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Is the Web the Culprit? Cognitive Escape and Internet Sexual risk among Gay and Bisexual Men

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Abstract Men who have Sex with Men (MSM) who find partners on the Internet tend to be sexually risky. A "cognitive escape" perspective maintains that feeling overwhelmed by rigorous sexual norms may lead one to cognitively disengage from these demands as a coping strategy. We thus proposed that the Internet might facilitate less restrained behavior among men whose psychological characteristics make them vulnerable to "escape"-based risk. We tested this in a socio-economically and ethnically diverse cross sectional survey sample of MSM, $n = 817$. Men who sought sex online reported more unprotected sex and sexually transmitted infections, controlling for demographics and overall number of sex partners. Consistent with an escape perspective, partner choice and sexual context, alcohol and drug use, and "burnout" or fatigue over sexual safety mediated the relationship between Internet use and sexual risk. The Internet is not an isolated source of risk; interventions must address the psychosocial aspects of this venue.

Keywords Men who have sex with men · Sexual risk · Sexually transmitted infections · Internet · Cognitive escape

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Introduction

The Internet has become a popular and dynamic source of partners for men who have sex with men (MSM). In some reports, the Internet outranks traditional venues such as gay bars or bathhouses as places for MSM to meet partners. Men who have sex with men who seek sex partners via the Internet are at heightened risk for unprotected sex, combining sex with drugs, and sexually transmitted infections (STIs; Bull & McFarlane, 2000; Klausner, Wolf, Fischer-Ponce, Zolt, & Katz, 2000). Thus, the Internet has become a key venue for not only sex, but for sexual risk-taking and disease transmission. The psychosocial processes that underlie the relationship between Internet sex seeking and behavioral risk have been less well explored. Characterizing psychosocial variables that create vulnerability to Internet sexual risk may facilitate the design of behavioral interventions to break up this pattern.

The Internet may enhance sexual risk directly, by increasing both the availability and acceptability of risky partners (see Cooper, Morahan-Martin, Mathy, & Maheu, 2002; Cooper, Scherer, Boies, & Gordon, 1999; Cooper & Victory, 2002; King, 1999). The emergence of "barebacking" – intentional unprotected sex among MSM – may have been facilitated by wide availability of risky partners through the Internet (Blechner, 2002) . The bareback – Internet connection may be particularly strong for men infected with HIV, many of whom use the Internet for health information (Kalichman, Benotsch, Weinhardt, Austin, Luke, et al., 2003; Mansergh, Marks, Colfax, Guzman, Rader, et al., 2002). Internet use may also increase the perceived acceptability of unprotected sex. Sunstein (2001); see Levant and Seligman (2002) coined the term "the daily me" to characterize peoples' tendency to access an increasingly narrow – but very deep – pool of Internet sites that reinforce and

polarize personal beliefs. Selective exposure to sites that feature attractive and apparently healthy gay men practicing unprotected sex may induce a "false consensus" (Krueger & Clement, 1994) that such practices are normative, creating increasingly extreme individual norms or attitudes. A simple Internet search using "MSM sex" or "barebacking" as key words yields many sites devoted to unprotected sex.

The Internet makes diverse forms of sex available, anonymous, affordable and acceptable (King, 1999), yet only a subset of Internet users move toward "addictive" or risky use (Cooper et al., 2002). Our perspective is that distinctive characteristics of the Internet interact with the psychosocial and personal dispositions of users to promote risk (Bargh, McKenna, & Fitzsimons, 2002; McKenna, Green, & Gleason, 2002). The Internet is associated with unsafe sex both because Internet exposure changes the norms or practices of users, and because it attracts people who are vulnerable to risk. We drew on a "cognitive escape" perspective (Dunkel-Schetter, Feinstein, Taylor, & Falke, 1992; Folkman, Chesney, Cooke, Boccellari, et al., 1994; McKirnan, Ostrow, & Hope, 1996; McKirnan, Vanable, Ostrow, & Hope, 2001; Williams, Elwood, & Bowen, 2000) in considering psychosocial variables that may underlie this complex relation.

Self-awareness of HIV risk is aversive, and "safer" practices lessen sexual spontaneity and pleasure. Sexually active men may avoid this conflict by cognitively disengaging from the threat of HIV through, for example, alcohol and drug use (McKirnan et al., 2001), or avoiding people or contexts where HIV precautions are normative. Coping by cognitive escape may be most likely among those who are individually vulnerable via "burnout" over sexual safety, depression, or social isolation. We applied this perspective to Internet risk by testing three sets of variables as possible mediators of the effect of sexual Internet use on sexual risk: the types of partners and sexual contexts men seek or are exposed to, drug and alcohol use, and psychological vulnerabilities of safer sex "burnout", depression, and social isolation.

