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Limited Effects of HIV Counseling and Testing for Women

A Prospective Study of Behavioral and Psychological Consequences

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Objectives.—To assess the consequences of human immunodeficiency virus (HIV) counseling and testing for seronegative women in terms of sexual behavior and psychological outcomes.

Design.—The design is prospective and longitudinal, using repeated measures. Participants were interviewed at recruitment, 2 weeks later (when tested women received results), and 3 months later.

Setting.—Four community health clinics in southern Connecticut; all provide HIV counseling and testing and other specialized and primary health care services.

Study Participants.—A sequential sample of women were recruited for two study groups: those seeking HIV counseling and testing (n=152), and a comparison group never tested for HIV (n=78), matched by clinic, race, and age.

Main Outcome Measures.—A composite measure of sexual risk was developed, based on sexual activity, condom use, and partner risk factors. Psychometrically valid and reliable measures of general psychological functioning and acquired immunodeficiency syndrome (AIDS)–specific psychological indicators were also used.

Results.—Average level of sexual risk was lower for tested than nontested women at all three interviews. For both groups, there was no significant change in sexual risk from baseline to 3-month follow-up. At the individual level, there was no difference in the number of women who decreased or increased sexual risk. For tested women, intrusive thoughts about AIDS and estimated chance of getting AIDS decreased after counseling and testing.

Conclusions.—Behavioral and psychological consequences of HIV counseling and testing for women at risk for HIV were limited. These results have implications for further prevention interventions.

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THE RAPID spread of human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) continues. Through 1993, more than 360 000 people in the United States had been diagnosed with AIDS.[1] In the absence of a vaccine or cure, behavior change is the only means of stemming this epidemic. While HIV counseling and testing is not a substitute for behavior change, it is assumed to play a significant role in the prevention effort.[2,3] Since HIV antibody testing was licensed in 1985, the demand for publicly funded testing increased steadily from 79 000 to more than 2 million in 1991.[4] As a diagnostic tool, testing enables those with HIV to initiate medical treatment that can enhance and prolong life. As a health intervention, HIV counseling and testing provides an opportunity for personal risk assessment, education about HIV/AIDS, and the prospect of reducing high-risk behavior, thus slowing the spread of the epidemic.

Considerable research has been conducted on the effects of HIV testing among gay and bisexual men.[5,6] Since the early 1980s, a dramatic reduction in high-risk sexual behavior among men who have sex with men has been documented; however, the extent to which HIV counseling and testing has been a determinant of this change is equivocal. Results from longitudinal cohort studies indicated that most changes in high-risk sexual behavior occurred prior to the availability of HIV counseling and testing.[7-9] Learning of a positive antibody test result has been related to decreased risk behavior; seronegative status resulted in little or no behavior change.[7,10,11] In two studies designed to examine psychological reactions to HIV counseling and testing among gay men, notification of seronegative status resulted in a significant decline in psychological distress, while notification of HIV seropositivity resulted in increased distress in one study[12] and decreased distress in the other.[13]

Two recent longitudinal studies found no effect of HIV counseling and testing on the sexual behavior of sexually transmitted disease (STD) clinic patients[14] or college students.[15] While both samples included women and men, the investigators did not report any differences by sex.

In 1991, equal numbers of women and men were tested at public sites.[4] Even so, there has been limited empirical research about women's high-risk behavior in general, and the effects of HIV counseling and testing on behavior in particular. Because there are substantial differences between men and women most at risk for HIV (eg, race, education, socioeconomic status, nature and type of sexual behavior and drug use, and power differentials in interpersonal relationships), we cannot assume that findings from studies of the effects of HIV counseling and testing on the behavior of men are generalizable to women.[16] There are limited data concerning why women were tested, their sexual behavior, perceptions of risk, and social or

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psychological characteristics. A recent review of research on the effects of HIV counseling and testing concluded that beyond notable behavior change among discordant couples, "findings among other heterosexuals at increased risk were scanty and mixed."[5(p2419)] To date, most research on women and HIV testing has focused on reproductive decision making.[17]

This 3-month longitudinal study examines the determinants and consequences of HIV testing for women. The primary objectives are to identify any deleterious or beneficial psychological consequences of HIV counseling and testing, and to determine whether women change their sexual risk behavior following HIV counseling and testing. Strengths of the study include its longitudinal prospective design, an untested comparison group, and a comprehensive measurement scheme. The study is designed to evaluate HIV counseling and testing as a health intervention for women at risk for HIV.

