

Increased High Risk Sexual Behavior After September 11 in Men Who Have Sex with Men: An Internet Survey

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Received March 10, 2004; revision received August 27, 2004; accepted October 1, 2004

Numerous studies on the mental health effects of terrorist attacks have been published, with some reporting increases in smoking and drug and alcohol use. None have reported on changes in sexual behavior. To investigate the impact of the September 11 attacks on sexual and drug- and alcohol-using behaviors of men who have sex with men (MSM), an anonymous Internet survey was conducted to obtain information retrospectively on behavior during three month periods before and after the attacks. A total of 2,915 MSM from all 50 U.S. states completed the survey. Men who were exposed to the attacks were not differentially targeted for the survey since the online banner ad used to recruit did not mention September 11. Exposure to the attacks varied: 11.4% lost a friend or relative; 5% witnessed the attacks in person; and nearly all saw the attacks on television within one hour of their occurrence. Nearly equal proportions of men reported increases and decreases in the number of sex partners following September 11. Small, statistically significant increases in unprotected anal intercourse and alcohol use, but not illicit drug use, were found when behavior after September 11 was compared to that before the attacks. Men who lost a friend or relative in the attacks were significantly more likely to report unprotected anal intercourse, an increased number of sex partners, and increased alcohol use after September 11 than those who did not. Counseling about substance abuse and risky sexual behavior should be incorporated into trauma-related programs for adolescents and adults.

KEY WORDS: terrorism; sexual risk behavior; alcohol use; drug use; gay men.

INTRODUCTION

Numerous research studies examining the psychological sequelae of the Oklahoma City bombing in 1995 and the September 11, 2001 attacks have documented the profound effects these acts of terrorism have had on the survivors, the United States as a whole, and those outside the country (Apolone & Vecchia, 2002; Galea et al., 2002; North et al., 1999; Schuster et al., 2001; Silver, Holman,

McIntosh, Poulin, & Gil-Rivas, 2002). Most studies have focused on the incidence or prevalence of psychological symptoms related to post-traumatic stress and distress. Some have documented increases in smoking and alcohol and drug use both in the general population and in people with varying levels of exposure to these events (Rasinski, Berkold, Smith, & Albertson, 2002; Vlahov et al., 2002). None of these studies have reported on changes in sexual behavior following the attacks despite the appearance of articles in the popular press describing the post-September 11 phenomenon of “terror sex” (Kazdin, 2001; Kelleher, 2001).

Given the strong links between drug and alcohol use and high risk sexual behavior, particularly unprotected anal intercourse (UAI), in men who have sex with men (MSM) and the attendant risk of HIV transmission, this is a population of particular concern (Dolezal, Meyer-Bahlburg, Remien, & Petkova, 1996; Stueve et al.,

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2002). To assess the potential impact of the events of September 11 on sexual and alcohol-, and drug-using behavior in MSM, we conducted a retrospective anonymous Internet-based survey to compare these behaviors in the three months before and the three months after September 11. The Internet was chosen as the site for the survey in order to recruit a large sample of men from around the country in a short period of time using minimal resources.

METHOD

Participants

The survey was hosted by a general interest, gay-oriented website. Overall, 5,981 individuals clicked on the banner linking to the survey; 2,284 exited the survey without answering any questions while 3,697 answered at least some of the questions. After removal of questionnaires missing key variables or with inconsistent responses, a total of 2,948 (79.7%) questionnaires were available for analysis: 2,933 were completed by men (18 of whom reported that they were exclusively heterosexual), 10 by women, and 5 by transgendered individuals. The sample was limited for this analysis to the 2,915 men who reported sex with other men or who self-identified as gay or bisexual.

Participants resided in all 50 states, Guam, and Puerto Rico, with a small number from locations outside the United States. The number of participants from each of the states was roughly in proportion to the size of the state's population. Table I presents demographic and behavioral data provided by the 2,915 MSM participants. The respondents were predominately white and nearly half of the sample was between 18 and 29 years of age (study participation was limited to those 18 and older). The majority of respondents reported up to \$40,000 annual income and almost 90% attended college. Most men (80.4%) reported having sex only with men and the number of lifetime sexual partners varied from none to more than 1,000 with about one quarter of the men reporting more than 100 lifetime partners.