Despite a growing "bareback culture" among MSM, condom use remains generally normative (Albarracin, Johnson, Fishbein, & Muellerleile, 2001), and safety or risk remains a matter of negotiation. However, the explicit "personal profiles" available in Internet meeting sites, and the proliferation of sites entirely devoted to unprotected sex, allows risky MSM to circumvent safety norms and the vagaries of negotiation to meet explicitly risky partners. This is similar to other public settings such as parks or bathhouses where anonymous or casual partners – and unprotected sex – are easily available or even normative (Binson, Woods, Pollack, Paul, Stall, et al., 2001; Flowers, Hart, & Marriott, 1999; Parsons & Halkitis, 2002). Within a general cognitive escape perspective, we hypothesized that men who sought Internet sex would also be less likely to know their partners' HIV sero-status, and would be disposed toward finding sex partners in parks, baths, or other public venues that facilitate anonymous encounters. We expected these characteristics to explain some of the increased sexual risk among men who find partners on-line; men who are motivated to cognitively disengage from HIV risk may use the Internet to find appropriate partners or settings.

Drug and alcohol use have long been associated with behavioral risk and HIV infection (Chesney, Barrett, & Stall, 1998), and drug use is relatively common among MSM (Stall, Paul, Greenwood, Pollack, Bein, et al., 2001; Woody, VanEtten, McKirnan, Donnell, Metzger et al., 2001). Drug use confers particular risk among men who use a cognitive escape strategy for coping with HIV (McKirnan et al., 2001). Although the association of Internet sex and drug use has not been widely explored, the Internet is increasingly used for men to seek partners to simultaneously use drugs (often methamphetamine) and have sex, typically described as "party and play" (PNP) in user profiles (Benotsch, Kalichman, & Cage, 2002). Drug-using men may gravitate to the Internet: the anxiety associated with risky sex, a general propensity toward sensation seeking, or states such as depression may lead man toward Internet "PNP" partners for anonymous, wholly escapist sex. Further, some evidence suggests that people who search the Internet for drug information become more accepting of drug use (Brewer, 2003). We expected drug use to mediate the link between Internet use and risk, such that controlling for drug use would attenuate the effect of Internet use on risk.

Psychological factors may also create vulnerability for Internet-related sexual risk. There is evidence that Internet use is associated with depression or social isolation, and that men who use the Internet for sex are more isolated and less "out" as MSM (Kraut, Kiesler, Boneva, Cummings, Helgeson, et al., 2002; Kraut, Patterson, Lundmark, Kiesler, Mukopadhyay, et al., 1998; Sanders, Field, Diego, & Kaplan, 2000; Tikkanen & Ross, 2000, 2003). Men who have sex with men may be particularly vulnerable to depression (Cochran & Mays, 2000; Mills, Paul, Stall, Pollack, Canchola, et al., 2004). We hypothesized that fatigue or "burnout" over sexual safety, less "outness" as gay, or depression and social isolation may lead men to seek partners on the Internet rather than in more traditional, face-to-face venues.

We had secondary, exploratory hypotheses about the demographics of users. Internet use is generally higher among white, more affluent, younger people (Cooper & Victory, 2002), and many Internet sites have sprung up to serve people living with HIV (Kalichman et al., 2003), including "barebacking" sites (Mansergh et al., 2002; Parsons & Halkitis, 2002). We therefore expected a higher proportion of younger, white, more affluent, or HIV-positive MSM to have used the

Internet at all. We tentatively predicted a similar pattern for sexual Internet use. Although lower SES or ethnic minority men may find the relative anonymity of on-line partners appealing, we speculated that the more frequent use of the Internet for work or purchasing among younger, White and affluent men might make them more comfortable finding sex partners on-line.

In sum, we hypothesized that sexual context, drug use, and psychosocial vulnerabilities mediate the effect of sexual Internet use on HIV risk behavior. We assumed the causal relation between Internet use and risk to be bidirectional. Men who approach the Internet as a convenient setting to find risky partners or avoid thinking about HIV contribute to the risky atmosphere of on-line sex. Men who go on-line for other reasons may then become risky as they encounter the Internet's increasingly permissive norms. We could not test the relative importance of these two causal paths. Rather, support for our mediating hypotheses would indicate areas of particular focus for interventions and further research.

Methods

Participants

Data are from brief anonymous surveys administered at gay/bisexual venues of Chicago during 2001. We used a targeted, multi-frame sampling approach that we have developed over successive community surveys. We focused recruitment efforts on well-known or typical venues where large numbers of MSM are available, drawing on a multiplicity of sites to avoid bias stemming from reliance on a single sampling source. We avoided sampling from bars or other obvious high-risk venues. We sampled Black Gay Pride events, Latino clubs or organizations, and a local street fair.

