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## **AGE-RELATED RISK FOR HIV INFECTION IN MEN WHO HAVE SEX WITH MEN: EXAMINATION OF BEHAVIORAL, RELATIONSHIP, AND SEROSTATUS VARIABLES**

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The study examined behavioral, relationship, and serostatus variables that potentially contribute to HIV infection risk in three age groups of men who have sex with men (MSM). MSM recruited in West Hollywood, California self-administered a questionnaire measuring unprotected insertive anal intercourse (UIAI) and unprotected receptive anal intercourse (URAI) with primary and nonprimary partners. The following relationship/serostatus variables were also assessed: recency of HIV testing, knowledge of own HIV serostatus, perception of partner's serostatus, seroconcordance (self and partner seronegative), and self-reported monogamy status. The prevalence of UIAI and URAI was higher with primary than nonprimary partners. These sexual risk behaviors with primary partners were substantially more prevalent among men younger than 25 years of age than among men aged 25 to 30 or over age 30. UIAI and URAI with nonprimary partners were uncommon in each age group, and there were no significant age differences on the serostatus and relationship variables. The findings suggest that young MSM may be at elevated risk for contracting HIV by virtue of their sexual risk behavior with primary partners. Targeted interventions for MSM need to address sexual risk in the context of primary relationships.

Several studies conducted in North America have found that the incidence of HIV infection is higher among younger (e.g., younger than 30 years old) than older men who have sex with men (MSM; for a recent review see Mansergh & Marks, 1998). Additional studies have found that younger MSM are more likely than their older counterparts to engage in unprotected anal intercourse (UAI; Mansergh & Marks, 1998). These findings underscore the need for HIV prevention programs for young MSM but do not illuminate the age-related variables associated with sexual risk behavior. Recent work (Mansergh et al., 1998; Mansergh, Marks, Murphy, Appleby, & Miller, 1999; McAuliffe et al., 1999) has focused on age-group differences in psychosocial variables such as HIV risk knowledge, perceived peer norms, knowing people with HIV/AIDS, and behavioral intentions

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as factors that might explain these age differences in UAI and incidence of HIV infection. The present study contributes to the literature by examining the relationship context in which risky sex occurs among MSM of different age groups.

In general, MSM are more likely to engage in UAI with primary than nonprimary partners (Bosga et al., 1995; Buchanan, Poppen, & Reisen, 1996; Dawson et al., 1994; Doll et al., 1991; McLean et al., 1994; Van de Ven et al., 1997; Vincke, Bolton, & Miller, 1997; Weatherburn, Hunt, Davies, Coxon, & McManus, 1991). It is not clear, though, whether the heightened prevalence of UAI among younger than older MSM occurs mostly with primary partners, mostly with nonprimary partners, or whether it occurs equally with both types of partners. Most of the studies of age differences in sexual risk have either left the partners undefined or have examined only one partner category. Understanding the types of partners with whom one engages in unsafe sex is essential for advancing the design of prevention programs.

Further, the documented age-group difference in UAI may not reflect accurately the age-related risk for contracting HIV. In almost all of the studies, the age-group comparisons were made in isolation of variables that may moderate risk for infection, such as knowledge of own and perception of partner's HIV serostatus (Dawson et al., 1994; Hoff et al., 1997; Kelly et al., 1991) and the nature of the relationship with a partner (e.g., monogamous vs. nonmonogamous; Davies, 1993; Kippax, Crawford, Davis, Rodden, & Dowsett, 1993). These serostatus and relationship variables inform age-group comparisons of behavior. For example, a study may find that the prevalence of UAI is higher among younger than older MSM. But if more of the younger than older men who engaged in UAI did so with a monogamous, seroconcordant partner (both self and partner seronegative), then risk for infection in the young men would be less than the risk faced by older men. On the other hand, a study may find that the prevalence of UAI is comparable across age groups. But if fewer younger than older men who engaged in UAI knew the HIV serostatus of their partners or were in a monogamous relationship with those partners, then their risk for infection may exceed the risk faced by older men. Little is known about how these behavioral and serostatus/relationship variables contribute to age-related risk for HIV infection.