Procedure

An anonymous Internet-based behavioral survey targeted to MSM was used to retrospectively collect information on high risk sexual, alcohol-, and drug-using behaviors and exposure to the September 11 terrorist attacks. Recruitment for the study took place during June and July 2002. A large gay website provider hosted a banner that advertised and linked to the survey in all

Table I. Demographic and Behavioral Characteristics of the Sample of Men Who Have Sex with Men Recruited through the Internet

Variable	<i>N</i>	%
Age (<i>N</i> = 2915) ^a		
18–24	878	30.1
25–29	478	16.4
30–39	798	27.4
40–49	537	18.4
50 or older	224	7.7
Race/Ethnicity (<i>N</i> = 2868)		
White	2425	84.5
Black	62	2.2
Hispanic	164	5.7
Other and Mixed Race	217	7.6
Education (<i>N</i> = 2904)		
Less than 12 Years	68	2.3
High School Graduate or GED	300	10.3
Some College	1239	42.7
College Graduate (4 Years)	731	25.2
Professional or Graduate Degree	566	19.5
Income (<i>N</i> = 2633)		
≤\$40,000	1600	60.8
>\$40,000	1033	39.2
Lifetime Sex Partners (<i>N</i> = 2856)		
None	23	0.8
1	44	1.5
2–10	549	19.2
11–50	997	34.9
51–500	1017	35.6
501+	226	7.9
Sex Partners (<i>N</i> = 2635)		
Only Men	2119	80.4
Men and Women	516	19.6
HIV Positive (<i>N</i> = 2902)		
	222	7.6

^aDenominators vary because of missing data.

U.S. adult chat rooms. The banner read, “Be part of an important study about sexual behavior and stressful events. Take this 10 min anonymous survey.”

The chat room banner provided the only link to a remote website hosted by the investigators' organization. The survey did not use cookies and neither collected user IP addresses nor stored them with submitted data. Participants were asked to read a one page consent form and click their agreement before gaining access to the anonymous survey. The study was approved by the Institutional Review Board of the Medical and Health Research Association of New York City, Inc.

Measures

The structured 60-item questionnaire included standard demographic information (age group, race/ethnicity, education, income, and residence), extensive information

on type of sexual contact (insertive and receptive anal, oral, and vaginal sex with and without condoms) with steady and casual partners, knowledge of partners' HIV status, frequency and type of illicit drug use, frequency of alcohol use, whether sex partners were met online, sexually transmitted infection (STI) diagnoses, HIV testing history, mental health treatment, and exposure to the events of September 11. Behavioral questions were asked about two different time periods: the three months before and the three months after September 11. Men were also asked specifically whether the number of partners they had sex with increased, decreased, or remained about the same in the three months after September 11 compared to the three months before. September 11 exposure questions were asked at the end of the survey. No personally identifying information was collected: only the first three digits of the zip code and year of birth were obtained. Links to STI prevention and treatment websites and mental health hotlines appeared at the end of the survey. Survey questions were adapted from questionnaires used by the investigators in previous studies (Koblin, Taylor, Avrett, & Stevens, 1996; Lehner & Chiasson, 1998).⁵

The survey was structured to enhance the validity of the answers. The questionnaire was divided into four sections and it was not possible to go back to previously completed sections. Thus, participants were not able to change answers to repeat questions included as validity checks. Questions about behavior before September 11 and after September 11 were in separate sections. Few completed questionnaires were eliminated because of inconsistent or clearly bogus responses (e.g., answering yes to use of every drug); the vast majority were excluded because of missing responses to one or more of the questions about sexual behavior.

RESULTS

To assess the statistical significance of changes in behavior in the three months after September 11 compared to the three months before, each individual served as his own control. McNemar's chi square test and the estimated odds ratio for matched pairs were used in the analysis presented in Table II. UAI (either insertive or receptive), alcohol consumption, and illicit drug use were common during the two three-month time periods of interest (June 11 to September 10, 2001 and September 11 to December 10, 2001) with most men reporting the same behavior before and after September 11. There were, however, small but significant increases

in the proportion of men reporting UAI and drinking until drunk at least one to three days per week on average after September 11. Meeting sex partners online and using nitrite inhalants, hallucinogens, and Viagra showed small but significant decreases after September 11.

