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HIERARCHICAL MESSAGES FOR INTRODUCING MULTIPLE HIV PREVENTION OPTIONS: PROMISE AND PITFALLS

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In battling HIV, many interventionists advocate the use of hierarchical messages that present multiple prevention options in order of decreasing effectiveness. The purpose of the present study was to determine if hierarchical messages provide women with additional prevention options without reducing the perceived efficacy of and willingness to use the primary method mentioned (in this case, male condoms). African American and Mexican American women between 18 and 32 years of age ($n = 112$) at risk for HIV were randomly assigned to receive either a male-condom-only message (use male condoms) or a hierarchical message (use male condoms; if not, use female condoms; if not, use spermicide). Compared with women in the male-condom-only condition, a significantly smaller percentage of women who received the hierarchical message perceived male condoms as highly effective against HIV. Women currently *not using* male condoms who received the hierarchical, rather than the male-condom-only, message were less likely to consider using male condoms in the future. Among current male condom users, however, the hierarchical message did not influence intent to use male condoms. These data point to the need for examining both the intended and unintended effects of hierarchical health care messages.

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As rates of infection with HIV continue to rise among women (Centers for Disease Control and Prevention [CDC], 2001), developing and promoting effective HIV prevention options becomes increasingly critical. For a variety of reasons, male condoms, although highly efficacious at protecting women against HIV and other sexually transmitted diseases (STDs) (CDC, 1993; Davis & Weller, 1999), have not been widely adopted by the majority of women at risk for HIV (Soler et al., 2000; Toltzis et al., 1999). One reason underlying this relatively low adoption rate may be women's inability to negotiate male condom use with their partners. Consequently, health practitioners and researchers (Elias & Coggins, 1996; Rosenberg & Gollub, 1992; Stein, 1990, 1993) have advocated the development and promotion of products other than male condoms that women can use (i.e., female-controlled products) to protect themselves from HIV and STDs.

Two alternatives to the male condom that have shown the greatest promise as female-controlled methods of HIV/STD prevention are female condoms and vaginal microbicides (i.e., products that inactivate, prevent entry, or prevent replication of HIV and other STD pathogens; Gollub et al., 1996; Elias & Heise, 1994; Rosenberg, 1997; Stone & Hitchcock, 1994). The efficacy of female controlled methods to prevent HIV, however, has been difficult to definitively establish. Although the female condom had been shown to have some efficacy in preventing STDs (Soper et al., 1993) and was expected to offer a level of protection against HIV similar to that of the male condom (Drew, Miner, & Conant, 1990; French et al., 1998), data documenting its efficacy with respect to HIV transmission were lacking at the time of this study.¹ A nonoxynol-9 (N-9) spermicidal product available over the counter likewise showed promise as an effective vaginal microbicide and was in clinical efficacy trials at the time the current research was conducted (Van Damme, 2002). This microbicial product had demonstrated some effectiveness against STDs (Louv et al., 1988; Niruthisard et al., 1992) but was expected to be substantially less efficacious in preventing HIV than either the male or female condom.

Because of expected differences in efficacy, these HIV prevention options have typically been offered hierarchically (i.e., women are informed of the various options for HIV prevention, beginning with the most effective option and followed by a series of alternatives in order of decreasing effectiveness; Gollub et al., 1996). An example of a hierarchical HIV prevention message for women is: "Use a male condom. If you don't use a male condom, use a female condom. If you don't use a male condom or a female condom, use spermicide."² Because women may receive HIV prevention information in a single health care visit (e.g., counseling after an HIV test), messages often offer multiple prevention options in the same session. At the time of the current study,

1. Since this study, additional evidence has suggested that the female condom offers substantial protection from HIV. At the time of this study, however, although it was expected to be equivalent to the male condom, conclusive evidence was not available and, thus, the female condom was offered as the second option in the hierarchy.

2. There are a variety of different forms of hierarchical messages for HIV prevention. For example, a hierarchy of choices developed by the AIDS Institute of the New York State Department of Health in 1992 started with a "1st choice" of male latex condoms (with spermicides for extra protection) and a message: "It's always safest if your man wears a condom. If he won't . . ." followed by a marker for the second choice (2nd choice [NEXT BEST]) after which the message was, "If he won't use a condom, you can use a female condom." This was followed by a 3rd choice (RISKY BUT MIGHT HELP) of "Use a diaphragm with jelly or cream as usual, put it in, and then put an extra application of spermicide into your vagina." The fourth choice, marked 4th Choice (BETTER THAN NOTHING) included the message, "Use a vaginal spermicide alone," and the last choice was marked "Worst choice (CRAZY!) Using nothing." Accompanying these major messages were subtexts that provided additional information about the products advocated.

a hierarchical message similar to the one used in this study was given to women as part of the HIV prevention programs for women in the State of New York (AIDS Institute, New York State Department of Health, 1992; 2000).