The study of MSM reported here examined age-group differences in the prevalence of unprotected insertive anal intercourse (UIAI) and unprotected receptive anal intercourse (URAI) with primary and nonprimary partners. For each age group, we examined the men's standings on an array of serostatus/relationship variables separately for those who engaged in unprotected anal sex and for those who did not. Those variables were recency of own HIV testing, knowledge of own HIV serostatus, perception of partner's HIV status, perception that both self and partner were seronegative, and self-reported monogamy status. By comparing the age groups on these variables among men who had engaged in UAI, we can arrive at a more informed interpretation of any age-group differences in the prevalence of UAI.

## METHODS

### RECRUITMENT AND QUESTIONNAIRE ADMINISTRATION

The survey was conducted in 1997 (August to November) in West Hollywood, California, a gay enclave of Los Angeles County. Three street locations were selected as recruitment sites by the principal investigators (not by the research assistants [RAs] who collected the data) after observing several candidate locations. Sites were selected

based on diversity of commercial establishments and volume of foot traffic in the immediate area. We did not set a minimum or maximum number of surveys to be administered at each location. Rather, the volume of pedestrians determined the amount of time spent recruiting at a specific site. One site was in front of a bookstore located close to restaurants and bars. Of the three sites, this location had the highest volume of pedestrians and thus produced the largest percentage of the sample (83%). The other sites were located near a coffee house and near a clothing store. These two sites accounted for 17% of the sample. At each location, recruitment was conducted on Fridays, Saturdays, and Sundays during three time periods (12–3 PM, 3–6 PM, 6–9 PM). Within this framework, the recruitment effort was tailored to the days/times in which pedestrians were most abundant. More time was spent recruiting on Saturdays and Sundays (75% of effort) than on Fridays (25% of effort), and somewhat more time was spent recruiting from 3–6 PM (50% effort) than from 12–3 PM (20% effort) or from 6–9 PM (30% effort). The actual composition of the sample approximated this breakdown.

A group of RAs worked together at a specific location to recruit participants. A single RA approached the first man available after the RA had finished interacting with a participant or study candidate. Occasionally men of white ethnicity were skipped in order to oversample men of color. The RAs approached men walking alone or in groups. When a group of men appeared, the man closest in physical proximity to the RA was selected. Men with female companions were not approached. The RA introduced himself or herself as a student attending the University of Southern California (USC), described the study as a survey about men's sexual behavior sponsored by USC, and informed each candidate that the survey would take about 30 minutes to complete and that he would be paid \$15 for his time. Each man was informed that no personal identification would be included on the survey and that the completed survey would be sealed in an envelope and deposited in a collection box. At the time of the initial approach, the RA did not mention that the study focused on MSM. If an unselected man from a group expressed interest in the study (very few cases), he was allowed to participate if he and the selected man were not sexual partners (preventing nonindependence of data) and if he met the following eligibility criteria: self-identified MSM; English speaking; white, African American, or Hispanic; 18–42 years of age; engaged in anal sex with a man in the past year; had never been paid with drugs or money for sex; and had never injected nonprescription drugs. Eligibility was determined with a brief self-administered screening questionnaire.

Of the men approached, 47% stated that they were not interested in participating and thus were not screened (the vast majority stated that they did not have time). Of those who expressed interest and agreed to fill-out the screener, 52% were eligible to participate and all but eight eligible men signed a written informed consent agreement and self-administered the main questionnaire. The men sat in folding chairs positioned on the sidewalk next to the storefront. No questionnaires were administered inside business establishments.

Forty-eight percent of the men screened were ineligible. Of those screened, 24% had not engaged in anal intercourse with another man in the past year; this accounted for half of the ineligible group. Other reasons for being ineligible (and percentages within that group) included injection drug use (7%), being paid with money or drugs for sex (13%), ethnicity (5%), age (4%), uncomfortable with English (1%), and not being a biological male (1%). Other men were ineligible for other reasons (e.g., had already participated in the study, incomplete screener, intoxicated).

