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Adolescents' Attitudes About HIV Immunization

Gregory D. Zimet, PhD, ***J. Dennis Fortenberry,*** MD, MS, and
Margaret J. Blythe, MD
Indiana University School of Medicine

Objective: **To evaluate the associations of health beliefs and health behaviors with attitudes about HIV immunization in a sample of adolescent clinic patients.**

Method: **Written self-report questionnaires were administered to 318 adolescents, 13 to 18 years of age (86% female; 72% African American).**

Results: **Although the group as a whole reported a positive attitude about an HIV vaccine, results of regression analyses indicated that several health beliefs were significant independent predictors of vaccine acceptability. In general, health behaviors were not strong predictors of attitudes about HIV vaccination, though some results suggested that those behaviorally at highest risk of HIV exposure accepted immunization more readily.**

Conclusions: **The findings indicate that attitudinal factors may ultimately influence acceptance of HIV immunization. Results are discussed in terms of the importance of continued study of HIV vaccine acceptability, in concert with research focused on vaccine development.**

Key words: *HIV; AIDS; vaccination; health beliefs; health behaviors; adolescents.*

Research into the development of a vaccine to prevent HIV infection has been reemphasized as a priority by the United States government through the National Institutes of Health (Hopkin, 1997). However, the effectiveness of HIV immunization programs will depend on both the development of a vaccine to prevent infection and on widespread acceptance of vaccination. To date, the overwhelming emphasis has been on issues related to vaccine development. Little empirical work has addressed potential problems related to HIV vaccine acceptance. Yet the social censure associated with major modes of HIV transmission (unprotected sexual intercourse and needle sharing by intravenous drug abusers), the dread associated with acquired immunodeficiency syndrome (AIDS), and the feelings of suspicion and distrust regarding AIDS-related public health policy all suggest that there may be significant barriers to HIV vaccine acceptance (Pinkerton & Abramson, 1993). In addition, many people do not get recommended immunizations for diseases not as stigmatized as AIDS, such as influenza (Fedson, 1995), childhood infectious diseases (Wood, Pereyra, Halfon, Hamlin, & Grabowsky, 1995), and hepatitis B (Barie, Dellinger, Dougherty, & Fink, 1994; Weinstock et al., 1995). These research findings, taken in conjunction with the unique issues associated with HIV immunization, suggest strongly that the availability of an HIV vaccine will not guarantee widespread public acceptance of HIV immunization.

Although an HIV vaccine poses several unique problems regarding acceptance, research on existing

All correspondence should be sent to Gregory D. Zimet, Section of Adolescent Medicine, Riley Hospital Rm. 1740X, 702 Barnhill Drive, Indianapolis, Indiana 46202. E-mail: gzimet@iupui.edu.

vaccines can provide some direction for initial inquiry into attitudes about HIV immunization. Investigations of hepatitis B immunization, for instance, have identified several health beliefs associated with nonacceptance of vaccine, including low perceived vulnerability to infection, doubts about vaccine efficacy, worries about vaccine safety, and fears about getting injections (Barie et al., 1994; Bodenheimer, Fulton, & Kramer, 1986; Israsena, Kamolratanakul, & Sakulramrung, 1992; Manian, 1991). Similarly, subjects who perceived fewer benefits of genital herpes vaccination and identified concerns about the limitations of such vaccination had more negative ratings of hypothetical herpes vaccines (Zimet, Fortenberry, et al., 1997). Using health belief measures based on the health belief model (HBM; Janz & Becker, 1984) in studies of HIV vaccine acceptability among university undergraduates, we found significant bivariate associations of several health beliefs to stated intention to accept a hypothetical HIV vaccine (Liau, Zimet, & Fortenberry, 1998; Zimet, Liau, & Fortenberry, 1997). Across both studies, low perceived susceptibility to HIV infection, greater perceived pragmatic obstacles to getting vaccinated, fear of the vaccine causing AIDS, and perceiving oneself to not belong to a traditionally identified risk group were associated with lower acceptance of HIV immunization. These research studies and the HBM were used as a basis for selecting and designing health belief measures for the present study.