Trained outreach workers approached potential respondents within target venues, and requested that they complete an anonymous survey of health-related attitudes and behaviors, drug and alcohol use, and sexual practices. Participants received a stipend of $5. We took the decision to complete the survey as informed consent. The intercept survey format did not allow for a formal sampling framework, so we could not calculate an enrollment rate. We estimate that over 50% of eligible individuals agreed to participate. Research assistants briefly examined item responses and instructed respondents to complete any skipped sections of the questionnaire before providing the stipend.

The final sample consisted of men who reported sex with another man in the previous 6 months or who identified themselves as MSM ($n = 817$). We collected this larger sample to characterize the general MSM community, including those who do not use the Internet. We drew a smaller sub-sample of Internet users ($n = 490$) for most analyses reported here, to compare men who used the Internet to find sexual partners to those who used it only for other purposes.

Measures

The seven-page survey addressed demographics, Internet use, health care and status, sexual behavior, drug and alcohol use, and psychosocial factors, including attitudes toward sexuality and sexual risk, social support, and depression. All items used simple check boxes or rating scales, with skip patterns where appropriate.

Demographics consisted of ethnicity, education, sexual orientation, annual income, and age. We assessed *Internet use* as whether the participant had ever used the Internet and, if so, whether he had used it for: "Socializing (talking to friends, using gay "chat rooms" . . .)"; "Exploring sexuality (or learning about different sexual acts. . .)"; "Getting information on STIs, HIV, Men's health/wellness, or Medical care"; "To find sex partner(s), a sex party, or sex venues (public restrooms, bookstores, etc.)."

Participants then rated the frequency with which they used the Internet at all, or looked for sex on the Internet. For analyses, we computed dichotomous ratings of any Internet use, and sexual Internet use. We coded sexual use if the participant checked any of the sex partners/venues options, or noted greater than zero frequency of Internet use to look for sex.

In the *Health care* section, participants reported any non-HIV sexually transmitted infection [STI] diagnosis in the previous two years, i.e., syphilis; genital warts [HPV], gonorrhea, chlamydia, or non-specific urethritis, herpes, or hepatitis A, B, or C. Participants reported their HIV status and, for HIV-negative men, the time since their last HIV test.

To assess s*exual behavior,* we asked participants to indicate whether they had one "primary" partner, defined as "a man you are emotionally close to and have sex with," and, if so, his HIV status. We then asked participants to indicate how many men they had sex with during the past 6 months "other than your primary partner," and how many of these men were HIV-positive, "did not tell you his HIV status," or were HIV-. Next, we presented a block of rating scales for all HIV-positive partners, and for all HIV-negative or unknown partners; each elicited the frequency of any anal sex, unprotected receptive and unprotected insertive anal sex, and the frequency of sex in public places, defined as "parks, public restrooms, bookstores, etc." Ratings were made on a seven-point scale ranging from "Never" (0) to "Nearly every day" (6).

The primary risk indices were overall number of sex partners, transmission risk behavior, and any recent STI. "Transmission risk" for HIV-positive participants consisted of any unprotected anal intercourse (UAI) with a partner of negative or unknown HIV sero-status. For participants who were

HIV-negative or did not know their status, we coded "transmission risk" as UAI with an HIV-positive or unknown partner. We were not able to isolate risk specifically with Internet partners. Therefore, analyses contrasted men who did versus did not use the Internet for sex partners in their overall HIV risk patterns.

Participants rated their *Drug and alcohol use* generally and in the sexual context. General use of each of 11 substances (e.g., alcohol, marijuana, cocaine) was assessed via seven-point frequency ratings ranging from "never" (0) to "about daily" (6), plus two items reflecting substance use problems (how often others expressed concern over use, drug interference with functioning, $r = .63$). Substance use during sex was assessed by how often men used alcohol, "poppers," cocaine, ecstasy, or any other drug during sex with any partner, from "never" (0) to "every time" (6).

For mediating analyses we used three continuous drug use measures: number of drugs other than alcohol or marijuana used in the previous 6 months, mean frequency of drug problems, and frequency of drug use during sex. For descriptive analyses we created dichotomous codings of these indices: use of any drug other than alcohol or marijuana, report of any drug problem more than rarely, and use of drugs other than alcohol on at least 50% of sexual occasions.