Nearly equal proportions of men reported increases and decreases in the number of sex partners in the three months after September 11. Twenty percent of the men reported that their number of sex partners increased, 23% reported a decrease in partners, and 57% reported the same number of sex partners in the three months before and after the attacks.

Participant exposure to the September 11 attacks varied considerably. Overall, 329 (11.4%) of the 2,875 men lost a family member or friend in the attacks; 145 (5%) saw the attacks in person (8 men were in the World Trade Center, 28 in lower Manhattan, 42 in another New York City neighborhood, 23 in Washington, DC, and 44 in other areas); 121 (4.2%) lived within a 10 mile radius of the World Trade Center or the Pentagon; and nearly everyone (91.8%) saw television coverage within one hour of the attacks. As might be expected, some men had more than one exposure (e.g., lost a friend or relative and saw the attacks in person). Altogether, 486 men had 595 exposures to the September 11 attacks.

No changes in the proportions of participants who sought counseling from a mental health professional (~6–7%) or sought advice from a family member, friend, religious or community leaders (~20%) were found when comparing the three months before and after September 11 for the entire sample. Nor were any changes seen when the results were stratified by type of exposure to the attacks (data not shown).

To assess the relation between type of exposure to the terrorist attacks and change in behavior, the odds ratios for drinking until drunk 1 to 3 days per week on average, UAI, and an increased number of sex partners in the three months after September 11 were determined for the three exposures structured hierarchically: losing a family member or friend (329:276 had this exposure alone; 53 had this exposure plus another); seeing the attacks in person (104:65 had this exposure alone; 39 had this exposure and lived within a 10 mile radius); and living within a 10 mile radius of the World Trade Center or the Pentagon (53 had only this exposure) (Table III). The 2,389 men not reporting any of these exposures made up the comparison group for these analyses. Statistical associations between categorical variables were tested by chi-square. The odds ratio was used as the measure of association in this and subsequent bivariate analyses. Those who lost a family member or friend in the attacks were significantly more likely to report all three risk

⁵A text copy of the questionnaire is available upon request from the corresponding author.

Table II. A Matched-Pairs Comparison of Behavior in the Three Months Before and the Three Months After September 11, 2001

Type of Behavior	Both Before and after 9/11		Before 9/11 only ^a		After 9/11 only ^b		Odds Ratio ^c
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	
Anal Intercourse ^d (<i>N</i> = 2694) ^e							
Unprotected	1170	43.4	201	7.5	248	9.2	1.23*
Protected	562	20.9					
None	513	19.0					
Met Sexual Partners (<i>N</i> = 2571)							
Online	1742	67.8	205	8.0	151	5.9	0.74*
Bar	662	25.7	133	5.2	137	5.3	1.03
Through a Friend	377	14.7	172	6.7	150	5.8	0.87
Drank until Drunk (<i>N</i> = 2762)							
At least 1–3 days/week on average	649	23.5	95	3.4	183	6.6	1.93***
Drug Use (<i>N</i> = 2435)							
Marijuana	638	26.2	65	2.7	68	2.8	1.05
Special K (Ketamine hydrochloride)	59	2.4	27	1.1	15	0.6	0.56
Speed (amphetamines, dexedrine, etc.)	63	2.6	27	1.1	21	0.9	0.78
Ecstasy (MDMA)	157	6.4	60	2.5	44	1.8	0.73
GHB (Gamma hydroxybutyrate)	54	2.2	18	0.7	15	0.7	0.83
Crystal Methamphetamine	88	3.6	33	1.4	37	1.5	1.12
Cocaine (non injection)	117	4.8	38	1.6	38	1.6	1.00
Nitrite inhalants	385	15.8	72	3.0	41	1.7	0.57**
Hallucinogens (LSD, peyote, etc.)	35	1.4	36	1.5	20	0.8	0.56*
Downers (Valium, Xanax, etc.)	103	4.2	30	1.2	29	1.2	0.97
Viagra	165	6.8	46	1.9	27	1.1	0.59*

^aReported UAI in the 3 months before 9/11 and either protected or no anal intercourse in the 3 months after 9/11.