A body of recent research with adolescents, derived from problem behavior theory, suggests that behaviors such as seatbelt use, maintaining a healthy diet, and using condoms tend to cluster together, forming a health-protective lifestyle (Costa, Jessor, Fortenberry, & Donovan, 1996; Donovan, Jessor, & Costa, 1993; Elliott, 1993). Similarly, behaviors such as tobacco use, alcohol consumption, and engaging in sexual relations with multiple partners tend to cluster together, forming a health-compromising lifestyle (Elliott, 1993). These findings suggest that persons whose health behaviors place them at greatest risk for a particular illness (i.e., those who engage in health risk behaviors) may be least likely to get a vaccine to prevent that illness. In a study of influenza vaccination among an elderly sample, for instance, obesity, failure to use seatbelts, and smoking were associated with failure to get influenza vaccine (Stehr-Green, Sprauer, Williams, & Sullivan, 1990). In addition, with respect to HBV immunization among sexually transmitted disease (STD) clinic patients, those with a past history of gonorrhea were seven times less likely to return for the second vaccine dose (Sellors et al., 1994). The adolescent health behavior research described above (i.e., Costa et al., 1996; Donovan et al., 1993; Elliott, 1993) was used as a basis for selecting and designing measures of health behavior in the present study.

The purpose of this study was to examine the acceptability of hypothetical HIV vaccination to adolescents and evaluate the relationship of health beliefs and health behaviors to acceptability of HIV immunization. This research builds on two earlier studies (Liau et al., 1998; Zimet, Liau, & Fortenberry, 1997) in several ways. First, the prior studies used university undergraduates, whereas the present research focused on urban adolescents. Given that adolescents may be a group targeted for HIV immunization, just as they are for hepatitis B immunization (Centers for Disease Control and Prevention, 1996), this sample is particularly relevant to the study of HIV vaccine acceptability. Urban adolescents, in particular, have been identified as a group at high risk for HIV infection (D'Angelo, Getson, Luban, & Gayle, 1991; St. Louis et al., 1991; Sweeney, Lindegren, Buehler, Onorato, & Janssen, 1995), and therefore an important target for HIV immunization. Second, the previous research involved only the evaluation of health beliefs in predicting attitudes about HIV vaccination. In the present study, health behaviors, including sexual behaviors, were measured as well. These factors are important to study in order to begin to evaluate whether those who would benefit most from an HIV vaccine (e.g., those engaging in unprotected sexual intercourse) would find such a vaccine acceptable.

Consistent with the HBM, we hypothesized that perceived susceptibility to HIV infection, perceived severity of AIDS, and perceived benefits of HIV immunization would predict greater vaccine acceptability. Conversely, our hypothesis was that perceived barriers to immunization would be associated with lower levels of HIV vaccine acceptability. With respect to health behaviors, we hypothesized that adolescents who engaged in other health-protective behaviors would be more likely to accept HIV immunization, another health-protective behavior. In addition, our hypothesis was that adolescents who engaged in health-compromising behaviors would have more negative attitudes about HIV immunization.

Method

Participants

The 318 adolescents included in this study were receiving health care at urban community adolescent health clinics based in Indianapolis. Of the 330 young people recruited for this research, 326 (98.8%) agreed to participate. Of the 326 participants, 318 (97.5%) returned useable questionnaires (i.e., all demographic information provided). Ages of participants ranged from 13 to 18 years (mean = 15.9, standard deviation = 1.5) and 86% were female. Though the percentage of female subjects is quite high, it reflects the demographic constitution of the population of patients seeking health care at these clinics. Seventy-two percent of the adolescents described themselves as African American and 26% self-identified as non-Hispanic White. Eighty percent reported that they had had sexual intercourse. Adolescents who agreed to participate were paid $5.00 to compensate them for the time and effort involved in the study.

Procedure

The research instrument consisted of an anonymous, self-administered written survey. Participants completed the surveys in the waiting room of the medical clinics prior to their clinic appointments. Written informed consent was obtained from each adolescent participant. The requirement for parental consent was waived because the majority of adolescents come to the clinics on their own for confidential health care. The study was approved by the university's institutional review board.

