampling
- RDSAT:** respondent-driven sampling analysis tool
- STI:** sexually transmitted infection

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