METHODS

Participants

Study participants were recruited from four urban community-based health clinics chosen to represent diverse client populations. Each clinic provided confidential and/or anonymous HIV testing as well as specialized (eg, gynecological) and primary health care services. Participants in the tested group (n=152) were women voluntarily seeking HIV counseling and testing. Women using other clinic services who had never been tested for HIV were included in the comparison group (n=78). The groups were matched by clinic, race, and age. Women were ineligible only if pregnant, in that pregnancy may influence sexual behavior.

Procedure

Study participants were recruited sequentially at each site. After a clinic appointment (which included pretest counseling and blood draw for those receiving HIV counseling and testing), eligible women were given basic information about the study by the HIV counselor or clinician. Those interested were introduced to a member of the research team who gave them more information about the study, obtained informed consent, and conducted the first interview. Approximately 80% of eligible women agreed to participate.

Data were collected at the clinic at three interviews: following the initial appointment (baseline, or interview 1); approximately 1 to 3 weeks later, which was just after tested participants received their test results and posttest counseling (interview 2); and approximately 3 months later (interview 3). Three months was considered long enough for behavior change to occur and stabilize, yet not so long that participants might be lost because of address change or attrition.

Strict ethical guidelines were followed to protect confidentiality, and participation was voluntary. All procedures were approved by a university institutional review board. Each participant was paid $75 for three interviews. All clinics followed state guidelines for HIV counseling and testing. Testing always included counseling by trained and certified counselors who would explain the HIV antibody test and procedures and confidentiality, assess the individual's reason for testing and extent of risk, recommend preventive measures (eg, for sexual transmission: abstinence, condom use, and mutual monogamy), address questions and concerns, assess the potential impact, discuss partner notification in case of a positive test result, and schedule the appointment to receive result and posttest counseling. Counselors also supplied written materials to reinforce prevention recommendations. HIV antibody testing was conducted by local private laboratories using standard enzyme-linked immunosorbent assay with Western blot confirmation.

Instruments

Psychometrically valid and reliable instruments from other AIDS research were used to replicate and extend findings from studies of men to this study of women. They were adapted in several ways. Structured interviews aided by specific verbal instructions and response cards were used, rather than questionnaires. Based on pilot testing, measures were simplified to enhance comprehension. Interviews were conducted in Spanish for women whose primary language was Spanish, and otherwise in English. Reliability of measures was evaluated using Cronbach's coefficient α for internal consistency; α ranged from .70 to .92.

To capitalize on the strength of the longitudinal design and to assess change and stability over time, identical measures were used at each interview. Information was collected in four areas: (1) background and sociodemographic variables, (2) general psychological indicators, (3) AIDS-specific psychological indicators, and (4) sexual behavior/risk.

Background and Sociodemographic Variables.—Background information included age, race, education, employment status, income, relationship status, sexual orientation, number and ages of children, age at first intercourse, and history of STD.

General Psychological Indicators.—Psychological measures that have proved most predictive of health behavior[18] were selected for use in this study.

Three measures—optimism, self-esteem, and hopelessness—used a 5-point Likert-type scale, with response categories ranging from 1 ("strongly disagree") to 5 ("strongly agree"). Optimism was measured using the 8-item Life Orientation Test,[19] including statements such as "you always look on the bright side of things" and "if something can go wrong for you, it will." The 10-item Rosenberg Self-esteem Scale[20,21] measures overall feelings of satisfaction with self, with items including "on the whole you are satisfied with yourself" and "you can do things as well as most people." The 20-item Beck Hopelessness Scale[22] includes items such as "you have great faith in the future" and "you don't expect to get what you really want."

The short version of the Hopkins Symptom Checklist (the HSCL-25)[23,24] provides independent measures of depression (15 items) and anxiety (10 items). Respondents report how often they were bothered by certain symptoms in the past month (eg, poor appetite, feeling fearful) on a Likert-type scale from 0 ("not at all") to 3 ("often").

AIDS-Specific Psychological Indicators.—We included AIDS-specific measures that have had the strongest association with high-risk behaviors in cross-sectional and longitudinal studies.[25,26] To account for specificity between attitudes and behavior, we followed past researchers who adapted general measures to pertain more specifically to HIV/AIDS.

To assess intrusive thoughts about AIDS, the 15-item Intrusion Subscale of the Impact of Events Scale[27] as adapted by Antoni et al[28] was used to determine the extent to which subjects experienced intrusive thoughts, strong feelings, and unwanted images related to the threat of AIDS (eg, "I have trouble doing other things because thoughts of AIDS come to mind" or "any reminder about AIDS brings back strong feelings") on a Likert-type scale from 1 ("not at all") to 4 ("often").