Hierarchical messages, like other persuasive health messages given to encourage behavior change (see Hornik, 2002, for a review), typically begin with a reminder of the risk and severity of becoming infected with HIV. This information is intended to generate arousal and enhance motivation to adopt new behaviors (Backer, Rogers, & Sporoy, 1992). Hierarchical messages then offer an array of options to reduce risk, in order of decreasing effectiveness. Although we know a good deal about the effect of persuasive health messages when a single option or multiple options of equal effectiveness are offered, we know little about the cognitive processing of multiple choices that are not equally effective.

Similarly, from a marketing perspective, we know that offering a "marketing mix", which involves offering a variety of products to choose from (as well as price, promotion, and placement) is effective in increasing consumer use (Ainslie & Rossi, 1998; English, 2000). For example, if a variety of brands of male condoms are offered in a clinic, more people will take them than if only one brand is offered (Williams, Christensen, Cagles, & Homan, 2001). However, the "marketing mix" model does not take into account how consumer use is affected when the products being offered have varying levels of effectiveness.

PROMISE AND POTENTIAL PITFALLS OF HIERARCHICAL MESSAGES

Offering women multiple options has the potential to increase HIV/STD protection through several routes. First, female-controlled options may provide women unable to use male condoms with alternative, more easily implemented methods of protection. Although these options may be less effective than the male condom, for women currently using no prevention method, use of even a less efficacious product provides some level of protection (Stein, 1992, 1993). For women who use male condoms on an intermittent basis, offering female-controlled options provides them with an opportunity to increase their level of HIV/STD protection by "supplementing" their male condom use. Consistent with this line of reasoning, research suggests that compared with a single-option male condom message, a hierarchical message results in an overall higher proportion of coital acts protected by some method of HIV/STD prevention (Farr, Castro, Disantostefano, Claassen, & Olguin, 1996; Fontanet et al., 1998).

Hierarchical messages offering prevention options of differing or unknown efficacy may have pitfalls, however. Several studies have found that women offered female-controlled prevention options in addition to male condoms are less likely to use male condoms than women offered a single-option message promoting only the male condom. For example, in a study by Farr et al. (1996), women given a hierarchical message including male condoms and spermicide used fewer male condoms than those in a control group who were given a male-condom-only message. Similar results were reported by Fontanet and colleagues (1998) who offered women male and female condoms presented hierarchically in one experimental condition and the male-condom-only in another condition. Thus, even when the efficacy of each option is clearly stated, offering multiple methods may result in less uptake of the primary and most efficacious option.

DIFFERENTIAL EFFECT OF HIERARCHICAL MESSAGES ON MALE CONDOM USERS AND NONUSERS

Clearly, a message that promotes a shift among current male condom users toward less effective prevention options would be unacceptable. On the other hand, women who currently use male condoms may be relatively unaffected by a hierarchical message. These women know they can use the primary option promoted, namely the male condom, and therefore may be relatively immune to the alternate methods mentioned in the hierarchical message.

Nonusers of male condoms, however, may have tried male condoms in the past but found them objectionable or encountered problems with their use. When these nonusers receive a message indicating that the male condom is the only method available for avoiding HIV, they may be willing to attempt its use again despite previous problems. However, when presented with multiple, perhaps more palatable options, nonusers may become less motivated to attempt male condom use. The first two research questions we explore in the current study are "Are women receiving a hierarchical message (use male condoms, if not, use female condoms; if not, use spermicide), compared with those receiving a male-condom-only message, less willing to use male condoms in the future?" and "Does the effect of the hierarchical message on willingness to use male condoms differ for women who are current users versus nonusers of male condoms?"

IMPACT OF HIERARCHICAL MESSAGES ON PERCEIVED METHOD EFFECTIVENESS

The reduction of male condom use in the hierarchical message condition may occur because presenting additional options undermines the perceived effectiveness of the primary option. Women may deduce that because alternatives are being offered, the primary option, the male condom, must be inadequate in some way (i.e., "If male condoms are so great, why are additional choices being offered?"). Consequently, they may conclude that the male condom is less effective. On the other hand, women might appreciate the differential efficacy of the various prevention methods but nevertheless bypass the highly efficacious male condom in favor of a less efficacious but more easily implemented alternative such as vaginal microbicides. Consequently, the third and fourth research questions we address are "Do women receiving the hierarchical message perceive the male condom to be less effective in preventing HIV than women receiving the male-condom-only message?" and "Is perceived effectiveness related to willingness to use the male condom in the future?"