Psychosocial factors consisted of burnout for sexual safety, depression, social support/isolation, and "outness" to others as having sex with men. Coping burnout represented the mean of two items ($r = 39$; "It takes a lot of effort to keep my sexual behavior safe" and "I find it difficult to maintain my commitment to safer sex") rated on a 5-point scale ranging from "Do not agree at all" (1) to "Strongly Agree" (5). Depression was assessed as the M of a 12-item scale ($\alpha = .91$) consisting of seven items from the CES-D found by Santor and Coyne (1997) to correspond to full-scale CES-D scores, and the five anxiety items from the Brief Symptom Inventory (BSI; Derogatis, 1982). Each item was rated on a four-point frequency scale ranging from "rarely" (0) to "Most or all of the time" (3). We assessed social support by five face-valid items reflecting the availability of instrumental and emotional supports ($\alpha = .86$). Items asked participants to indicate whether they had someone to: (1) have a good time with; (2) give you food or a place to stay; (3) listen to you talk about yourself or your problems; (4) go with you to an appointment for moral support; (5) show you that they love or care for you. Participants rated each of the social support items on a five-point scale of "none of the time" (1) to "all of the time" (5). "Outness" as MSM was the mean of three standardized items rated on interval scales: the proportion of "people you know or see day-to-day know you have sex with men," comfort in disclosing sexual orientation to care providers, and preference for others to be aware of sexual orientation ($\alpha = .54$). For binary analyses we used a median split on this variable.

Data analysis

We tested hypotheses using the Wald statistic from the hierarchical logistic regression procedure in SPSS. The Wald produces a chi square value testing the statistical significance of each coefficient (β) in a regression model with a dichotomous outcome variable. We entered age, socio-economic status, ethnicity, and HIV sero-status as an initial step for all analyses. We tested whether demographic variables moderated the effect of Internet use on risk by entering interaction effects (e.g., of sero-status by Internet use) as a last step, after entry of main effects. For mediating hypotheses we entered the demographic covariates, then the block of mediators (e.g., the three drug use variables), then the Internet use predictor. We tested mediation by examining how much the entry of the hypothesized mediators attenuated the direct effect of sexual Internet use on risk. Alpha was set to $p <. 01$ to compensate for the large number of analyses; $p < .05$ was considered trend level. In analyses of sexual risk we entered participants' overall number of sex partners as a covariate to control for differences in overall sexual activity.

Results

Demographic characteristics of the sample

African-Americans comprised 51% of the overall sample ($n = 419$), followed by Latinos (16%, $n = 133$) Whites (22% $n = 183$) and Asian/Pacific Islanders (7%, $n = 56$). Mean age was 33 years (SD = 9.8); 25% were age 18 to 25, 37% age 26 to 35, 38% over age 35. Median education was "some college," median annual income was \$31K–\$40K. Education and income were summed to reflect socio-economic status (SES; $r = .47$). Median "outness" as MSM was to ". . . about half the people I know." White participants were older, [F (1,719) = 27.7, $p < .001$], reported higher SES [controlling for age, F (1,719) = 26.9, $p < .001$), and were more "out" as MSM [F (1,717) = 26.1, $p < .001$] than were Latinos or African-Americans.

Seventy six percent of the complete sample identified themselves as "gay." The remainder identified as "bisexual" (12%)," "straight" (1%) or "down low" or related terms (11%). African-Americans were significantly less likely to label themselves as "gay" (69%) than were Latinos (85%) or Whites (87%); χ^2 (1, $n = 730$) = 31.2, $p < .001$. Fifteen percent of the sample reported a recent STI diagnosis. The most common STI was gonorrhea/Chlamydia/NSU (5.8%,

Table 1 Percent reporting any Internet use and Internet use for sex, by demographics

	Any Internet use*	Internet use for sex: complete sample ($n = 817$)**	Internet use for sex: Internet users only ($n = 460$)***
Overall	60%	36%	56%
Ethnic groups			
African-American	55%	33%	53%
Latino	54%	27%	47%
White	75%	46%	60%
Socio-economic status			
Lower	45%	29%	58%
Middle	57%	34%	54%
Upper	76%	44%	55%
Age group			
18–25	65%	42%	60%
26–35	63%	37%	57%
36 and above	55%	30%	51%
HIV status			
HIV-positive	47%	24%	47%
HIV-negative	65%	39%	57%

*All comparisons within demographic variable Wald (2, $n = 720$) > 10.8, $p < .001$ except HIV status, Wald (1, $n = 634$) = 1.2, n.s.

**All comparisons Wald (2, $n = 720$) > 9.6, $p < .01$, except HIV status, Wald (1, $n = 634$) = 1.8, n.s.

***All comparisons $p > .1$, n.s.

$n = 47$), followed by HPV (3.2%, $n = 26$) and Hepatitis A (1.8%, $n = 15$). Eighty-four percent had been HIV tested; 17.2% reported themselves to be HIV-positive. Of men who reported they were HIV-negative, 83% reported that they had been tested within the prior 12 months.