The nine-item Health Locus of Control Scale[29] as modified by Kelly et al[30] measures perceived sense of control over the acquisition of HIV/AIDS in three dimensions: internal control ("you are in control of whether or not you get AIDS"), chance/luck external control ("if you get AIDS, it's a matter of fate"), and powerful-others external control ("whether or not you get AIDS is determined by other people"), using a Lik-

ert-type scale from 1 ("strongly disagree") to 5 ("strongly agree").

An 8-item measure of AIDS self-efficacy, devised for the purposes of this study, assesses participants' ability to take actions to improve health or reduce risk, such as talking to a health professional about AIDS or using a condom correctly. Respondents rated how certain they were that they could perform each action, ranging from 0% ("very unsure") to 100% ("very sure").

As in Kelly et al,[30] participants rated their perceived risk for the preceding month (or intervening weeks, at interview 2) on a Likert-type scale from 1 ("not risky at all") to 5 ("extremely risky"). They also estimated their chance of getting AIDS eventually, on a scale from 0% ("definitely will not get AIDS") to 100% ("definitely will get AIDS").

Sexual Behavior/Risk.—Participants were asked about their sexual behavior using questions similar to those developed for the Multicenter AIDS Cohort Study,[31] with the addition of sexual activities specific to women. Respondents reported the number of times they engaged in protected and unprotected vaginal and anal intercourse during the preceding 30 days. For comparisons over time, the number of occurrences of each sexual act between the first and second interviews was adjusted to compensate for the shorter time interval: ([No. of occurrences/No. of days between interviews]×30 days). Participants reported the number of sexual partners in the previous 30 days and/or between interviews, as well as the number of partners during the year prior to baseline. They also indicated whether any sexual partner may have any of the following risk factors: HIV-positive serostatus, current or past injection drug use, sex with men, or other sexual partners. Those who responded negatively to all items were considered to have "no known partner risk"; all others were considered to have "uncertain or high partner risk."

A composite measure of level of risk was developed on the premise that the following three conditions are necessary for heterosexual transmission of HIV: sexual intercourse, without a condom, and with a partner who carries HIV. A hierarchically ordered, four-level risk variable was created with values from 0 to 3 using self-reported sexual behaviors: (0) not sexually active, (1) no unprotected intercourse, (2) unprotected intercourse with a partner believed to have no risk, and (3) unprotected intercourse with a partner having uncertain or high risk. Group means were calculated using values of 0 to 3. This moves beyond previous measurement schemes that only consider behaviors (eg, unprotected intercourse) without reference to partner risk.

Table 1.—Sociodemographic and Background Information

Characteristic	Group, No. (%) Tested (n=152)	Comparison (n=78)
Race/ethnicity		
White	73 (48.0)	38 (48.7)
African American	52 (34.2)	27 (34.6)
Latina	22 (14.5)	11 (14.1)
Other	5 (3.3)	2 (2.6)
Education		
High school degree or less	71 (46.7)	43 (55.2)
Some college or college degree	81 (53.3)	35 (44.9)
Employed		
No	84 (55.3)	42 (53.8)
Yes	68 (44.7)	36 (46.2)
Annual income, $*		
<6000	58 (38.7)	18 (23.1)
6000-12 000	48 (32.0)	34 (43.6)
>12 000	44 (29.3)	26 (33.3)
Relationship status†		
Married or committed	73 (48.1)	56 (71.8)
Noncommitted relationship or none	79 (51.9)	22 (28.2)
Gender of sexual partners†		
Men only	123 (80.9)	76 (97.4)
Women only or women and men	29 (19.1)	2 (2.6)

*Only 150 respondents in the tested group.
†$P<.01$.

Table 2.—Potential Risk Factors Prior to the First Interview

Risk Factor	Group, No. (%) Tested (n=152)	Comparison (n=78)
Ever had STD*	70 (46.1)	39 (50.0)
More than one partner in last year†	89 (58.9)	31 (39.7)
More than one partner in last month	19 (12.5)	7 (9.0)
Risky‡ partner in last month†	75 (49.3)	26 (33.3)
Unprotected vaginal intercourse in last month†	66 (43.4)	48 (61.5)
Unprotected anal intercourse in last month	6 (4.0)	3 (3.9)
Sex after alcohol or drugs in last month	55 (36.2)	27 (34.6)
Sex in exchange for drugs or money in last month	8 (5.3)	0 (0)

*STD indicates sexually transmitted disease.
†$P<.05$.
‡Defined as someone who reportedly has a recent history of injection drug use, sex with men, or more than one sex partner.