MALE CONDOM SUBSTITUTION

Not using male condoms will not affect an individual's overall level of HIV/STD protection if they are replaced by a method of similar efficacy. However, if a woman bypasses the highly efficacious male condom in favor of a substantially less efficacious alternative such as spermicide, then her overall level of HIV protection would be compromised. Similarly, if male condom use is reduced without any concomitant increase in the use of female-controlled methods, then a woman's overall level of HIV protection would be compromised even further. Thus, the final research question we address is: "Is reduced intent to use male condoms accompanied by an increased intent to use female-controlled methods (i.e., female condoms or microbicial products)?"

CURRENT STUDY

Consistent with messages used in a number of prevention programs (Gollub et al., 1996; Stein & Susser, 1998), we offered women a hierarchical message that included the male condom as the primary option, the female condom as the secondary option, and, finally, a N-9 spermicidal product as a last resort for HIV prevention. Because the efficacy of the two female-controlled products in terms of HIV prevention was not known at the time of this study, we did not give women the products and assess actual use but instead assessed the effect of the hierarchical message on “willingness” to use these products. This paradigm allowed us to assess reactions to offering women prevention options of differing levels of efficacy without actually giving women products whose efficacy was not well established. The current study adds to our knowledge about hierarchical messages by (a) examining differences in the reactions of users and nonusers of male condoms to multiple prevention options, (b) determining the effect of hierarchical messages on perceived effectiveness of different prevention methods, (c) and by examining patterns of condom substitution.

METHOD

PARTICIPANTS

Study participants were African American and Mexican American women from East and South Los Angeles, 18-32 years of age, and at risk for acquiring HIV and other STDs through heterosexual transmission. This group of women was chosen because of the disproportionate effect that the HIV epidemic has had on minority women in the United States and the increasing role of heterosexual transmission in the HIV epidemic among women in this age range (CDC, 2001). Women were defined as at heterosexual risk for acquiring HIV if they had unprotected vaginal intercourse in the last 2 years and at least three sex partners during that period. Participants also had to be able to read English. Because we were assessing how women who are at risk for heterosexual transmission of HIV respond to prevention messages, those already HIV infected and who indicated at screening that they had injected drugs (and thereby might acquire HIV through another transmission route) were excluded.

African American and Mexican American women were approached by trained interviewers of the same race/ethnicity as participants. Interviewers approached women at shopping malls, flea markets, parks, outdoor markets, community health clinics, and other “community” locations. Women were randomly assigned to receive either the male-condom-only message ($n = 56$) or the hierarchical message ($n = 56$). The message given to women receiving the hierarchy was essentially: “Use a male condom. If you do not use a male condom, use a female condom. If you do not use a male or female condoms, use spermicide.” To randomly assign participants to message condition, each interviewer received a set of prerandomized questionnaire packets. This procedure ensured that neither research site nor researcher was confounded with condition and that the researcher remained blind to message condition. Both the brochure and the subsequent survey instrument were reviewed and approved by the University of Southern California Institutional Review Board prior to the study.

PROCEDURE

Women were approached and asked if they were interested in participating in a study about women’s health and relationships. Women willing to participate were asked a series of questions to assess eligibility. Of the women screened for this study, 66% were found to be eligible. Eligible women were given a consent form explaining

the risks and benefits of participation in the study, assuring confidentiality of responses, and explaining the sensitive nature of some of the study questions. One hundred twelve women agreed to participate (98% of those found to be eligible) and completed a self-administered questionnaire on current contraceptive use (including male condoms). The interviewer stayed nearby to assist participants with the questionnaire if needed.

Within the questionnaire was a pocket containing a brochure (with either the male-condom-only or hierarchical message). Participants were asked to read the brochure at their own pace and no time limit was placed on either reading the brochure or completing the questionnaire. After reading the brochure, women responded to a series of questions about the brochure, including willingness to use a variety of HIV prevention options including male condoms, female condoms and spermicide.

MESSAGE CONDITIONS

The exact messages (male-condom-only and hierarchical) are provided in the appendix. The first two pages of the brochure were identical in both conditions. On the first page, the message was "to protect yourself from HIV, the virus that causes AIDS . . ." On the second page, in both conditions, the brochure read, "Use a male condom" followed by a detailed description of a male condom, how to use it, what is known and not known about the product's efficacy, and the pros and cons of the product.

In the hierarchical condition, there were two additional pages of information. The third page of the hierarchical brochure provided the message, "If you don't use a male condom, use a female condom," followed by a detailed description of a female condom using the same format previously used for the male condom. The fourth and final page read, "If you don't use a male condom or a female condom, use spermicide" followed by a detailed description of spermicide.