## MEASURES

Participants provided information on demographic factors, sexual orientation (do you consider yourself gay, bisexual, or heterosexual?), and HIV testing (ever been tested for HIV, recency of last HIV test, current HIV status [seronegative, seropositive, unknown]). They indicated (yes/no) their perceptions of whether they currently were in a monogamous sexual relationship (neither you nor your partner have sex with anyone else) and, for those who responded affirmatively, how long they had been in that relationship.

Participants with primary male sex partners in the past 12 months (i.e., a man with whom they had been in a relationship at least 6 months and with whom they felt a special emotional bond) were asked whether they engaged in UIAI or URAI with ejaculation in the most recent sexual encounters with those partners. These measures were not limited to participants currently in a primary relationship; rather, all participants who had primary partners in the past year completed the measures. They also indicated their perceptions of the partner's HIV status (unknown, seropositive, seronegative, rather not say) before the sexual activity and how long ago the activity took place. This set of measures was repeated for participants who had nonprimary male partners in the past year (i.e., a sex partner with whom one was not in a primary relationship of at least 6 months and with whom one did not feel a special emotional bond).

## STATISTICAL ANALYSES

Fourteen percent of the participants reported that they were seropositive. There were too few seropositive participants for a reliable analysis of that subgroup. To focus on MSM at risk for HIV infection, analyses were restricted to men who reported that they were HIV seronegative or of unknown serostatus. Only a small number of participants in the analytic sample had partners perceived to be seropositive. The prevalence of UIAI or URAI did not change appreciably when seropositive partners were omitted from the analysis. The findings are based on the full complement of partners.

We calculated the prevalence of UAI (UIAI, URAI, and either type of UAI) with primary and nonprimary partners for the total sample and examined the association with serostatus and relationship variables (chi-square).

For the age-related analyses, the analytic sample was divided *a priori* into three age groups (under 25 years, 25–30 years, over 30 years) based on cutoff points used by others (Dean & Meyer, 1995; McAuliffe et al., 1999; Ridge, Plummer, & Minichiello, 1994; Sittitrai, 1998; Van de Ven et al., 1997). The age groups were compared (chi-square) in the prevalence of UIAI, URAI, or UAI with primary and nonprimary partners (six dependent measures). To assess and statistically control for other demographic factors, these six measures were also analyzed separately in logistic regression models with age (below age 25 as referent), education (ordinal categories), income (continuous), and ethnicity (white [referent], Hispanic, African American) as simultaneous predictors.

Two sets of chi-square comparisons were made to examine age-group differences in UAI in the context of the serostatus/relationship variables. First, participants who engaged in UAI (either receptive or insertive) with primary partners were compared across age groups on the following serostatus and relationship variables: (a) participant tested for HIV in the past year (yes/no), (b) self-reported HIV serostatus (negative, unknown), (c) perception of primary partner's serostatus (negative, positive,

unknown, rather not say), (d) participant's report that both self and primary partner were seronegative (seroconcordant, yes/no), (e) perceived to be in a monogamous relationship with primary partner for at least 6 months (yes/no), and (f) seroconcordant (both seronegative) and monogamous relationship for at least 6 months (yes/no). This time frame rendered the monogamy variable compatible with the primary partner measure; approximately 70% of the men in each age group who reported that they currently were in a monogamous relationship had been monogamous at least six months. Second, within each age group, the UAI and no-UAI strata were compared on the serostatus/relationship dimensions. These two sets of analyses could not be conducted reliably for participants who had nonprimary partners, because few men had engaged in UAI with those partners.

## RESULTS

### SAMPLE CHARACTERISTICS

The analytic sample included 367 men who reported that they were seronegative (83%) or of unknown serostatus (17%). Median age was 29 years; 26% ( $n = 96$ ) were younger than 25, 34% ( $n = 125$ ) were between 25 and 30, and 40% ( $n = 146$ ) were older than 30. Ethnic group breakdown was 50% White, 27% Hispanic, and 23% African American. Nearly 87% of the participants were gay and 11% were bisexual; the remaining 2% perceived themselves as heterosexual. Educationally, 49% had a 4-year college degree or higher, 16% had a 2-year college degree, and 33% had a high school diploma and some college experience. Median annual income range was \$20,000–\$29,999. Eighty-one percent of the men had been tested for HIV in the past year.