Statistical Analyses

Analyses of variance (ANOVA) and multivariate analyses of variance (MANOVA) with repeated measures were used to analyze differences by group (tested vs comparison) and interview (interview 1/interview 2/interview 3), as well as the interaction between group and interview. The primary advantage of the repeated measures design is that it controls for individual differences, thus producing a more powerful test of study hypotheses than a between-subjects design.[32] MANOVAs were conducted for two sets of dependent variables: general psychological indicators and AIDS-specific psychological indicators. MANOVA tests simultaneously for group differences in multiple dependent variables, while accounting for their intercorrelations. Whenever differences are found, follow-up ANOVAs with repeated measures are conducted to determine the source of the difference. Repeated-measures ANOVA was used to examine the main and interaction effects of group and interview on mean level of sexual risk.

At the individual level, χ^2 analyses were used to assess whether the number of participants whose sexual risk decreased over time was significantly greater than the number of participants whose sexual risk increased. McNemar χ^2 was used, wherein each individual serves as her own control.[33]

RESULTS

Description of the Study Sample and Potential Risk Factors Prior to Baseline

Table 1 provides demographic and background information on the women in the tested and comparison groups. Age ranged from 18 to 61 years, with a mean (SD) age of 30.8 (7.9) years. Forty-eight percent were white, 34.2% African American, 14.5% Latina, and 3.3% of other race/ethnicity. Education ranged from no formal education to graduate degree. There were only two differences between women in the tested and comparison groups: fewer women who were tested were married or involved in a committed relationship ($P<.01$), and tested women were more likely to report having sex with women ($P<.01$). Among those tested, eight women (5.2%) tested seropositive for HIV antibodies.

Many women sought HIV counseling and testing because they perceived themselves to be at risk, based on either their own past sexual or drug-related behaviors (21.1%) or the behaviors of their sexual partners (27.6%), because they simply "wanted to know" (23.7%), because of social pressure or a sense of social responsibility (23.7%), or because they were entering a new relationship (17.0%). (Total exceeds 100% because participants could give more than one reason.)

Women in both groups were at potential risk for HIV (Table 2): 47.4% of the women had ever had an STD, and 35.7% engaged in sex after using alcohol or drugs in the month preceding the baseline interview. Among women in the comparison group, 39.7% had more than one partner in the past year, and

Table 3.—General Psychological Indicators Over Time by Group*

Indicator	Interview 1		Interview 2		Interview 3	
	Tested (n=136)	Comparison (n=70)	Tested (n=136)	Comparison (n=70)	Tested (n=136)	Comparison (n=70)
Optimism	3.50† (0.63)	3.46† (0.65)	3.57† (0.64)	3.57† (0.64)	3.55† (0.69)	3.61† (0.62)
Self-esteem	3.73† (0.60)	3.79‡ (0.60)	3.77† (0.62)	3.89‡ (0.54)	3.78† (0.60)	3.93‡ (0.57)
Hopelessness	2.18† (0.50)	2.08‡ (0.55)	2.16† (0.53)	2.05‡ (0.51)	2.17† (0.53)	2.07‡ (0.53)
Anxiety	0.99† (0.69)	0.87‡ (0.56)	0.97† (0.71)	0.61‡ (0.50)	0.93† (0.67)	0.67‡ (0.56)
Depression	1.23† (0.65)	1.20‡ (0.63)	1.14§ (0.70)	0.85‖ (0.62)	1.14§ (0.65)	0.88‖ (0.62)

*Participants who completed all three interviews, excluding women with human immunodeficiency virus. Data are expressed as mean (SD) for each indicator. Means with the same superscript are not significantly different.

Table 4.—AIDS-Specific Psychological Indicators Over Time by Group*

Indicator	Interview 1		Interview 2		Interview 3	
	Tested (n=136)	Comparison (n=70)	Tested (n=136)	Comparison (n=70)	Tested (n=136)	Comparison (n=70)
Intrusive thoughts	1.90† (0.66)	1.56‡ (0.56)	2.03† (0.72)	1.47‡ (0.58)	1.64§ (0.59)	1.56‡ (0.60)
Health locus of control	3.67† (0.62)	3.74† (0.55)	3.77† (0.58)	3.73† (0.62)	3.75† (0.57)	3.69† (0.58)
Self-efficacy	86.0† (11.4)	84.7† (13.7)	87.9† (11.3)	85.6† (15.0)	86.5† (12.6)	85.9† (14.4)
Perceived risk	1.99† (1.29)	1.68† (0.99)	1.38‡ (0.70)	1.36‡ (0.71)	1.55‡ (0.83)	1.49‡ (1.89)
Chance of getting AIDS	31.5%† (2.55)	21.0%‡ (1.95)	20.4%‡ (2.01)	25.3%‡ (2.10)	21.3%‡ (1.89)	21.6%‡ (1.78)

*Participants who completed all three interviews, excluding women with human immunodeficiency virus. AIDS indicates acquired immunodeficiency syndrome. Data are expressed as mean (SD) for each indicator. Means with the same superscript are not significantly different.