Care was taken to ensure that the information about each prevention method was comparable in tone, length, and information regarding use and efficacy. Both messages (male-condom-only and hierarchical) were piloted extensively to assure that the contents were easily understood by the population and the final draft was approved by the University of Southern California Institutional Review Board.

MEASURES

The questionnaire was self-administered and required approximately 15 minutes to complete. Items were extensively pilot-tested to ensure a seventh grade reading level and cultural appropriateness of the items. The questionnaire was reviewed and approved by the University of Southern California Institutional Review Board.

Current Male Condom Use. At the beginning of the study, prior to receiving the prevention message, participants were given a list of HIV/STD and pregnancy prevention methods including male condoms. They were asked, "Which of the following are you currently using? Please check the line if you are using it now." Women who checked male condoms were classified as "current male condom users" (62% of the sample). All other women were classified as "nonusers of male condoms."

Dependent Measures. After reading the brochure, women were asked to indicate the extent to which they would consider using each of the three methods described in the brochure (i.e., male condoms, female condoms, and spermicide) on a scale from 1 ("I would *never* consider using this method") to 10 ("I would *definitely* consider using this method"). Data for "consider using" male condoms were highly skewed: 64% of participants said they would "definitely consider" using male condoms (i.e., 10 on a

10-point scale). Thus, we dichotomized the data into a group of women “highly willing to use” the male condom (i.e., score of 10) and a group “less willing to use” (i.e., score of nine or lower). Willingness to use the female condom and the spermicide were more normally distributed, and thus these measures were analyzed as a continuous 10-point scale.

After reading the brochure, participants indicated their perception of effectiveness of male condoms on a scale from 0% to 100%. Again, the data were not normally distributed with 50% of the women indicating that male condoms were at least 90% effective. Given that participants were told in the intervention that male condoms were highly effective, at least 90%, we dichotomized the data into those who accurately reported the male condom’s effectiveness (highly effective) and those who perceived the male condom as less effective than it actually is (less effective).

STATISTICAL ANALYSIS

Statistical tests to examine differences in sociodemographic and behavioral characteristics of women assigned to the hierarchical message condition versus the male-condom-only condition were (a) chi-square analyses for categorical data, (b) *t* tests for continuous data (i.e., age, and age of first sex), and (c) Mann Whitney U for ranked data (i.e., number of sexual partners). Because data were not normally distributed for “willingness to use” and “perceived effectiveness of” male condoms, we could not employ parametric tests (which assume a symmetrical distribution of data). Instead, multivariate logistic regression analyses were performed on the dichotomous outcome variables with message condition (hierarchical vs. male-condom-only), current male condom use (using/not using), and the interaction (i.e., cross-product) of the two as independent variables. For willingness to use the female condom and the spermicidal product, the data were sufficiently normal to warrant parametric analyses, and analysis of variance was performed with message condition as the independent variable. Data were analyzed with SPSS, Version 9.

RESULTS

PARTICIPANT CHARACTERISTICS

The mean age of women in the sample was 25, approximately one half were educated at the high school level, and the majority had an annual income below \$10,000. The characteristics of the sample suggested that the women were indeed at relatively high risk for HIV infection. For example, the average (median) number of lifetime sex partners was 10 to 11, age at first sex was 15, number of partners in the past year was 3, and more than 50% of the participants had an STD at some point in their lives. Furthermore, more than half of the women reported no or very low condom use in the past two years (65% of women in both message conditions used male condoms infrequently or not at all).

The samples, randomly assigned to the two message conditions, were not significantly different on a number of key variables: education, age, pregnancy history, STD history, age at first sex, number of partners (lifetime, past year, past month), and current condom use (Table 1). They did differ on annual income, however, with a higher percentage of women in the hierarchical than in the male-condom-only condition making less than \$10,000 per year. When we examined the data to determine if income could be a confounder of the effect of message condition on outcome measures (willingness to use and perceived effectiveness), we found income to be unrelated to all outcome measures and thus not responsible for our findings.

TABLE 1. Sample Characteristics

Variable	Message Condition	
	Hierarchical (<i>n</i> = 56)	Male-Condom Only (<i>n</i> = 56)
Ethnicity (% African American)	52	52
Yearly income (% < \$10,000/yr) ^a	63	37
Education (% ≥ High school degree)	43	49
Age (mean)	25	24
Ever pregnant (%)	73	64
Unplanned pregnancy (%)	65	52
STD history (% reporting any STD)	52	54
Age at first sex (mean)	15	15
Sexual partners (median)		
Lifetime	11	10
Last Year	3	2
Last Month	1	1
Sexually active last month (%)	93	86
Male condom use (% currently using)	59	64

^aThis comparison was significantly different at *p* < .05.