### UNPROTECTED ANAL SEX WITH PRIMARY AND NONPRIMARY PARTNERS

The most recent sexual encounters occurred within 3 weeks of the survey for approximately half of the participants (median of 17 days for primary partners and 20 days for nonprimary partners). Overall, 56% of the participants had a primary partner in the past year, of whom 26% engaged in UIAI, 21% engaged in URAI, and a total of 35% engaged in at least one of the two types of unprotected anal sex in the most recent encounter with that partner. Of those who had primary partners, 83% of the men said they knew the HIV status of those partners (73% were perceived to be seronegative), 59% perceived that they were in a seroconcordant relationship (both seronegative) with those partners, 25% believed they were in a monogamous relationship for at least six months, and 19% were in a seroconcordant monogamous relationship. Only one of these serostatus/relationship variables was associated with sexual risk: UIAI with primary partners was more prevalent among those who were in a monogamous relationship (46%) than among those who were not (23%,  $p < .01$ ). The difference in URAI was in the same direction but not significant (30% vs. 21%). The same pattern of results was observed for those who were in a seroconcordant monogamous relationship (vs. not), stemming largely from the differences produced by perceived monogamy status.

Nearly two thirds of the men (66%) had a nonprimary partner in the past year, of whom 12% engaged in UIAI, 8% engaged in URAI, and a total of 17% engaged in at least one of the two types of unprotected anal sex in the most recent encounter with that partner. Of those who had nonprimary partners, 44% said they knew the HIV

status of their most recent nonprimary partner and 31% reported that both self and partner were seronegative. Neither of these variables was associated with the prevalence of unprotected anal sex.

### AGE-GROUP DIFFERENCES IN UNPROTECTED ANAL SEX

We turn next to age-group differences in unprotected anal intercourse. As seen in Table 1, a significantly larger percentage of men younger than age 25 years compared with the two older groups had a primary male sex partner in the past year. Of those who had primary partners, the prevalence of UIAI, URAI, and UAI with those partners was substantially higher among participants under age 25 than among older participants. Of those who had nonprimary partners, there were no significant age-group differences in the prevalence of unprotected anal sex with those partners. Risky anal sex with nonprimary partners was uniformly low for each age group. The findings shown in Table 1 were confirmed in the multivariate logistic regression models described earlier. Two other demographic associations emerged in those models: education was inversely associated ( $p < .05$ ) with the likelihood of UIAI with nonprimary partners, and income was inversely associated ( $p < .01$ ) with the likelihood of URAI with nonprimary partners. The three ethnic groups did not differ on the anal sex measures.

### SEROSTATUS/RELATIONSHIP VARIABLES BY AGE AND SEXUAL RISK GROUPS

Table 2 displays the findings on the serostatus/relationship variables among participants who had primary partners, stratified by age and sexual risk groups. Men aged 25 to 30 and over age 30 were pooled in this analysis because those two groups did not differ in the prevalence of unprotected anal intercourse with primary partners (Table 1). The first set of chi-square analyses, performed among participants who engaged in UAI with primary partners, indicated that there were no significant differences between age groups on any of the serostatus/relationship variables in Table 2. Thus, young MSM's elevated prevalence of unprotected anal sex with primary partners was not qualified by age-group differences in any of these background variables. The second set of chi-square analyses examined whether there were differences on the serostatus/relationship dimensions for those who engaged in UAI with primary partners compared with those who did not. Only one appreciable difference emerged: among men younger than 25 years of age, the percentage who perceived that they were in a monogamous relationship with primary partners was significantly higher among those who engaged in UAI than among those who did not.