33.3% had a risky partner in the past month. Among tested women, these proportions were significantly higher; 58.9% had more than one partner ($P<.01$), and 49.3% had a risky partner ($P<.05$). On the other hand, significantly fewer of the tested women had unprotected vaginal intercourse during the previous month ($P<.01$). Overall, sexually active participants reported having vaginal intercourse without condoms nearly twice as often as vaginal intercourse with condoms (mean, 6.1 vs 3.5 times).

Longitudinal Analyses of the Consequences of HIV Counseling and Testing

The retention rate over the study period was 93.4%. Two women in the comparison group were subsequently excluded because they were tested for HIV before the third interview. This resulted in a final sample size of 213: 143 in the tested group and 70 in the comparison group. There were no sociodemographic differences between those who remained in the study and those who dropped out or were excluded. There were two significant differences on psychological measures: those who remained in the sample had lower levels of depression ($P<.05$), and lower estimated chance of getting AIDS ($P<.01$).

The women who tested positive for HIV antibodies were excluded from longitudinal analyses. The psychological and behavioral consequences of learning that one's serostatus is positive were expected to differ from the consequences of a negative result.

General Psychological Indicators.—Repeated-measures MANOVA on five measures of psychological adjustment (Table 3) found significant differences between tested and untested groups ($P<.0001$) and at different times ($P<.05$). Although the magnitude of the differences may seem small, they are statistically significant and reflect differences in the aggregate means across group or over all three interviews. Over time, the tested women reported lower self-esteem and greater hopelessness than nontested women (both $P<.05$), as well as greater anxiety and depression (both $P<.0005$); there was no difference in optimism. Across groups, depression ($P<.0005$) was lower at interview 2 and interview 3 than at baseline. The two groups did not differ in time-related changes (ie, there was no group by time interaction).

AIDS-Specific Psychological Indicators.—Repeated-measures MANOVA on the five AIDS-specific measures (Table 4) found significant effects for group ($P<.0001$) and time ($P<.0005$), as well as a significant group by time interaction ($P<.0005$). At baseline, tested women reported higher levels of intrusive thoughts about AIDS and a higher estimated chance of getting AIDS than women in the comparison group. By interview 3, intrusive thoughts and estimated chance of AIDS among tested women had declined to levels comparable to those reported by nontested women. Levels of perceived risk also decreased over time for women in both groups.

Sexual Behavior/Risk.—Analysis of sexual risk was limited to women who were sexually active at some point during the study: 26 women were excluded because they were not sexually active during the study. Because we defined risky sexual behavior as unprotected vaginal and anal intercourse, we also excluded 19 women who reported that they had sex only with women. Hence, for this analysis sample size was 161.

Repeated-measures ANOVA on level of sexual risk (Table 5) found significant main effects for group ($P<.01$) and time ($P<.0001$). At all three interviews, the mean level of risk of the tested women was lower than the mean risk level of those not tested. The distribution revealed that more tested women abstained from sexual relations or had no unprotected intercourse; 34.7% of the tested women abstained from sex during the "waiting period" between getting tested and receiving results. Over time, sexual risk for women in both groups declined at interview 2 and returned to prior levels at interview 3. This apparent behavior change reflects the shorter time interval between interview 1 and interview 2, despite the mathematical adjustment to a base of 30 days. There was no significant difference between groups in the way these indicators changed over time.