Across the two message conditions, there was no significant difference in the proportion of African Americans to Mexican Americans (52% in each condition were African American). Most women in the study (89%) had been sexually active in the past month. Because the patterns of findings for the African American and Mexican American women did not differ, data for the two racial/ethnic groups were collapsed in all analyses. The percentage of women currently using male condoms also did not differ significantly between the two message conditions (59% in the hierarchical and 64% in the male-condom-only condition).

IMPACT OF THE HIERARCHICAL MESSAGE ON WILLINGNESS TO USE AND PERCEIVED EFFECTIVENESS OF MALE CONDOMS

Willingness to Use. There was no main effect for type of message. Women receiving the hierarchical message and those receiving the male-condom-only message did not differ in their willingness to use male condoms in the future; 62% of those in the hierarchical condition and 65% of women in the male-condom-only condition were highly willing to use male condoms in the future (Table 2). There was a significant main effect for current male condom use. Not surprisingly, a higher percentage of women currently using male condoms were highly willing to use them in the future (73%) than were women not currently using them (48%). Although not statistically significant (*p* < .06), the interaction of message condition and current male condom use was in the expected direction. Among women who were *not* current male condom users, a lower percentage receiving the hierarchical message were highly willing to use the male condom (36%) compared with women receiving the male-condom-only message (60%). Among current male condom users, however, there was no difference in the percentage of women highly willing to use the male condom in the two message conditions (79% for the hierarchical condition; 68% for the male-condom-only condition).

TABLE 2. Percentage of Women Highly Willing to Use Male Condoms

Conditions	Percentage Highly Willing to Use	OR	(95% CI)	<i>p</i>
Message Content				.75
Hierarchical (<i>n</i> = 55)	62	0.9	(0.40–2.02) reference group	
Male-condom-only (<i>n</i> = 54)	65			
Current Male Condom Usage				.01
Not Using (<i>n</i> = 42)	48	0.3	(0.15–0.75) reference group	
Using (<i>n</i> = 67)	73			
Message × Current Usage Interaction				.06
Not Using				
Hierarchical (<i>n</i> = 22)	36 ^a			
Male-condom-only (<i>n</i> = 20)	60 ^b			
Using				
Hierarchical (<i>n</i> = 33)	79 ^b			
Male-condom-only (<i>n</i> = 34)	68 ^b			

Note. Percentages in the interaction analysis with different superscripts are different at *p* < .05.

Perceived Effectiveness. A lower percentage of women receiving the hierarchical message perceived male condoms to be highly effective (46%) than did women receiving the male-condom-only message (64%; *p* = .04; Table 3). In terms of the effect of current male condom use, a significantly higher percentage of current male condom users perceived male condoms to be highly effective (64%) than did nonusers (42%, *p* = .03). The interaction of message condition and current male condom use was nonsignificant; a lower percentage of women in the hierarchical message condition, regardless of current condom use, accurately perceived male condoms to be highly effective.

Because women not currently using male condoms who received the hierarchical message not only perceived male condoms to be less effective but also were less willing to use them, we examined the relation between perceived effectiveness and willingness to use the male condom in the sample as a whole. There was a statistically significant relationship between ratings of condom effectiveness and willingness to use them in the future. Women who perceived male condoms as more effective were more willing to use them in the future ($\chi^2 = 4.4$, *p* = .04).

WILLINGNESS TO USE FEMALE-CONTROLLED METHODS

We wanted to determine if the reduced willingness to use male condoms (found among women who were not already using male condoms when they received the hierarchical message) was accompanied by increased willingness to use the female-controlled products. To examine this issue, we looked at differences in willingness to use the female condom and spermicide among nonusers of male condoms, comparing women who received the hierarchical message with those receiving the male-condom-only message. Among nonusers of male condoms, women receiving the hierarchical message did not differ in their willingness to use the female condom when compared with women receiving the male-condom-only message (*M* = 7.1 [*SD* = .51] vs. *M* = 7.2 [*SD* = .42]; *t* (39) = .09, *ns*). Women in the hierarchical condition, however, indicated significantly greater willingness to use the N-9 spermicidal product than did

TABLE 3. Percentage of Women Who Perceived Male Condoms to be Highly ($\geq 90\%$) Effective