### DISCUSSION

This study examined behavioral, serostatus, and relationship variables that may contribute to HIV infection risk in MSM. Consistent with other studies (Bosga et al., 1995; Buchanan et al., 1996; Dawson et al., 1994; Doll et al., 1991; McLean et al., 1994; Van de Ven et al., 1997; Vincke et al., 1997; Weatherburn et al., 1991), we found that HIV seronegative and unknown serostatus MSM were more likely to have engaged in UAI with primary than nonprimary partners. Additionally, the present study offers new insights on age-related sexual risk behavior of MSM. First, the prevalence of UAI with nonprimary partners was low and fairly uniform across the three age groups; in fact,

Table 1. Percent Reporting Unprotected Anal Intercourse in Most Recent Encounter with Primary and Nonprimary Partners by Participant Age Group

Percent/Sexual Behavior	Age group		
	< 25 years old	25–30 years old	> 30 years old
who had a primary partner	70.8 <sup>a</sup> (68 of 96)	50.4 <sup>b</sup> (63 of 125)	52.1 <sup>b</sup> (76 of 146)
Among those who had a primary partner			
who engaged in unprotected insertive anal intercourse			
with ejaculation with primary partner	38.2 <sup>a</sup>	20.6 <sup>b</sup>	18.4 <sup>b</sup>
who engaged in unprotected receptive anal intercourse			
with ejaculation with primary partner	30.9 <sup>a</sup>	14.3 <sup>b</sup>	17.1 <sup>b</sup>
who engaged in either type of unprotected anal intercourse			
with ejaculation with primary partner <sup>1</sup>	45.6 <sup>a</sup>	28.6 <sup>b</sup>	30.3 <sup>ab</sup>
who had a nonprimary partner	62.5 (60 of 96)	64.0 (80 of 125)	70.6 (103 of 146)
Among those who had a nonprimary partner			
who engaged in unprotected insertive anal intercourse			
with ejaculation with nonprimary partner	8.3	18.8	8.7
who engaged in unprotected receptive anal intercourse			
with ejaculation with nonprimary partner	6.7	10.0	6.8
who engaged in either type of unprotected anal intercourse			
with ejaculation with nonprimary partner	13.3	22.5	15.5

Note. For each sexual behavior measure, percentages with different superscripts differ,  $p < .05$  (chi-square) between age groups.  
<sup>1</sup>The finding for men < 25 years of age (45.6%) differed,  $p = .06$  (chi-square) from the finding for men > 30 years of age (30.3%).

Table 2. Standing on Serostatus and Relationship Variables Among Men Who Engaged and Did Not Engage in UAI in Most Recent Encounter With Primary Partners by Participant Age Group

Percent/Serostatus and relationship variables	Age group		
	< 25 years old	25 and older	
Engaged in UAI (n = 31)	83.9	Engaged in UAI (n = 41)	Did not engage in UAI (n = 98)
had HIV test in past year			
Participant's HIV serostatus			
unknown	14.8	8.3	9.1
seronegative	85.2	91.7	90.9
Partner's HIV serostatus before UAI			
unknown	16.7	22.5	12.5
seronegative	76.7	65.0	75.0
seropositive	6.6	7.5	12.5
rather not say	0.0	5.0	0.0
seroconcordant <sup>1</sup> (Participant and partner HIV-neg)	61.3	58.5	60.2
in monogamous relationship for at least 6 months	38.7 <sup>a</sup>	31.7	19.4
in seroconcordant and monogamous relationship for at least 6 months	29.0	24.4	15.3

*Note.* For the monogamy variable, percentages with different superscripts differ  $p < .05$  (chi-square) between the two UAI groups.

UAI = unprotected insertive or receptive anal intercourse with primary partner.

<sup>1</sup>Seroconcordance is an index based on participants' self-reported seronegative status and the seronegative status of primary partners reported by participants.



the prevalence was lowest among MSM under age 25 years of age. Second, MSM under age 25 were significantly more likely than older MSM to have engaged in UAI with primary partners. Third, the men's standings on the serostatus/relationship variables were similar across age groups among those who engaged in UAI with primary partners. Thus, in the present sample, young MSM (relative to their older counterparts) may have been at elevated risk for HIV infection more from their elevated prevalence of UAI with primary partners than from their sexual activity with nonprimary partners or from age-related differences in the serostatus/relationship variables.