The statistical power to detect an interaction was limited by the sample size. The fact that large samples are necessary to have adequate power to detect interaction effects is a general statistical concern.[34] In this case, there was less than 30% power to detect an interaction if one existed. In order to have adequate power (80%), a sample size of 2100 would have been required. With the current (fixed) sample, we identified a small effect size (.10); it would have been necessary to have a medium effect size (.25) in order to detect mean differences.[35]

Table 5.—Level of Sexual Risk Over Time by Group*

Level of Risk	Interview 1		Interview 2		Interview 3	
	Tested (n=101)	Comparison (n=60)	Tested (n=101)	Comparison (n=60)	Tested (n=101)	Comparison (n=60)
Group means† (SD)	1.79‡ (1.14)	1.97§ (1.02)	1.26‖ (1.16)	1.70¶ (1.06)	1.67‡ (1.10)	2.05§ (0.85)
Values: sexual activity, No. (%) responding yes						
0: Not sexually active	17 (16.8)	7 (11.7)	35 (34.7)	11 (18.3)	19 (18.8)	3 (5.0)
1: No unprotected intercourse	27 (26.7)	11 (18.3)	28 (27.7)	12 (20.0)	26 (25.8)	11 (18.3)
2: Unprotected intercourse, no known partner risk	17 (16.8)	19 (31.7)	15 (14.9)	21 (35.0)	26 (25.7)	26 (43.3)
3: Unprotected intercourse, partner risk uncertain or high	40 (39.6)	23 (38.3)	23 (22.8)	16 (26.7)	30 (29.7)	20 (33.3)

*Participants who completed all three interviews and who were heterosexually active at any of three times, excluding lesbians and women with human immunodeficiency virus infection. Means with the same superscript are not significantly different.
†Group means were calculated using the values of 0 to 3.

We conducted additional post hoc analyses to examine the lack of a detected interaction more closely. We increased the power slightly by repeating the analysis using the entire sample (rather than limiting it to heterosexually active women), and still there was no interaction. Second, we conducted repeated-measures ANOVAs separately for two time intervals (interview 1 to interview 2, and interview 1 to interview 3); no interaction was found in either case. Finally, we reviewed the data carefully, examining changes over time and by group, and concluded that the observed changes over time in mean group differences were modest.

It was reported earlier that at baseline fewer women who received HIV counseling and testing were married or in a committed relationship than those not tested. Therefore, it was possible that the difference in sexual risk was due to a greater amount of unprotected intercourse among women who were married or in a committed relationship. However, the results did not change when the analysis was repeated with relationship status as a covariate.

Individual Patterns of Stability or Change Over Time

The final analysis examined individual patterns of stability and change over time to determine how many participants in each group modified sexual behavior from baseline to 3-month follow-up—in the direction of decreased risk or increased risk—and how many maintained a stable pattern of behavior (Figure). The majority of women in both groups continued whichever behavior they had been practicing at baseline. Although a greater proportion of tested women decreased their risk over time, there was no statistically significant difference between the tested and comparison groups in their behavior change from interview 1 to interview 3. In paired analysis (McNemar χ^2), women who were tested were no more likely to decrease than to increase their level of risk; the same was true for nontested women.

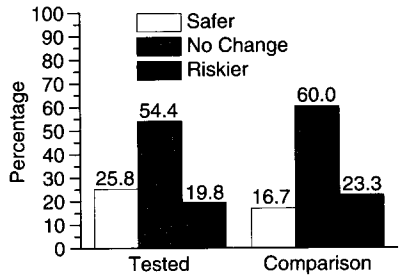
COMMENT

HIV counseling and testing is a critical component of the AIDS prevention effort. It has been thought that individualized education and risk assessment along with knowledge of HIV serostatus would result in reduced high-risk behavior, thereby slowing the spread of the epidemic. In previous studies with gay and bisexual men and with injection drug users, a negative HIV test result was not associated with reduction of high-risk sexual behavior.[5] According to the results of this study, the same is true for heterosexual women.

At baseline, multiple risk factors for HIV were present among women in both groups: more than one partner in the past year, risky partner in the past month, unprotected intercourse, sex after alcohol or drugs, and a history of STD. Clearly, many women in this diverse inner-city sample were engaging in sexual behavior that put them at risk for HIV infection, regardless of whether they sought HIV counseling and testing.

At all times during the study, tested women were safer on a composite measure of intercourse, condom use, and partner risk factors. This finding suggests that women who sought counseling and testing may have already made changes in their sexual behavior prior to testing. Regardless of testing, average sexual risk was virtually unchanged 3 months after baseline (interview 1).

Based on an analysis of individual patterns of stability and change in sexual behavior, it appears that past behavior is a better predictor of current behavior than receiving counseling and a negative test result. The majority of women in both groups remained at the same level of risk. Among those who did change, they were as likely to engage in higher risk behavior 3 months later as they were to engage in lower risk behavior.



Relative change in risk for the tested group and the comparison group from interview 1 to interview 3.