Conditions	Percent Who Perceive Condoms as Highly Effective	OR	(95% CI)	<i>p</i>
Message Content				.04
Hierarchical (<i>n</i> = 55)	46	0.5	(0.21–1.00)	
Male-condom-only (<i>n</i> = 54)	64		reference group	
Current Male Condom Usage				.03
Not Using (<i>n</i> = 43)	42	0.4	(0.18–0.92)	
Using (<i>n</i> = 66)	64		reference group	
Message \times Current Usage Interaction				.62
Not Using				
Hierarchical (<i>n</i> = 23)	30			
Male-condom-only (<i>n</i> = 20)	55			
Using				
Hierarchical (<i>n</i> = 32)	56			
Male-condom-only (<i>n</i> = 34)	71			

women receiving the male-condom-only message ($M = 5.3$ [$SD = .48$] vs. $M = 3.5$ [$SD = .50$], $t(39) = 2.4$; $p < .05$).

DISCUSSION

With a wave of new HIV prevention products in various stages of development and evaluation (Alliance for Microbicide Development, 2000), it is essential that we understand both the intended and unintended consequences of hierarchical messages that recommend a variety of options. In the current research we investigated the potential consequences of offering women multiple HIV/STD prevention methods of differing levels of efficacy. More specifically, we empirically tested whether presenting additional female-controlled options (female condoms and spermicide) inadvertently undermines the perceived efficacy and willingness to use the primary option, namely male condoms.

PERCEIVED EFFICACY OF MALE CONDOMS

Our data reveal that compared with their counterparts who received the male-condom-only message, women who received the hierarchical message perceived male condoms to be significantly less effective in preventing HIV. This decline in the perceived efficacy of male condoms following the hierarchical message held for both current condom users and nonusers. This across-the-board reduction in the perceived effectiveness of male condoms in preventing HIV should suggest to health care practitioners that such hierarchical messages may have unforeseen negative consequences.

WILLINGNESS TO USE MALE CONDOMS

Interestingly, this reduction in perceived effectiveness translated into a reduced willingness to use male condoms only among women *not* currently using them. Among current users, although the hierarchical message lowered perceived efficacy of male condoms, it did not appear to interfere with willingness to continue their use. It is

perhaps not surprising that hierarchical messages have a different impact on women currently using and those not using male condoms. Although the hierarchical HIV prevention message led current condom users to view male condoms as somewhat less effective, it apparently did not lead them to question the *relative* efficacy of male condoms. In other words, current male condom users know they are using the most effective HIV prevention method presently available. Thus, the hierarchical message did not significantly influence their willingness to continue to use male condoms.

Among women not currently using male condoms, however, a hierarchical message reduced both the perceived effectiveness of male condoms and their willingness to use them in the future. In interpreting this result it is important to keep in mind that many nonusers may have had negative experiences with male condoms in the past and may not be particularly eager to try them again. Perceiving male condoms as only moderately effective may provide additional grounds for continuing to avoid them in the future. Consequently, for nonusers a reduction in the perceived effectiveness of male condoms may further justify bypassing them in favor of alternative HIV/STD prevention methods that may be more easily implemented. If we had demonstrated how to use the male condom and given nonusing women skills in condom use, they may have been more willing to try them in the future and thus results of this study would have been attenuated.

WILLINGNESS TO USE FEMALE-CONTROLLED OPTIONS

Taken together, these findings suggest that offering multiple HIV prevention options of varying levels of effectiveness to women already using male condoms is not likely to affect their overall level of HIV protection. Despite the availability of the alternative methods presented in the hierarchical message, current condom users do not appear eager to abandon male condoms. Nor do they seem interested in "supplementing" their male condom use with female-controlled products. In fact, when we examined interest in the female-controlled options among women already using male condoms, we found that women receiving a hierarchical message were no more willing to use female condoms or spermicide than women in the male-condom-only condition. Thus, at least in our sample, the benefits of offering additional options to women already using male condoms are not immediately apparent.

Did women not currently using male condoms express more interest in the female-controlled options? As previously noted, for women not currently using the male condom interventions offering multiple prevention options may result in less willingness to try the most efficacious product, the male condom, and thus may inadvertently reduce their overall level of HIV protection. This potential reduction in condom use may be offset, however, if willingness to use female-controlled products is increased by exposure to a hierarchical message. Our data did, indeed, reveal increased interest on the part of nonusers toward at least one of the female-controlled products; although nonusers of the male condom in the hierarchical condition were no more willing to use the female condom than those receiving the male-condom-only message, they did indicate greater willingness to use the N-9 spermicidal product.