These findings certainly do not rule out the possibility that behavioral factors (i.e., unprotected sex) interact with serostatus or relationship variables to increase or decrease age-specific risk for HIV infection. Admittedly, some of our measured variables (e.g., report of own HIV serostatus and perceived serostatus of primary partners) had skewed distributions, which may have lessened the opportunity to detect associations. Additional examination of these variables as well as other variables would facilitate understanding of HIV exposure risk. For example, it would be informative to know the ages of sexual partners. In many urban areas HIV seroprevalence is higher in populations of older than younger MSM (Osmond et al., 1994). Thus, if a sizable percentage of young participants were having sex with other young men, this could be protective and could reduce the risk of being exposed to HIV through unprotected anal sex (Blower, Service, & Osmond, 1997; Morris, Zavisca, & Dean, 1995; Service & Blower, 1996).

The finding that many participants who engaged in UAI with primary partners perceived that they were in a seroconcordant (both seronegative) or monogamous relationship must be viewed cautiously. Kippax and colleagues (1993) coined the term negotiated safety and suggested that the negotiated practice of unprotected anal sex with a seroconcordant partner in the context of a mutually monogamous relationship could be taken as an alternative to condom use. Others (Bosga et al., 1995; Ekstrand et al., 1993), however, have insisted that this strategy may represent negotiated danger, because the relationship may not be truly monogamous (Appleby, Miller, & Rothspan, 1999) or because people may not really know (Dawson et al., 1994; McLean et al., 1994) or honestly communicate their current HIV status. Two people may discuss the issues of HIV testing, serostatus, and relationship "rules" soon after establishing a primary relationship but not continue to discuss those issues, which may jeopardize safety. Periodic discussion may help preserve a safe relationship. Yet true negotiated safety, as defined above, may occur infrequently. In the present study, although most of our participants reported that they knew their own serostatus and that of their primary partners, relatively few of those who engaged in UAI with those partners reported that they were in a seroconcordant *and* monogamous relationship.

Limitations of the study warrant comment. The investigation was conducted with a relatively small multiethnic sample of middle-class, well-educated, self-identified MSM recruited in West Hollywood, California. The sample did not include MSM who ever injected nonprescription drugs or who ever exchanged money or drugs for sex. Generalizing the findings to MSM in general or to MSM residing in other urban areas or other regions of the country should be done cautiously.

Only men who had engaged in anal intercourse with another man in the past 12 months were eligible to participate in the study. We believe that little bias was introduced by omitting MSM who had engaged in oral sex only. Only 24% of the men screened for eligibility had not engaged in anal intercourse with a man in the past year.

Further, the prevalence of anal intercourse does not appear to be associated with age. Van de Ven and colleagues (1997) found that the prevalence of "no anal sex" with regular male partners in the past 6 months was 14% for MSM younger than 25 years of age and 20% for MSM age 25 or older (not significant). They also found comparable rates of "no anal sex" with casual partners in the past six months (27% of MSM under age 25 and 27% of MSM 25 or older). Studies conducted by the Centers for Disease Control and Prevention (1999) have obtained similar outcomes.

Methodologically, we did not collect data from the sexual partners and thus were not able to corroborate the responses of the study participants. It is virtually impossible to collect such dyadic data in community surveys. Participants who reported that they were in a monogamous relationship probably were reporting their own status accurately, but we were not able to determine with certainty whether a relationship was mutually monogamous.

Despite the sampling and methodological limitations, our findings strongly suggest that prevention interventions for young as well as older MSM need to address the risk for HIV infection that may stem from UAI with primary partners. Although we do not have any direct evidence from this study, UAI with those partners may arise partially from the need for intimacy and interpersonal connection that may overshadow concerns about personal risk. Additionally, some MSM may perceive that unprotected sex with a primary partner is "safe," even if they are not in a mutually monogamous relationship with that partner. In terms of Gestalt figure-ground effects, a steady sexual relationship may become the salient figure seen against an obscure ground that includes peripheral risk factors associated with that relationship. Focusing on the figure may cause a person to lose sight of those background risk factors. And even if a person were to think about those factors, emotional involvement with a partner may lead to a biased assessment that functions to maintain an illusory sense of safety. Interventions that address these affective, perceptual, and motivational variables may be efficacious in reducing MSM's unsafe sex with primary partners.

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