^bReported either protected or no anal intercourse in the 3 months before 9/11 and UAI in the 3 months after 9/11.

^cMcNemar's test and estimated odds ratio for matched pairs.

^dEither insertive or receptive.

^eDenominators vary because of missing data. To be included in this analysis, respondents had to answer the question for both time periods.

* $p < .05$, ** $p < .01$, *** $p < .0001$.

Table III. Relationship Between Level of Exposure to the Attacks and Behavior in the Three Months After September 11

Risk Behavior	Prevalence by Exposure ^a		Odds Ratio	95% CI	<i>p</i>
	Yes %	No %			
Family/Friend Lost (<i>N</i> = 329)					
Drinking until Drunk at least 1–3 days/week	37.5	29.9	1.41	1.11–1.79	.005
Increased Sex Partners after 9/11	30.8	18.6	1.94	1.50–2.51	<.001
Unprotected Anal Sex	57.3	48.2	1.44	1.14–1.82	.002
Saw in Person (<i>N</i> = 104)					
Drinking until Drunk at least 1–3 days/week	30.7	29.9	1.04	0.68–1.60	ns
Increased Sex Partners after 9/11	14.6	18.6	0.74	0.43–1.30	ns
Unprotected Anal Sex	51.5	48.2	1.14	0.77–1.69	ns
Lived in NYC/DC (<i>N</i> = 53)					
Drinking until Drunk at least 1–3 days/week	26.9	29.9	0.87	0.47–1.61	ns
Increased Sex Partners after 9/11	28.3	18.6	1.72	0.94–3.16	.079
Unprotected Anal Sex	40.4	48.2	0.73	0.42–1.27	ns

^aSince 92 men had more than one exposure to 9/11, exposures in this analysis were categorized hierarchically: men who lost a family member or friend; saw the attacks; and lived within a 10 mile radius of New York City or Washington, DC. 2,389 participants were exposed through the media only and served as the comparison group.

Table IV. A Comparison of Risk Factors for Unprotected Anal Intercourse (UAI) in Three Months Before and After September 11
Bivariate Analysis

Risk Factors	N	UAI Prevalence Before	OR	p	N	UAI Prevalence After	OR	p
Age groups: 18–29 vs. 30–49 vs. 50+	2906	49% vs. 48% vs. 37%		.004	2876	50% vs. 50% vs. 42%		.056
Less than college vs. College grad or more	2895	51% vs. 43%	1.39	<.001	2865	53% vs. 45%	1.34	<.001
\$41K or more vs. up to \$40K	2624	47% vs. 49%	0.91	ns	2598	48% vs. 51%	0.91	ns
Drunk at least 1–3 days	2880	54% vs. 45%	1.39	<.001	2853	55% vs. 47%	1.39	<.001
HIV positive	2893	57% vs. 47%	1.50	.004	2865	58% vs. 49%	1.48	.006
Met sex partners online	2744	51% vs. 45%	1.31	.002	2717	55% vs. 43%	1.65	<.001
Used drugs before sex	2864	62% vs. 43%	2.23	<.001	2827	68% vs. 43%	2.76	<.001
Lost family/friends in 9/11	2862	52% vs. 47%	1.21	ns	2834	57% vs. 48%	1.44	.002
Sex partners after 9–11 increased	2865	50% vs. 47%	1.13	ns	2841	63% vs. 46%	1.93	<.001

behaviors than the controls. Within the two other exposure groups, the only other marginally significant difference was seen in those living within a 10 mile radius of the attacks, who reported an increased number of sex partners in the three months after September 11.

Since alcohol use, drug use before sex, and number of sex partners have been associated with UAI in numerous studies of HIV in MSM, measures of these behaviors were included in bivariate (Table IV) and multivariate (Table V) analyses of risk factors for UAI in the two time periods. Drug use patterns among the study participants were complex, but 91% of those who used drugs before sex used nitrite inhalants, crystal methamphetamine, cocaine, or marijuana alone or in various combinations. To avoid misleading results due to multicollinearity of the drug variables, only drug use before sex was included in the following analyses.