The finding of increased willingness to use the spermicidal product by nonusers of male condoms is both good and bad news. It is heartening to see that women who were not users of male condoms were willing to adopt some method of HIV prevention; they were not generally uninterested in prevention. Thus, for women who have been unable to implement available methods, a product such as a

spermicide/microbicide that is easier to use and requires less negotiation with a partner may provide some level of HIV/STD protection to women who would otherwise have none. But for women who, although not currently using, would consider using male condoms, offering additional options may be detrimental. Our data suggest that these women, when exposed to a hierarchical message, may bypass male condoms, not for an option of similar effectiveness (the female condom) whose substitution would not impact their overall level of HIV protection, but for a product of lower or unknown efficacy (such as the N-9 spermicidal product offered in the current study).

LIMITATIONS AND FUTURE DIRECTIONS

Future research should examine ways to offer multiple HIV prevention options without undermining use of the most effective primary option. More specifically, message research is needed to determine ways to counteract the reduction in perceived effectiveness of the male condom that occurs when additional options are offered. Furthermore, other paradigms for offering multiple options should be examined. For example, an intervention for women is currently under evaluation that encourages male condom use in the first phase of the study and then offers options of lower efficacy to only those women unable to implement male condom use. And, finally, future research agendas should include modeling studies to determine (a) the level of efficacy a product must have and (b) the level of uptake of the product that is needed to offset the loss of male condom use that occurs when additional prevention options are offered.

With respect to the present research, several methodological issues should be underscored. First, we had a relatively small sample size that was further restricted because our effects differed based on current patterns of condom use. Although we were able to demonstrate significant and meaningful differences between current users and nonusers of male condoms, future research should build in planned contrasts of these subgroups. Moreover, our two primary dependent variables were single-item measures. Also the item measuring intent to use was not specific to a time period. Despite these limitations, results across these measures converged, providing a coherent pattern of findings. Future studies are needed, however, to replicate and extend our findings using composites of items for each construct to ensure reliable assessment. Additionally, to ensure generalizability of findings, future studies should examine these issues with different samples of women recruited across different contexts and venues.

With respect to the intervention used in our study, our findings are based on a onetime delivery of a health care message. We do not know how the cumulative effects of repeated exposure would affect the outcome. We do know that in consumer markets, repetition of messages and increased product exposure cause consumers to feel more favorably about a given product (Chebat, Laroche, Boddoura, & Filiatrault, 1992; Hawkins, Hoch, & Meyers-Levy, 2001; Lane, 2000). This indicates that multiple exposures to a health-related prevention message may make women more likely to change behavior. In actual clinical practice, women may make multiple visits and give health care providers or educators multiple opportunities to deliver health messages. An array of prevention options can then be provided to women and they can choose the option most suited to their own situation, with the opportunity to change their decisions as their situations change. Women may try the most effective method first and, if not successful, move to the less effective but more easily used method. Or they may choose a less effective method that is acceptable to their partners at the time and

switch to a more effective method if their situations change. The current findings of this study may be less applicable to multiple-session interventions. Instead, our findings are specific to a onetime counseling or educational session (e.g., information provided in brochure or in counseling following an HIV test).

Although brochures are typical in many health clinics, other media (e.g., videotapes) might produce different effects than those found in the current study. Thus, it is unclear to what extent these findings could be generalized to similar messages in other media. We are currently repeating this study using videotaped messages to present the information in a hierarchical message. Additionally, the messages in this study varied in length (i.e., hierarchical message was longer than the male condom message), a necessary condition in order to provide equivalent amounts of information about each prevention method. We acknowledge that message type and message length are confounded in this study. However, the current study was an investigation of a message that was being used in public health programs and research, and thus we chose to use messages in keeping with those used in practice, thereby maintaining external validity.

This study was limited to one region of the United States and to two ethnic groups. We do not know if findings can be generalized to other regions of the United States and to other ethnic groups. A particularly interesting issue is whether findings would generalize to Hispanic women whose primary language is not English and who have a lower level of formal education. Certainly results of the brochure study may differ with less acculturated and less educated women, who may have difficulty comprehending the quantity of information presented. We are attempting to replicate findings from the current study using videotaped prevention messages with women of lower educational level. Furthermore, because traditional gender roles have been shown to be more salient among some racial/ethnic cultures, we cannot be sure that our findings would apply to other groups. For example, Hispanic women may be more concerned about finding a prevention method that cannot be detected by the man than are other women and therefore are more likely than other ethnic groups to substitute less effective methods for the male condom. In the current study, however, we did not find differences in male condom use for African American and Hispanic women. Future research is needed to determine if similar results would be obtained with other racial/ethnic groups.