Demographic characteristics of MSM Internet users

Table 1 describes demographic patterns of Internet use among MSM. Sixty percent of the complete sample had used the Internet at least once, somewhat more than the 50%–52% of the general population of Illinois who had used the Internet by 2001 (Cooper & Victory, 2002). Among men who had used the Internet at least once, the most common uses were "socializing" (63%) and finding sex partners (56%), followed by medical information (46%) and other MSM-related reasons (33%). Seventy two percent of Internet users reported using the Internet for multiple reasons; only six percent of Internet users used it exclusively for sex.

Internet use was more common among participants who were white, more affluent, and younger, as expected from general population patterns (Cooper & Victory, 2002; see Table 1). Contrary to prediction, HIV-positive men did not report higher Internet use than did HIV-negative men when controlling for age, ethnicity, and SES. A similar pattern emerged in men's Internet use to find sex partners, given in the second column of Table 1. Sexual Internet use was by no means ubiquitous; 36% of the complete MSM sample had used the Internet for sex, and among men who had been on the Internet at least once, only slightly more than half used it for sex.

When we examined Internet use for sex among men who had used the Internet at least once—given in the last column of Table 1—all demographic trends disappeared. Thus, ethnicity, SES and age determined whether MSM used the Internet at all, but among MSM who had been on the Internet at least once there were no demographic differences in specifically sexual Internet use. Analyses reported below address the 60% of participants ($n = 490$) who had ever used the Internet, contrasting those who had used the Internet to seek sex ($n = 273$, 56% of Internet users) with those who used the Internet only for other reasons ($n = 217$, 44% of users).

Risk among MSM who use the Internet for sex

Table 2 describes differences between sexual and non-sexual Internet users in sexual risk, sex partners and context, drug use, and psychological vulnerabilities. All analyses controlled for demographics, HIV sero-status, and overall number of sex partners (with exception of "number of sex partners" analysis).

Overall, 36% of men who had used the Internet for any reason reported any unprotected anal intercourse (UAI), 17.7% met our more stringent criteria for "transmission risk" (HIV sero-discordant unprotected anal intercourse), and 15.2% reported a recent Sexually Transmitted Infection other than HIV (STI). Within this group, men who had sought sex on-line were considerably more risky than were men who used the Internet only for other reasons, given in the first section of Table 2. Sexual Internet users were more likely to report any unprotected anal sex (UAI; Odds ratio [OR] = 2.03, 95%CI = 1.39–2.97), transmission risk, (OR = 2.66, 95%CI = 1.58–4.49), and a recent STI (OR = 1.85, 95%CI = 1.09–3.14). All risk analyses controlled for demographics, HIV sero-status, and number of sex partners. These data thus supported the general finding that sexual Internet use is associated with greater HIV risk.

Moderating analyses: ethnicity, age, and sero-status differences in Internet risk

We explored whether using the Internet to find partners might be more risky among white, younger, and HIV infected men. Number of sex partners did not differ by age, SES, or HIV status [all Fs (1, 638) < 1.8, $ps > .1$], although White MSM reported significantly more sex partners than did African-American and Latino men, $M = 5.3$ versus 3.5,

Table 2 Percent of non-sexual and sexual internet users reporting each key study variable

Target variable	Internet use groups		
	Non-sexual internet use only, $n = 217$	Sexual internet use, $n = 273$	Wald χ^2 (df, n)
Sexual risk			
Any unprotected anal sex (UPA)	29%	45%	12.0 (1, $n = 472$)
Any HIV sero-discordant UPA	10%	23%	17.6 (1, $n = 472$)
Recent sexually transmitted infection	11%	18%	6.1 (1, $n = 472$)*
Sex partners and context			
Multiple partners	15%	34%	19.6 (1, $n = 412$)
Any partner of unknown HIV status	21%	31%	9.7 (1, $n = 436$)
Any public or anonymous partner	14%	37%	27.7 (1, $n = 436$)
Alcohol and drug use			
Any drug use	22%	29%	4.2 (1, $n = 460$)*
Any alcohol or drug problem	12%	25%	10.2 (1, $n = 459$)
Drug use $\geq 50\%$ of sexual episodes	19%	35%	10.5 (1, $n = 459$)
Psychological vulnerabilities			
HIV safety "burnout"	33%	55%	28.6 (1, $n = 470$)
≥ 2 depression symptoms	22%	39%	8.3 (1, $n = 469$)*
Low social support	29%	38%	5.2 (1, $n = 469$)*
Not "out" as MSM	38%	48%	5.9 (1, $n = 469$)*

Note. All analyses control for age, ethnicity, socio-economic status, HIV sero-status, and number of sex partners (other than the analysis of "multiple partners").

All effects $p < .001$, except $^*p < .05$ (trend level). Odds ratios are given in the text.