Measures

Sociodemographic and Control Variables. Demographic variables assessed included age, gender, race/ethnicity (African American, non-Hispanic White, Hispanic, other), and self-reported academic achievement (1 = mostly Fs, 5 = mostly As).

Health Beliefs. Health belief items were designed to reflect the four core HBM domains of susceptibility, severity, benefits, and barriers and were adapted from preliminary research with university undergraduates (Liau et al., 1998; Zimet, Liau, & Fortenberrry, 1997), then pilot-tested with 15 adolescents from the sample population to ensure that items were understandable. Prior research with undergraduates indicated that the subscales had adequate internal reliability, with coefficient alphas ranging from .66 to .87 (Liau et al., 1998). Exploratory factor analysis, also with college students, indicated that health belief items loaded on their designated subscales (Zimet, Liau, & Fortenberry, 1997). All health belief items used a 6-point response format (1 = strongly disagree, 6 = strongly agree).

Four items measured perceived susceptibility to HIV infection. The items were designed to assess feelings of vulnerability to infection, rather than a cognitive appraisal of probability of infection (e.g., "I am worried about getting infected with the AIDS virus"). This subscale demonstrated adequate internal reliability (alpha = .73).

Four items measured perceived severity of AIDS (e.g., "Life would become totally meaningless to me if I got AIDS"). The severity subscale also had adequate internal reliability (alpha = .70).

Three items addressed the perceived benefits associated with receiving hypothetical HIV immunization. Items focused on the vaccine as a health maintenance measure and an AIDS prevention measure (e.g., "Getting an AIDS vaccine would be a good way for me to stay healthy"). The benefits subscale had acceptable reliability for a 3-item measure (alpha = .62).

The domain of perceived barriers consisted of four distinct subscales. The first subscale, pragmatic obstacles to vaccination, was assessed by three items (alpha = .70), which focused on barriers such as difficulty keeping multiple clinic appointments (e.g., "It might be hard for me to find time to get vaccinated for AIDS").

The second barrier, conditional nonmembership in a traditionally identified high-risk group, was measured with four items (alpha = .72). The items in this subscale addressed beliefs that it would be unnecessary to receive HIV immunization if one did not participate in risk behaviors or belong to a group traditionally identified as high risk (e.g., "Since I don't shoot up drugs, I wouldn't really need an AIDS vaccine").

The third barrier subscale, fear of the vaccine, was assessed with four items (alpha = .70), which evaluated concerns that the vaccine might lead to HIV infection (e.g., "I think it might be possible to get AIDS from an AIDS vaccine").

The fourth barrier subscale, fear of needles, was assessed by three items (alpha = .76) related to concerns that clean needles might not be used for im-

munization (e.g., "I am not sure that the needles are clean and sterile when they give shots").

Health Behaviors. A range of health-protective and health-compromising behaviors was measured. Items were adapted from an established, large-scale survey research study with adolescents (Costa, Jessor, Donovan, & Fortenberry, 1995; Costa et al., 1996).

Seatbelt use was assessed with two items (alpha = .87) addressing the frequency of use during highway driving and while going short distances (1 = never, 5 = always).

Attention to a healthy diet was measured with two items (alpha = .66) asking about the degree of attention paid to keeping down the amounts of salt and fat consumed (1 = none, 3 = a lot).

Physical fitness was assessed with two items (alpha = .66) addressing self-evaluated physical conditioning and ability to play at active sports without tiredness (1 = strongly disagree, 6 = strongly agree).

Alcohol use was based on a three-item scale (alpha = .84), which evaluated frequency of drinking over the past three months (1 = not at all, 5 = every day), quantity usually consumed during each episode of drinking (1 = I didn't drink at all, 5 = six or more cans of beer, glasses of wine, or drinks of liquor), and frequency of high-volume drinking (five or more drinks per episode; 1 = never, 4 = once a week or more).