Finally, we did not collect "use" data—only willingness to use various methods of HIV prevention. Although a recent meta-analysis of 96 studies with over 22,594 respondents demonstrated that behavioral intent to use male condoms is a strong predictor of future male condom use (Alabarracin, Johnson, Fishbein, & Muellerleile, 2001), they are certainly not perfectly correlated. Additional longitudinal work that examines the role of hierarchical messages on actual method use is clearly needed. Our findings concerning willingness to use HIV prevention products, however, do seem remarkably consistent with behavioral studies (Farr et al., 1996; Gollub et al., 1996), suggesting that message studies may provide a useful, cost-efficient way to examine women's acceptability of HIV prevention methods, such as vaginal microbicides, when the efficacy of the product is not yet known.

In sum, as this and related work suggests (Blumberg, 2000), HIV prevention messages can have unexpected effects that undermine our best intentions. It is therefore imperative that research continues to examine how people process HIV prevention messages. Only by better understanding these processes and designing interventions and messages with them in mind (Sherman, Nelson, & Steele, 2000), can researchers

and prevention specialists facilitate the use of the most efficacious HIV prevention products available.

APPENDIX A

USE A MALE CONDOM

The male condom protects a woman from viruses and bacteria in the man's semen by covering his penis with latex or "rubber". A new latex condom should be unrolled onto the man's penis, leaving room at the tip, as soon as the penis is hard, so that the woman is not exposed to any fluid from the penis. It is important for the man to use a new condom each time he has sex with the woman.

Because much research has been done on the male condom, we know quite a bit about how well it protects women from HIV and STDs. Research shows that if the male condom is used correctly, it greatly reduces your chances of getting HIV or other STDs from your partner. Lab studies show that viruses, including HIV, cannot get through a latex condom. However, because male condoms can break and slip-off, they are not foolproof. So far, research has shown that the male condom is the best form of protection against HIV that we have.

Male condoms have been in use for a long time. Because of this they are familiar to most men and women and are easily available.

Because the man wears the male condom, a woman can not use this method without her partner's cooperation. The decision to use or not use male condoms is therefore not just the woman's alone. Even if the woman provides the male condom and suggests using one, her partner still has to agree to use it.

Finally, some people who use male condoms complain of a loss of sensation and pleasure.

IF YOU DON'T USE A MALE CONDOM, USE A FEMALE CONDOM

The female condom protects women from viruses and bacteria in the man's semen by lining the vagina with a soft, loose-fitting plastic pouch. A soft ring at the closed end is used to put the female condom inside the vagina and hold it in place. A second ring stays outside the vagina and partly covers the vaginal lip area. It is important for the woman to guide the man into the female condom so that the penis does not slip underneath the pouch and directly expose the vagina to any fluid from the penis.

Because the female condom is a new product, we don't know very much about how well it protects women from HIV and STDs. Research is underway to find out how much the female condom will reduce the chances of getting HIV when it is used correctly. Lab studies show that viruses, including HIV, cannot get through the female condom. However, because the female condom can tear or slip out of place it is not foolproof. So far, there has not been enough research to determine how well the female condom protects women against HIV.

Because the woman wears the female condom, she can insert the female condom herself. The decision to use or not use female condoms is therefore largely the woman's. However, even if the woman provides the female condom and inserts it before sex, she must still have her partner's cooperation to keep the female condom in place.

Using the female condom is difficult for some women because they must insert it up into their vaginas, being careful to make sure that it is in the right place during sex.

Finally, some people who use female condoms complain of a loss of sensation and pleasure.

IF YOU DON'T USE A MALE CONDOM OR A FEMALE CONDOM, USE SPERMICIDE

Spermicides coat the woman's vagina with cream, jelly, or foam that kills the sperm in a man's semen. Some spermicides can be inserted a few seconds before sex, whereas others need ten minutes in the vagina to become effective. Some are effective for only one hour, while others are effective for up to 24 hours. It is important to read the directions carefully to make sure the spermicide is used correctly, because different types of spermicide work differently.

Because spermicides were developed to prevent pregnancy, we don't know very much about how well spermicide protects women from HIV and STDs. Research is underway to find out if, when spermicide is used correctly, it will reduce the chances of getting HIV from a male partner. Lab studies show that spermicides kill sperm and kills viruses, including HIV. However, it is unclear whether spermicide also the HIV virus in a woman's vagina. So far, there has not been enough research to determine whether or not spermicide protects women against HIV.

Because spermicide goes into a woman's vagina, she can insert the spermicide herself. The decision to use or not use spermicide could therefore be the woman's alone. Because a woman can provide the spermicide and insert it before sex, a woman can use spermicide without their partner's cooperation.

Some people are allergic to spermicides, causing them to have a burning or irritating sensation. In addition, spermicides can be runny and messy to use.

Finally, some men and women who use spermicides complain of a loss of sensation and pleasure.

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