In the first bivariate analysis presented in Table IV, all potential risk factors, except income, were significantly associated with UAI before September 11 (education, age,

drinking, HIV infection, meeting sex partners online, and drugs before sex). To assess whether men who lost a friend or relative in the attacks and men who reported an increased number of partners after September 11 were similar to other men participating in the survey, we examined the high risk sexual behavior of these two groups of men in the three months before the attacks (see the last two rows in the left hand column of Table IV). There were no significant differences in the frequency of UAI reported by these men compared to other participants. Similar risk factors were significantly associated with UAI after September 11 as seen in the second analysis presented in Table IV. In addition, after September 11, losing a friend or relative in the attacks and reporting an increased number of sex partners were both significantly associated with UAI.

Multivariate logistic regression models were constructed to examine simultaneously the effects of variables found to have a statistically significant association with UAI in bivariate analyses. Independent predictors of UAI

Table V. A Comparison of Risk Factors for Unprotected Anal Intercourse (UAI) in the Three Months Before and After September 11
Multivariate Analysis

Risk Factors	Adjusted OR (95% CI) Before 9/11 (N = 2349)	p	Adjusted OR (95% CI) After 9/11 (N = 2214)	p
Age				
50+ (Referent group)	1.00		1.00	
18–29	1.50 (1.08–2.09)	.016	1.31 (0.94–1.82)	ns
30–49	1.40 (1.02–1.93)	.039	1.26 (0.91–1.72)	ns
Less than college degree	1.52 (1.29–1.80)	<.001	1.49 (1.26–1.77)	<.001
Drunk at least 1–3 days	1.17 (0.97–1.39)	ns	1.13 (0.94–1.35)	ns
HIV positive	1.53 (1.13–2.06)	.006	1.29 (0.95–1.76)	ns
Met sex partners online	1.35 (1.12–1.61)	.001	1.62 (1.36–1.93)	<.001
Used drugs before sex	1.97 (1.64–2.37)	<.001	2.37 (1.95–2.88)	<.001
Exposure to 9/11				
None (Referent group)	1.00		1.00	
Live in NYC/DC	1.17 (0.65–2.13)	ns	0.75 (0.41–1.38)	ns
Saw in person	1.21 (0.79–1.84)	ns	1.16 (0.76–1.78)	ns
Lost friend or family	1.15 (0.90–1.47)	ns	1.31 (1.02–1.68)	.037

in the three months before September 11 included age younger than 50, having no college degree, HIV infection, meeting sex partners online, and using drugs before sex. Men with different exposures to September 11 were equally likely to have UAI in the three months before the attacks (Table V). However, losing a friend or family member in the attacks became significantly associated with UAI in the three months after September 11 while having no college degree, meeting sex partners online, and using drugs before sex remained significant. Alcohol consumption was not a significant independent predictor of UAI in the multivariate analysis for either time period.

Having a family member or friend killed in the attacks was also associated with an increased number of sex partners after September 11 in a separate logistic regression analysis (adjusted odds ratio [adj. OR] 1.70, 95% confidence interval [CI] 1.28–2.25) controlling for age, education, drug use, and HIV status. In this model, drinking (adj. OR 1.52, 95% CI 1.22–1.91), using drugs before sex (adj. OR 1.55, 95% CI 1.17–2.07), and meeting sex partners online (adj. OR 2.24, 95% CI 1.71–2.93) were also significantly associated with an increased number of sex partners after September 11.

DISCUSSION

The horrific nature of the September 11 terrorist attacks on New York City and Washington, DC, the continuing threat of additional attacks, and the identification of bioterrorism-related anthrax affected the behavior of all segments of the U.S. population to varying degrees. In this survey of MSM recruited through the Internet, we found small but significant increases in the proportion of men reporting UAI and drinking until drunk at least 1–3 days per week on average in the three months after September 11 compared to the three months before. Alcohol use is a potentially dysfunctional coping response to many stressful situations (Carver & Scheier, 1994) and increases in alcohol consumption, smoking, and drug use have been observed in other studies focusing on the psychological and behavioral aftermath of traumatic events (North et al., 2002; Rasinski et al., 2002; Stewart, 1996; Ursano, 2002; Vlahov et al., 2002). To our knowledge, this is the first report on sexual behavior following traumatic events like the Oklahoma City bombing and the September 11 terrorist attacks.