F (1, 638) = 7.78, $p < .005$. Transmission risk did not vary by age ($p > .1$), although ethnic minority, lower SES, and HIV-positive men were all significantly more likely to report HIV sero-discordant unprotected anal sex (Ethnicity, Wald $(3, n = 492) = 10.5, p < .001$; SES, Wald $(1, n = 492) = 4.27$, $p < .05$; HIV status, Wald (2, $n = 492) = 14.3$, $p < .001$). The only demographic-like variable that related to STI rates was HIV status: 33% of HIV-positive men reported a recent STI, compared to 12% of HIV-negative men, Wald (1, $n = 579) = 22.6$, OR = 3.59, 95%CI = 2.25–5.74, $p < .001$.

To examine whether demographic status moderated the effect of sexual Internet use on risk we regressed transmission risk and STI status on the interactions of Internet use by each demographic variable. None of these interactions were statistically significant, ps $> .1$. Thus, transmission risk varied by demographic sub-group, and HIV-positive men were particularly likely to report risky behavior or a recent STI. However, the increased sexual risk for men who found partners on the Internet did not vary by their age, ethnicity, socio-economic status, or HIV status.

Contextual and psychosocial mediators of sexual Internet use and transmission risk

We tested three blocks of variables that may mediate the effect of Internet use on sexual risk: the context of sexual activity, drug and alcohol use, and psychosocial variables. Table 2 describes comparisons between sexual and non-sexual Internet users on these measures. Analyses reported in Table 3 tested the extent to which each block of variables mediated the effect of sexual Internet use on transmission risk.

Sex Partners and Context

Context variables consisted of overall number of sex partners, at least one partner of unknown sero-status, and

Table 3 Direct and Mediated Effects of Sexual Internet Use on HIV Transmission risk

	Wald (1, $n = 470$)	% Variance accounted for in transmission risk	χ^2 Change from direct to mediated effect
Direct effect:	19.8	6.3	
With mediators in the model:			
Partner characteristics[1]	5.0*	1.4	14.7
Drug use[2]	12.3	4.7	7.5
Psychosocial variables[3]	9.2	3.4	10.6
All mediators	2.8**	.08	17

Note. All analyses control for age, ethnicity, SES, HIV sero-status, and number of sex partners. All effects $p < .001$ except $^*p < .05$,**n.s.

Independent effects within blocks of mediators: 1. Public/anonymous partners, Wald (1, $n = 472) = 49$, $p < .001$. 2. Number of drugs used, sexual drug use, Wald (1, $n = 362) > 10.8$, $p < .001$. 3. Burnout for sexual safety, Wald (1, $n = 433) = 7.3$, $p < .007$.

meeting any partner in a public or anonymous setting. Beyond attraction for specific partner types, these context variables may help men avoid self-awareness of HIV or HIV risk. We hypothesized that these "risk precursors" would be higher among men who sought partners on the Internet, and may help explain the elevated transmission risk of such men. These three variables accounted for 12.5% of the variance in sexual Internet use, Wald (3, $n = 436$) = 76.3, $p < .001$.

Men who sought sex on the Internet were more likely to report 5 or more sex partners (OR = 2.88, 95%CI = 1.77–4.69; *M* partners = 6.4 versus 3.4, F (1, 407) = 14.7, $p < .001$), at least one partner of unknown status, (OR = 1.56, CI = 1.04–2.33), and sex in public or anonymous settings, OR = 3.22, CI = 2.08–5.02); see Table 2. Internet sex seekers were also less likely to report a primary partner, 47% versus 62% [Wald (1, $n = 472$) = 9.2, $p < .002$, OR = .56, 95%CI = .38–.81), and were more likely to report at least one non-primary sex partner, 60% versus 37% [Wald (1, $n = 412$) = 7.2, $p < .01$, OR = 3.3, 95%CI = 1.38–7.9]. Thus, sexual Internet users reported both more sex partners, and an emphasis on casual or anonymous rather than "primary" partners.

The context variables accounted for 22% of the variance in transmission risk, Wald (3, $n = 492$) = 76.4, $p < .001$, with demographics, HIV sero-status and overall number of sex partners as covariates. Sex in public or anonymous settings was a particularly strong predictor. Forty-six percent of the men reporting public sex also reported transmission risk, versus 8% of men who did not report public sex, OR = 9.88, 95%CI = 5.96–16.38, Wald (1, $n = 492$) = 73, $p < .001$. Neither overall number of partners nor reports of any unknown partners were significant predictors of transmission risk.

Drug and alcohol use

We examined the number of drugs men used other than marijuana or alcohol, *M* drug problems, and the percentage of sexual occasions involving drug use. Table 2 shows results of binary coding of these measures. As a block the drug variables were significantly related to sexual Internet use, Wald (3, $n = 445$) = 16.6, $p < .001$, accounting for 5% of the variance. The strongest individual predictors of sexual Internet use were the percentage of sexual occasions involving drugs (OR = 2.25, 95%CI = 1.38–3.67), and drug problems, OR = 2.16, 95%CI = 1.26–3.72, see Table 2. Simple drug use itself only modestly related to sexual Internet use.