Marijuana use was measured with two items (alpha = .97), which addressed lifetime use (1 = never, 5 = very often) and use over the previous three months (1 = never, 5 = about every day).

Cigarette smoking was assessed with a single item addressing amount smoked daily over the prior three months (1 = none, 5 = two packs a day or more).

Sexual behaviors evaluated included frequency of condom use over the past three months (1 = never, 5 = always), condom use at last intercourse, and number of partners over the past year.

HIV Vaccine Acceptability. The outcome measure for the health belief and health behavior variables, acceptability of hypothetical HIV immunization, was assessed with three items (alpha = .91). The first item asked respondents to indicate on a 6-point scale their level of agreement with the statement: "If a vaccine to prevent AIDS was available, I would get vaccinated for AIDS" (1 = strongly disagree, 6 = strongly agree). The remaining items in the scale had a similar format, but asked about acceptability if the vaccine required a single shot and three shots over a 6-month period, respectively.

Analyses

As a first step, bivariate correlation coefficients were used to assess the association of health belief and health behavior predictors with the HIV vaccine acceptability scale. Pearson product-moment correlations were calculated, except when predictors were dichotomous, in which case point-biserial correlations were used instead.

Multivariable prediction of vaccine acceptability was accomplished by multiple linear regression analyses (MLR). For each MLR, all sociodemographic and control variables (i.e., gender, race, age, and self-reported academic achievement) were entered as a block to control for possible confounding. Then, a forward selection approach was used to identify significant predictors from the set of health belief and health behavior variables. For this process, the statistical criterion set for entry was $p < .10$ and the criterion for removal was set at $p < .15$. These levels of significance were chosen rather than the historical standard for statistical significance (e.g., $p < .05$) because in a multiple regression equation, the control for covariance can result in increased predictive power for certain variables due to suppression of irrelevant variance (Cohen & Cohen, 1975). For interpretation of the final regression analysis, a significance level of $p < .05$ was accepted. One MLR was based on all subjects and included the sexual experience variable (virgin, nonvirgin), but excluded sexual behaviors, such as condom use and number of partners. A second MLR was based only on subjects who were sexually experienced and included the sexual behavior predictors excluded in the first analysis. For each of the two analyses, a backward removal MLR procedure also was run in order to confirm the forward selection results.

Results

Description of HIV Vaccine Acceptability

Based on the 6-point response scale, mean HIV vaccine acceptability on the outcome measure was 5.0, with a standard deviation of 1.3, suggesting a gener-

ally positive response to an HIV vaccine. However, vaccine acceptability decreased as additional information about the hypothetical vaccine was provided. The first vaccine acceptability item asked about a generic HIV vaccine (i.e., "If a vaccine to prevent AIDS was available, I would get vaccinated for AIDS"). For this item, the mean acceptability score was 5.12 (SD = 1.38). However, the score dropped to 5.06 (SD = 1.33) when the second item was presented, which described the vaccine as requiring a shot. Finally, when the third item described the vaccine as requiring three shots over a 6-month period, mean acceptability dropped again to 4.89 (SD = 1.42). Repeated measures analysis of variance (ANOVA) indicated that ratings for the third vaccine item were significantly lower than ratings for either the first or second vaccine acceptability item, Fs(1, 316) = 14.95 and 10.64, respectively, ps < .001.

Prediction of HIV Vaccine Acceptability: Health Beliefs and Health Behaviors

Bivariate Correlations: Health Beliefs. Bivariate correlations indicated that higher levels of HIV vaccine acceptability were associated with higher scores on scales measuring perceived susceptibility to HIV (r = .25, p < .001) and perceived benefits of immunization (r = .40, p < .001). Conversely, lower levels of HIV vaccine acceptability were associated with higher scores on scales measuring pragmatic obstacles (r = −.25, p < .001), fear of the vaccine causing AIDS (r = −.32, p < .001), fear of needles not being clean (r = −.23, p < .001), and perceiving oneself to not belong to a traditionally identified high-risk group (r = −.34, p < .001). Perceived severity of AIDS was not significantly related to vaccine acceptability.