The psychological consequences of HIV counseling and testing for women appeared to be minimal, at least for the measures used in the present study. Variation in general psychological outcomes appeared to be independent of testing. Over time, differences were significant between the tested and comparison groups on only two AIDS-specific outcomes. Intrusive thoughts about AIDS and estimated chance of getting AIDS were elevated for tested women at baseline, which may indicate an "AIDS-related stress" specific to testing. Differences in both indices disappeared 3 months after testing. It may be important to examine the possible association of perceived risk and intrusive thoughts about AIDS with motivation to reduce high-risk sexual behavior over time.

Future research should examine the long-term consequences of HIV counseling and testing on women's psychological well-being and behavior, in particular, whether any short-term positive or negative changes persist or revert. Moreover, it is critical to examine the demographic, social, psychological, and behavioral factors that may predict behavior over time. One quarter of the women did become safer following testing; future analyses should examine individual dif-

ferences that predict for whom HIV counseling and testing results in reduced risk behavior.

In summary, the data suggest that HIV counseling and testing has a limited psychological effect and a limited effect on high-risk sexual behavior over time for seronegative heterosexual women. It is possible that among individuals who seek HIV counseling and testing, behavioral changes made prior to testing may make additional changes difficult to detect. Moreover, there are many factors that may influence risk behavior, and it may be difficult to disentangle the effects of counseling and testing from other predictors. In addition, because this was not a randomly selected sample, the generalizability of these results remains to be demonstrated. Nonetheless, the study sample, although drawn from a single city, was comparable in demographics to those of women tested at federally funded sites[4] and was representative of all women tested at the clinics where women in this study were recruited.

The demand for HIV counseling and testing continues to increase. HIV counseling and testing remains critical for early diagnosis of seropositivity and subsequent referral to medical care. However, based on these results, counseling and testing does not appear to be an effective prevention intervention for seronegative women at risk for HIV. These results are consistent with previous studies conducted largely with gay men. Innovative approaches must be developed and systematically evaluated. For example, current HIV counseling and testing protocols involve brief interventions (ie, one session each of pretest and posttest counseling); more extensive interventions may be warranted. Also, because sexual conduct is a product of interpersonal interaction and may be shaped by social influences, couples or group counseling may prove more effective, as well as more economical. In light of the rapidly growing epidemic, we must rethink approaches to prevention and redefine the role that HIV counseling and testing will play in the national AIDS prevention effort.