The block of drug variables were strongly related to transmission risk, χ^2 (3, $n = 463$) = 32.9, $p < .001$, accounting for 10.4% of the variance in risk beyond the effects of demographics, HIV sero-status, and number of sex partners. The strongest individual predictors of transmission risk were overall drug use [Wald (1, $n = 476$) = 16.4, $p < .001$] and frequent use during sex [Wald (1, $n = 476$) 28, $p < .001$]. Drug problems had a trend-level effect on risk, Wald (1, $n = 479$) = 3.9, $p < .05$.

Psychosocial variables

We hypothesized that men who felt burnout, depression or social isolation, or who were less open about their sexual orientation would be prone to "cognitive escape" coping with HIV. This coping style may lead them to gravitate to the Internet rather than more traditional face-to-face venues to find partners, and be vulnerable to sexual risk once there.

The block of psychosocial variables significantly related to Internet use, Wald (4, $n = 464$) = 36.6, $p < .001$, accounting for 10.1% of the variance. Individual effects are given in Table 2, using binary codings. Both safety burnout and depression strongly related to sexual Internet use, whereas social isolation and "outness" as MSM had trend-level effects. The block of psychosocial variables accounted for 5.3% of the variance in transmission risk, Wald (4, $n = 484$) = 17.5, $p < .001$. However, the only significant univariate effect in the multiple regression was burnout over sexual safety, Wald (4, $n = 490$) = 16.6, $p < .001$.

Mediators of Internet-driven sexual risk

Individual mediators of Internet-based sexual risk

Table 3 provides results of the mediating analyses. The first row shows the direct effect of sexual Internet use on risk. Subsequent rows show changes in this effect after the entry of each block of mediators. Mediation is indicated by a significant decrease in the χ^2 value of the direct effect when the mediating variable is entered into the equation first.

The simple effect of sexual Internet use on risk was Wald (1, $n = 472$) = 19.7, $p < .001$, accounting for 6.3% of the variance. When the context variables were entered prior to the Internet term this X^2 diminished to 5.0, $p < .05$, representing 1.4% of the variance, $\chi^2 = 14.7$, $p < .001$. The strongest individual mediating effect of the context variables was a history of sex in public/anonymous settings, Wald (1, $n = 472$) = 58, $p < .001$.

Despite the strong effect of drug use on both transmission risk and the use of the Internet to find sex partners, the drug variables only modestly attenuated the effect of Internet use on transmission risk; see Table 3. The psychosocial variables partially mediated the effect of Internet use on risk: the multivariate Wald significantly diminished when the psychosocial variables entered into the model first (see Table 3). Consistent with the univariate results, "burnout" was the only variable that significantly mediated the effect of Internet use on risk.

Overall mediating effects

To examine the joint effect of the mediators we entered individual variables from each mediator block that showed significant effects on sexual Internet use and transmission risk. We represented sexual context by men's history of sex in public or anonymous settings. Since all three drug variables showed effects on sexual Internet use and risk, we entered the mean of the three drug measures ($\alpha = .63$). We represented the psychosocial block by "burnout" for sexual safety. The three indicators were related: safety burnout significantly related to the drug use composite, r ($n = 511$) = .19, $p < .001$, and men who reported public/anonymous sex reported significantly more drug use r ($n = 513$) = .37, $p < .001$, and burnout, r ($n = 511$) = –.23, $p < .001$.

As a set the mediators accounted for 14% of the variance in sexual Internet use, Wald (3, $n = 470$) = 50, $p <$ .001, and 24% of the variance in transmission risk, Wald (3, $n = 490$) = 78, $p < .001$. Partner choice, drug use, and burnout mediated the influence of Internet use on sexual risk: once the mediators were entered into the regression the effect of Internet use on risk was no longer statistically significant (see Table 3). We replicated this strong mediating effect in an analysis of men's self-report of a recent STI. The effect of sexual Internet use on a recent STI decreased from Wald (1, $n = 490$) = 6.05, $p < .05$, to Wald (1, $n = 470$) = 2.2, ns, once the mediators were added to the regression model.

Discussion

We replicated the finding that sexual Internet use underlies sex risk among MSM, explored demographic differences in Internet use and risk, and examined three blocks of mediators that may help explain Internet-based sexual risk. We hypothesized that the properties of the Internet facilitate cognitive escape among those who are psychologically vulnerable, who find the demands for sexual safety taxing, or who are predisposed to sexual risk-taking.