Bivariate Correlations: Health Behaviors. Greater acceptance of HIV vaccination was related to older age (r = .17, p < .01), female gender (r = −.13, p < .05), greater use of marijuana (r = .14, p < .05) and being sexually experienced (r = .14, p < .05). Among the sexually experienced adolescents, greater vaccine acceptance was associated with less frequent condom use (r = −.24, p < .01), and nonuse of condoms at last intercourse (r = −.23, p < .01). Race, academic achievement, dietary habits, seatbelt use, physical fitness, alcohol use, and cigarette smoking were not significantly associated with vaccine acceptance.

Table I. Summary of Regression Analysis for Variables Predicting Acceptability of HIV Immunization to Adolescents (N = 312)

Variable	*B*	SE B	β
Step 1			
Gender	−.27	.18	−.08
African American race	.05	.38	.02
White race	−.04	.39	−.02
Academic achievement	−.04	.07	−.03
Age	.07	.04	.08
Step 2			
Benefits	.37	.06	.31**
Step 3			
Not in risk group	−.16	.07	−.14*
Step 4			
Susceptibility to HIV	.19	.06	.19**
Step 5			
Fear of the vaccine	−.23	.07	−.17**

Total R^2 = .31 (F = 15.06, p < .01); R^2 = .05 for Step 1; ΔR^2 = .17 for Step 2 (p < .01); ΔR^2 = .05 for Step 3 (p < .01); ΔR^2 = .02 for Step 4 (p < .01); ΔR^2 = .02 for Step 5 (p < .01).
*p < .05.
**p < .01.

Multiple Linear Regression Analyses

For both the total sample and the subsample of sexually experienced adolescents, forward selection MLR and backward elimination MLR resulted in the same set of significant predictors. Only the forward selection results will be reported. The MLR including all subjects resulted in a significant predictive model (R^2 = .31), F(9, 303) = 15.06, p < .001. None of the control variables was a significant predictor in the MLR. Increased perceived susceptibility to HIV and greater perceived benefits of vaccination were associated with higher vaccine acceptance. Conversely, greater fear of the vaccine causing AIDS and perceiving oneself to not belong to a traditionally identified high-risk group were associated with lower vaccine acceptance. The regression summary statistics for all subjects appear in Table I.

Among the sexually experienced adolescents, the MLR also resulted in a statistically significant predictive model (R^2 = .33), F(10, 225) = 11.25, p < .001. As in the MLR for the total sample, susceptibility and benefits were significant predictors of vaccine acceptability. However, in contrast to the previous analysis, fear of needles was significantly and negatively associated with HIV vaccine acceptance, but fear of the vaccine and nonmembership in a traditionally identified high-risk group were

Table II. Summary of Regression Analysis for Variables Predicting Acceptability of HIV Immunization to Sexually Experienced Adolescents ($N = 235$)

Variable	*B*	*SE B*	β
Step 1			
Gender	−.38	.21	−.10
African American race	−.29	.41	−.11
White race	−.34	.42	−.13
Academic achievement	−.05	.08	−.04
Age	.05	.05	.05
Step 2			
Benefits	.37	.06	.32**
Step 3			
Condom use	−.18	.05	−.21**
Step 4			
Susceptibility to HIV	.23	.06	.23**
Step 5			
Fear of needles	−.19	.05	−.22**
Step 6			
Healthy diet	−.29	.11	−.15*

Total $R^2 = .33$ ($F = 11.25$, $p < .01$); $R^2 = .06$ for Step 1; $\Delta R^2 = .12$ for Step 2 ($p < .01$); $\Delta R^2 = .05$ for Step 3 ($p < .01$); $\Delta R^2 = .04$ for Step 4 ($p < .01$); $\Delta R^2 = .04$ for Step 5 ($p < .01$); $\Delta R^2 = .02$ for Step 6 ($p < .05$).
*$p < .05$.
**$p < .01$.

not. In addition, decreased attention to a healthy diet and fewer sexual partners were independent health behavior predictors of greater HIV vaccine acceptability. Table II presents the regression summary statistics for the sexually experienced subjects.