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References

1. Centers for Disease Control and Prevention. *HIV/AIDS Surveillance Report.* Atlanta, Ga: US Dept of Health and Human Services; December 31, 1993.
2. Presidential Commission on the Human Immunodeficiency Virus Epidemic. *Final Report, 1988.* Washington, DC: US Government Printing Office; 1988.
3. Coates TJ, Stall RD, Kegeles SM, Lo B, Morin SF, McKusick L.. AIDS antibody testing: will it stop the AIDS epidemic? will it help people infected with HIV? *Am Psychol.* 1988;43:859-864.
4. Centers for Disease Control and Prevention. Publicly funded HIV counseling and testing—United States, 1991. *MMWR Morb Mortal Wkly Rep.* 1992; 41:613-617.
5. Higgins DL, Galavotti C, O'Reilly KR, et al. Evidence for the effects of HIV antibody counseling and testing on risk behaviors. *JAMA.* 1991;266: 2419-2429.
6. Jacobsen PB, Perry SW, Hirsch DA. Behavioral and psychological responses to HIV antibody testing. *J Consult Clin Psychol.* 1990;58:31-37.
7. Fox R, Odaka NJ, Brookmeyer R, Polk BF. Effect of antibody test disclosure on subsequent sexual activity in homosexual men. *AIDS.* 1987;1:241-246.
8. Wiktor SZ, Biggar RJ, Melbye M, et al. Effect of knowledge of HIV status upon sexual activity among homosexual men. *J Acquir Immune Defic Syndr.* 1990;3:62-68.
9. Doll LS, O'Malley P, Pershing A, Darrow WW, Hessol N, Lifson A. High-risk sexual behavior and knowledge of HIV antibody status in the San Francisco city clinic cohort. *Health Psychol.* 1990;9:253-256.
10. Coates TJ, Morin SF, McKusick L. Behavioral consequences of AIDS antibody testing among gay men. *JAMA.* 1987;258:1889.
11. McCusker J, Stoddard AM, Mayer KH, Zapka J, Morrison C, Saltzman SP. Effects of HIV antibody test knowledge on subsequent sexual behaviors in a cohort of homosexually active men. *Am J Public Health.* 1988;78:462-467.
12. Ostrow DG, Joseph JG, Kessler R, et al. Disclosure of HIV antibody status: behavioral and mental health characteristics. *AIDS Educ Prev.* 1989; 1:1-11.
13. Perry SW, Jacobsberg LB, Fishman B, Weiler PH, Gold JWM, Frances AJ. Psychological responses to serological testing for HIV. *AIDS.* 1990; 4:145-152.
14. Wenger NS, Linn LS, Epstein M, Shapiro MF. Reduction of high-risk sexual behavior among heterosexuals undergoing HIV antibody testing: a randomized clinical trial. *Am J Public Health.* 1991; 91:1580-1585.
15. Wenger NS, Greenberg JM, Hilborne LH, Kusseling F, Mangotich M, Shapiro MF. Effect of HIV antibody testing and AIDS education on communication about HIV risk and sexual behavior: a randomized, controlled trial in college students. *Ann Intern Med.* 1992;117:905-911.
16. Ickovics JR, Rodin J. Women and AIDS in the United States: epidemiology, natural history and mediating mechanisms. *Health Psychol.* 1992;11:1-16.
17. Selwyn PA, Carter RJ, Schoenbaum EE, Robertson VJ, Klein RS, Rogers MF. Knowledge of HIV antibody status and decisions to continue or terminate pregnancy among intravenous drug users. *JAMA.* 1989;261:3567-3571.
18. Rodin J, Salovey P. Health psychology. *Ann Rev Psychol.* 1989;40:533-579.
19. Scheier MF, Carver CS. Optimism, coping, and health: assessment and implications of generalized outcome expectancies. *Health Psychol.* 1985;4:219-247.
20. Rosenberg M. *Society and the Adolescent Self-image.* Princeton, NJ: Princeton University Press; 1965.
21. Crandall R. The measurement of self-esteem and related constructs. In: Robinson JP, Shaver PR, eds. *Measures of Social Psychological Attitudes.* Ann Arbor, Mich: Institute for Social Research; 1973.
22. Beck AT, Weissman A, Lester D, Trexler L. The measurement of pessimism: the hopelessness scale. *J Consult Clin Psychol.* 1974;42:861-865.
23. Derogatis LR, Lopman RS, Rickels K, Uhlenhuth EH, Covi L. The Hopkins Symptom Checklist (HSCL). *Mod Prob Pharmacopsych.* 1974;7:79-110.
24. Winokur A, Winokur EF, Rickels K, Cox DS. Symptoms of emotional distress and family planning service: stability over a 4-week period. *Br J Psychiatry.* 1984;144:395-399.
25. Catania JA, Coates TJ, Stall R, et al. Prevalence of AIDS-related risk factors and condom use in the United States. *Science.* 1992;258:1101-1106.
26. Joseph JG, Montgomery S, Kirshet J, et al. Perceived risk of AIDS: assessing the behavioral and psychosocial consequences in a cohort of gay men. *J Appl Soc Psychol.* 1987;17:231-250.
27. Horowitz M, Wilner N, Alvarez W. Impact of event scale: a measure of subjective stress. *Psychosomatic Med.* 1979;41:209-218.
28. Antoni MH, August S, LaPerriere A, et al. Psychological and neuroendocrine measures related to functional immune changes in anticipation of HIV-1 serostatus notification. *Psychosomatic Med.* 1990;52:496-510.
29. Wallston KA, Wallston BS, DeVellis R. Development of the multidimensional health locus of control (MHLC) scale. *Health Educ Monogr.* 1978;6: 160-170.
30. Kelly JA, St. Lawrence JS, Brasfield TL, et al. Psychological factors that predict AIDS high-risk versus AIDS precautionary behavior. *J Consult Clin Psychol.* 1990;58:117-120.
31. Adib SM, Joseph JG, Ostrow DG, Tal M, Schwartz SA. Relapse in sexual behavior among homosexual men: a 2-year follow-up from the Chicago MACS/CCS. *AIDS.* 1991;5:757-760.
32. Bray JH, Maxwell SE. *Multivariate Analyses of Variance.* Thousand Oaks, Calif: Sage Publications Inc; 1985.
33. Siegel S. *Nonparametric Statistics for the Behavioral Sciences.* New York, NY: McGraw-Hill International Book Co; 1956.
34. McClelland GH, Judd CM. Statistical difficulties of detecting interactions and moderator effects. *Psychol Bull.* 1993;114:376-390.
35. Cohen J. *Statistical Power Analysis for the Behavioral Sciences.* Hillsdale, NJ: Lawrence Erlbaum Associates Inc; 1988.

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