Men who have sex with men who reported any Internet use were more sexually active, but not more risky than men who had never been on the Internet. In contrast, when we examined only men who had used the Internet at least once, those who sought sex partners on-line were substantially more risky than were those who used the Internet only for other reasons, consistent with other findings (Bull & McFarlane, 2000; Klausner et al., 2000; McFarlane, Bull, & Reitmeijer, 2000; McFarlane, Ross, & Elford, 2004). We used stringent risk measures – sero-discordant unprotected anal sex and a recent STI – and analyzed them with demographics, HIV sero-status, and number of sex partners as covariates. These analyses show sexual Internet use to have important effects on risk beyond men's HIV status or overall sexual activity.

The socio-economic and ethnic diversity of our sample allowed us to conduct powerful demographic analyses. We found the usual pattern of general Internet use; it is concentrated in younger, more affluent, white men. However, there were no ethnic, socio-economic, age or HIV sero-status differences in specifically sexual Internet use, or in Internet-related sexual risk. We could not assess whether different sub-groups tended to access separate sites or chat lines—more qualitative research would be useful for that question—but these results do indicate that there is no "high risk" demographic group for this HIV transmission vector.

Our main findings suggested that Internet risk stems from an interaction of men's pre-existing psychosocial vulnerabilities and the properties of the Internet itself. Those who are motivated to "cognitively disengage" during sex may gravitate to the Internet as a setting where this behavior is supported, and in the process become even more risky. Consistent with this, a history of sex in anonymous, public places was the strongest individual mediator of Internet sex risk.

Drug use strongly related to both on-line sex and HIV/STI transmission risk, consistent with other findings that "sexual escape" use of drugs predicts risk (McKirnan et al., 2001). The link of sexual Internet use and drugs is clear in a perusal of MSM sites, where "party and play" is a common element in men's personal profiles. Despite this, drug use played only a modest role in explaining the relationship between Internet use and transmission risk. Clearly, drug use is important to prevention in this area, although the interplay of Internet use, drugs and risk warrants further quantitative and qualitative study.

Our general framework proposed that psychosocial vulnerabilities motivate men to avoid self-awareness of HIV risk and longer-term health concerns, and that the Internet presents a high-risk environment that facilitates that escape coping. Consistent with this, depression, social isolation and being less "out" as gay related to sexual Internet use. Psychologically vulnerable men appear to gravitate to the Internet to find partners. A history of anonymous partners and burnout over sexual safety most powerfully mediated effect of Internet use on risk. Burnout may reflect a more general disposition; it related to depression and drug use. Insofar as men increasingly feel less willing or able to cope with sexual safety, the Internet may be an attractive venue for finding partners and settings where HIV need not be cognitively present. These processes operated independent of men's overall numbers of sex partners, indicating that they are not simply a matter of greater sexual availability.

These findings underscore the importance of psychosocial factors in preventive interventions for cyberspace.

Interventions must not only address the risky features of the Internet per se, but the motives men have for approaching this venue for sex partners. Men who are depressed or fatigued from continuing demands for sexual restraint may approach the Internet as an anonymous, wholly casual sexual setting where concerns over infection or long-term health need not be cognitively present. Once within that Internet world, men may then find it difficult to assert safety concerns where bare-backing, drug and alcohol use, non-disclosure of sero-status, and other risky behaviors may seem like the rule rather than the exception. Assisting men to become self-aware of their larger vulnerability and risk patterns may help them resist the powerful risk inducement of the Internet sexual environment, as would addressing psychological vulnerabilities such as depression or fatigue over safety.

More qualitative work is clearly called for on these vulnerability and escape processes, particularly as part of intervention development. Alternately, it would be interesting to reverse this framework and explore men who consciously use the Internet to find safe, non-drug using partners. Some of the mechanisms that help some men avoid having to cope with safety norms may help other men avoid having to cope with pressure toward risk. Unfortunately, such men appear to be in the minority at present.

This study is limited both by potential sampling biases and by our sexual outcome measure. Since we recruited primarily at public venues our sample is biased toward people who are more "out" and active as MSM. The outness bias may have made it difficult to detect effects of this variable on risk, while recruiting more active MSM may bias toward a generally higher risk sample. However, our sample was unusually diverse for this research area, and the lack of any Internet—risk differences by age, ethnicity, SES or sero-status suggests that simple sample biases did not unduly influence these results.

We assessed overall risk levels rather than risk specifically with Internet versus non-Internet partners. Differentiating risk by Internet versus non-Internet partner type would have helped us address the "person v. context" distinction. Bolding, Davis, Sherr, Hart, and Elford (2004) did examine this, and found men who used the Internet to be riskier with both Internet and non-Internet partners, suggesting as much a "person" as an Internet effect. However, since we cannot randomly assign men to find sex partners online versus face-to-face, we can never isolate the effect of the Internet from the characteristics of the people who use it. Within the constraints of a cross-sectional, non-experimental design our data lend strong support to a psychosocial framework for understanding and modifying Internet risk.

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