Compared to men whose only exposure to the terrorist attacks was through the media, changes in risk behaviors varied by level of exposure to the attacks. Men who lost a friend or relative in the attacks were significantly more likely to report an increase in the number of sex partners, UAI, and drinking in the three

months after September 11. For men who saw the attacks in person and those who lived within a ten mile radius of New York City or Washington, DC, only one marginally significant difference in behavior was found. Men who lived within the ten mile radius were somewhat more likely to report an increase in the number of sex partners in the three months after September 11.

Like alcohol and drugs, sexual activity may also be used to regulate mood and cope with feelings of depression or anxiety (negative mood). The few research studies of sexual function following a traumatic experience without serious physical injury have focused on sexual dysfunction in men with posttraumatic stress disorder (Kotler et al., 2000) who are most commonly combat veterans (Cosgrove et al., 2002; Kaplan, 1989; Letourneau, Schewe, & Frueh, 1997). To a lesser extent, negative mood also tends to be associated with a decrease in sexual interest and response. However, negative mood is not always related to a decrease in sexual interest and response. In research studies on the relation between negative mood and sexuality in heterosexual men and women and gay men, a substantial minority have reported an increase in sexual interest and response (Bancroft et al., 2003a; Bancroft, Janssen, Strong, & Vukadinovic, 2003b; Janssen, Lykins, & Graham, 2003). Depression has also been associated with reduced concern about sexual risk in some gay men (Bancroft et al., 2003b).

The changes in sexual behavior reported after September 11 by the men in our survey reflect these varied responses to negative mood. While some men reported decreases, a small but significant proportion of men reported an increase in UAI and an increase in the number of partners following the attacks. The powerful need to connect with another person experienced by many after September 11 may have motivated some to seek comfort, security, and affirmation of life through sex. The sense of fatalism prevalent after the September 11 attacks, however, may have exacerbated reduced concerns about high risk sexual behavior, particularly within the context of drug and alcohol use.

As seen in other studies of MSM (Dolezal et al., 1996; McKirnan, Vanable, Ostrow, & Hope, 2001; Stueve et al., 2002), both drug and alcohol use were significantly related to high risk behavior in our survey. Using drugs before sex was an independent predictor of UAI and both drugs before sex and alcohol use were independent predictors of an increased number of sex partners in the three months after September 11.

Some coping mechanisms were not reported by our survey participants. Following the Oklahoma City bombing, firefighters and bombing survivors reported

turning to family members and friends as their most common coping method (North et al., 1999; 2002). After September 11, seeking social support was also a very important coping mechanism for the nation as a whole (Rasinski et al., 2002; Schuster et al., 2001) and for New York City residents (Galea et al., 2002; Rasinski et al., 2002). It is somewhat surprising that the men in our study did not report seeking support from friends or family or mental health counseling more frequently following September 11. This may be due to the wording of the question since we did not ask whether men sought support or counseling specifically because of the attacks. Instead, we asked in separate questions whether men sought advice from family members or friends or sought professional counseling in the three months before the attacks and the three months after the attacks and compared proportions.

The primary strength of our study is that it expands research on behavioral response to the trauma of terrorist attacks beyond drug and alcohol use to include sexual behavior. There are, however, some limitations to this study and to Internet surveys in general. Since the survey was conducted nine months after the September 11 terrorist attacks and participants were asked about pre-disaster behavior that could have taken place up to 13 months before the survey, faulty memory and recall bias may have affected the results of our study. It is likely, however, that the unprecedented nature of, and near universal media exposure to, the attacks firmly anchored September 11, 2001 in the memories of the study participants. The chat room banner that was used to recruit study participants did not mention September 11 so it is unlikely that those most affected by the attacks were differentially attracted to the survey website. They may have been more likely to complete the survey once they got to the website, though, since the consent form stated that the study was about how people were coping after September 11.