Discussion

HIV Vaccine Acceptability

The adolescents in the present study appeared positively disposed toward the idea of HIV immunization. However, as more specific information about potential vaccines was presented, acceptability dropped. These findings are consistent with results of an HIV vaccine acceptability study done with a very different sample of university undergraduates (Liau et al., 1998), suggesting that ambivalence about HIV immunization is not simply a function of the specific sample of adolescents who participated in the present study. In addition, many experts argue that any HIV vaccine will have limited efficacy (Cohen, 1994). It is possible that vaccine acceptability would decrease even more with this kind of vaccine.

Prediction of HIV Vaccine Acceptability

We hypothesized that health beliefs and health behaviors would predict acceptability of hypothetical HIV immunization. The results provide partial support for our hypotheses. With respect to the health beliefs, as predicted, bivariate correlations indicated that increased perceived susceptibility to HIV infection and perceived benefits of immunization were associated with greater HIV vaccine acceptability. Conversely, as predicted, greater perceived obstacles to immunization, fear of the vaccine causing HIV infection, perceiving the vaccine as unnecessary as long as one is not a member of a traditionally identified risk group, and fear of needles were all related to lower vaccine acceptability.

The MLR analysis for the total sample indicated that perceived susceptibility, perceived benefits, nonmembership in a traditionally identified risk group, and fear of the vaccine persisted as significant independent predictors of HIV vaccine acceptability. For the sexually active subsample, the MLR indicated that vaccine acceptability increased with increases in perceived benefits and perceived susceptibility and with decreases in fear of needles, attention to a healthy diet, and condom use frequency. Overall, the health belief findings from this group of adolescents were comparable to the results reported in prior studies with university undergraduates (Liau et al., 1998; Zimet, Liau, & Fortenberry, 1997) and are largely consistent with research reports on determinants of acceptance of hepatitis B immunization (Barie et al., 1994; Bodenheimer et al., 1986; Israsena et al., 1992; Manian, 1991) and with findings from studies on determinants of participation in experimental HIV vaccine trials (Celentano et al., 1995; Douglas, Judson, Parks, Buchbinder, & McKirnan, 1994; Macqueen et al., 1994; Vlahov et al., 1994). These results suggest that certain health beliefs may ultimately influence individuals' decisions about getting HIV immunization once it becomes available.

Although several health beliefs were associated with HIV vaccine acceptability, perceived severity of AIDS did not predict vaccine acceptability, a finding consistent with prior studies (Liau et al., 1998; Zimet, Liau, & Fortenberry, 1997). We were able to generate a reasonable degree of variability in our measure of this construct (range = 1 to 6, $M = 3.9$, $SD = 1.2$) by posing rather extreme statements for the severity subscale (e.g., "Life would become totally meaningless to me if I got AIDS"). However, it

is possible that in so doing, we artificially expanded a construct that, in fact, had a fairly narrow range (i.e., nearly everyone perceives AIDS to be a very severe condition) and, therefore, little predictive power.

With respect to health behaviors, we found only limited support for our hypotheses. The bivariate analyses for the group as a whole indicated that those who were sexually experienced were more accepting of HIV immunization. However, this relationship was not significant in the MLR. Among the sexually experienced subsample, those who used condoms less frequently, and therefore were potentially at increased risk for infection, were more accepting of HIV immunization. Frequency of condom use maintained independent predictive power in the MLR. These findings contrast with the expectation that those who engage in more health risk behaviors would be less inclined to accept immunization, a health protective behavior. These adolescents apparently accurately recognized their heightened risk for exposure to HIV and therefore were more interested in the potential protection that would be afforded by vaccination.