Similar to the findings from other studies using recruitment sites common to HIV-related behavioral research (e.g., STD clinics, bars and other public venues, and gay cultural events), generalizability of the results beyond the study population is problematic. It is not possible to determine whether the men who participated in this Internet-based survey are representative of the population of MSM using the Internet or of MSM in general since these populations have never been fully enumerated or described in the U. S. Reported drug use in our sample was far lower than that found in two large, multi-city studies of MSM (Koblin et al., 2003; Stall et al., 2001) but, since our study recruited a national sample of men, it may better reflect drug use in the MSM population. The racial/ethnic distribution of our sample was similar to that of a probability sample of MSM obtained in 1997

from New York, Los Angeles, Chicago, and San Francisco (Catania et al., 2001) but the proportion of whites (84.5%) in our study was far higher than the 69.8% present in the U. S. male population 18 to 64 years of age, according to the 2000 U.S. Census.

It is also likely that men who use the Internet to meet sex partners, as more than 80% of our sample did, are different from the general MSM population. The majority of subjects who have computer skills and access to participate in online sex surveys tend to be younger, wealthier, educated males (Binik, Mah, & Kiesler, 1999; Toomey & Rothenberg, 2000). Data from Sweden (Ross, Tikkanen, & Mansson, 2000) and London (Elford, Bolding, Davis, Sher, & Hart, 2004) comparing MSM surveyed through online and offline venues showed that men surveyed online were younger but less well-educated, and less likely to have sex only with men than those recruited offline. In our study, twenty percent of the participants reported sex with both men and women. In addition, there are some data to suggest that men seeking sex partners on the Internet may have somewhat higher sexual risk behaviors than those who seek partners in other ways (Benotsch, Kalichman, & Cage, 2001; Elford, Bolding, & Sherr, 2001; Ross, Tikkanen, & Mansson, 2000).

Internet surveys are becoming increasingly common for a variety of commercial and research purposes because of decreased cost and increased speed of participant recruitment, but this method has a number of limitations (Witte, Amoroso, & Howard, 2000). One potential problem with anonymous Internet surveys like the one we conducted is that participants may not be who they say they are. For example, we specified that participants must be 18 years of age or older but we could not verify participant age. We did, however, use several techniques to minimize non-valid data. In terms of participant age, the host site required that persons registering on the site be 18 or older and provide a working e-mail address. Another concern was that some individuals would complete the questionnaire many times. Given the rapid rate at which a very large number of banners rotate through the host site chat rooms, this seems very unlikely to have occurred. An individual might have to wait up to an hour for the banner to reappear in a specific chat room. In addition, it was not technically possible for participants to bookmark the survey, as it could only be entered through the banner in the chat room. Finally, no incentives were provided for survey participation so there was no financial reward for completing the survey multiple times.

An important potential advantage of online interviewing is that respondents may be more likely to report high risk behavior than they are in face-to-face interviews (Gribble et al., 2000). While the data comparing these

two interviewing techniques are somewhat conflicting, the findings from a recent study suggest that responses may differ by the content of the questions. Newman et al. (2002) assessed response differences between face-to-face interviewing and audio computer assisted self-interviewing (audio-CASI) among injection drug users on topics including drug use and sexual behavior. Self-disclosure of heavily stigmatized behaviors for which embarrassment would be likely and social support unlikely was more common using audio CASI while disclosure of psychological distress for which social support would be likely and embarrassment less likely was reported more often in face-to-face interviews. Reporting of neutral items did not differ by interview mode.

Participation in this survey was limited to MSM but our finding of increased high risk sexual behavior in some MSM following the September 11 terrorist attacks may be applicable to a broader population. The paradoxical increases in sexual activity during negative mood states reported by other researchers, together with the findings from our study, suggest that it is important to include measures of sexual activity in studies of the psychological and behavioral responses to disaster and other traumatic events. Counseling for those who experience trauma should include discussions of the potential for a full spectrum of changes in sexual functioning.

ACKNOWLEDGMENTS

We thank Myrna M. Weissman, Ph.D., Professor of Epidemiology in Psychiatry, College of Physicians and Surgeons and the School of Public Health at Columbia University, for providing the questions used to assess proximal exposure to the September 11 terrorist attacks. Data analysis and manuscript preparation were funded in part through CDC Contract Number 200-97-0621, Task 33 to RTI International, and Subcontract Number 10-46U-6900 from RTI to Medical and Health Research Association of New York City, Inc. The content of this publication does not necessarily reflect the views or policies of the Department of Health and Human Services, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.

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