Implications

The ultimate success of an HIV immunization program will depend both on the availability of an effective vaccine and on the acceptance of this vaccine by individuals whose behaviors place them at risk for infection. The results of the present study, taken in conjunction with prior research (Liau et al., 1998; Zimet, Liau, & Fortenberry, 1997), suggest that universal HIV vaccine acceptance cannot be assumed and that the characteristics of the vaccine as well as individuals' health beliefs are likely to influence the acceptability of HIV immunization. These results are particularly relevant given the concern that any HIV vaccine may be limited in efficacy (Cohen, 1994) and therefore require very high immunization coverage (i.e., acceptance) in order to reduce rates of HIV infection (Anderson & Garnett, 1996; Anderson, Swinton, & Garnett, 1995; Blower & McLean, 1994; Pinkerton & Abramson, 1993).

As efforts to develop HIV vaccines continue, it will be important, in parallel, to anticipate the health education strategies that will enhance the acceptability of vaccination. Failure to address issues of HIV vaccine acceptance may lead to inadequate vaccine coverage, delays in immunization program implementation, and unnecessary expenditure of substantial sums of money on ineffective vaccination efforts (Levin, 1993). It is essential, therefore, that health professionals begin now to understand issues relevant to HIV vaccine acceptability. This study indicates that some of the obstacles to HIV immunization that will need to be addressed in health education efforts include concerns about vaccine safety and perceiving oneself not to be vulnerable to HIV infection. In addition, clarification of the benefits of HIV immunization, especially with a vaccine of limited efficacy, may be an important part of a health education strategy.

Limitations and Future Directions

This study continues to lay the groundwork for understanding issues that may predict HIV vaccine acceptance. However, several limitations need to be addressed and provide some indication of future directions for this area of research. First of all, this study, by necessity, focuses on attitudes about a hypothetical vaccine. Likely, attitudes measured now will be rather imperfect predictors of behavior if and when an HIV vaccine is developed and made available. In addition, the adolescents included in this study were all seeking some form of health care (many for reproductive or other sexuality-related health services) and most were young women. It is possible that, as active seekers of health services, their attitudes about HIV immunization and related health beliefs and health behaviors do not represent the broader population of adolescents. In future research it will be important to sample a more representative population of adolescents from a variety of geographical areas. Also, given the importance of risky sexual behaviors in the transmission of HIV, it will be important to evaluate adolescents' sexual behaviors in more detail, particularly as they may influence vaccine acceptability.

Furthermore, although most of the adolescents in this study were independently seeking health care at community-based clinics, it is possible that parents will be required to provide consent for HIV immunization of adolescent children. In addition, research suggests that parents and their adolescent children agree that parents should have the authority to decide about many health-related issues (Smetana, 1994). Also, a recent study found that the best predictor of hepatitis B vaccine acceptance among adolescents was their perception that parents believed hepatitis B vaccination was important

(Rosenthal, Kottenhahn, Biro, & Succop, 1995). In future research, therefore, it will be important to examine parental attitudes about HIV vaccination for their children. Parents of adolescents likely will have some of the same issues with respect to HIV vaccination as the adolescents themselves. However, there may be some unique factors relevant specifically to parents. For instance, getting immunized for a sexually transmitted infection such as HIV carries with it an explicit or implicit acknowledgment of present or future sexual activity. How comfortable will parents feel about acknowledging the risk of sexually transmitted infections for their adolescent children?

Another limitation of the present study is that the study instrument was derived, in part, from research with college students. As a result, some issues particularly relevant to adolescents may not have been addressed, such as peer influence. Further, the research did not include assessments of potentially important predictive factors, such as cultural or community attitudes and beliefs regarding, for example, attitudes about preventive health care and the relative value placed on immunization in the context of other important concerns (e.g., violence, poverty, transportation needs, etc.). Although the study of individual health beliefs and health behaviors has provided a useful starting point, future research will need to take into account some of these other key issues.

Finally, another issue relevant to the development of HIV immunization programs is the possibility that immunization for HIV might lead some individuals to increase their HIV-related risk behaviors (Hom et al., 1997). Although this response would be particularly problematic with a low efficacy vaccine, even immunization with a highly efficacious HIV vaccine could have the unintended and paradoxical consequence of increasing the incidence of other sexually transmitted infections. It clearly will be important to study this issue further and to address the potential problem of increased risk behavior as part of HIV immunization programs.

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