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AIDS-Related Health Behavior: Coping, Protection Motivation, and Previous Behavior

Frank W. Van der Velde^{1,2} and Joop Van der Pligt¹

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The purpose of this study was to examine Rogers' protection motivation theory and aspects of Janis and Mann's conflict theory in the context of AIDS-related health behavior. Subjects were 84 heterosexual men and women and 147 homosexual men with multiple sexual partners; LISREL's path-analysis techniques were used to evaluate the goodness of fit of the structural equation models. Protection motivation theory did fit the data but had considerably more explanatory power for heterosexual than for homosexual subjects (49 vs. 22%, respectively). When coping styles were added, different patterns of findings were found among both groups. Adding variables such as social norms and previous behavior increased the explained variance to 73% for heterosexual subjects and to 44% for homosexual subjects. It was concluded that although protection motivation theory did fit the data fairly adequately, expanding the theory with other variables—especially those related to previous behavior—could improve our understanding of AIDS-related health behavior.

KEY WORDS: AIDS; protection motivation; coping; heterosexuals; homosexuals.

INTRODUCTION

Many health education programs attempt to persuade people to protect themselves against impending dangers such as illness, accidents, and

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environmental hazards. Unfortunately, people often fail to take measures to reduce these risks and, hence, increase the likelihood of negative consequences that could be avoided (e.g., Janis, 1986). Since the early 1950s, social psychologists have attempted to assess these processes and investigate the determinants of health-related behavior. Numerous studies in a variety of domains have been conducted to answer the question why some people engage in adaptive, and some in maladaptive, behavior (see Sutton, 1982). This study addresses this issue in the context of AIDS.

Very little information on the incidence of HIV infection is currently available. So far, no representative, population-based seroincidence surveys have been reported and no definite answer can be given to the question to what extent HIV resides in the general population (McNeil *et al.*, 1989). Therefore, anyone with multiple sexual partners should be considered at risk of becoming infected with HIV. The recommendations of health education campaigns are unambiguous: abstaining from high-risk behavior significantly reduces the chances of being infected with HIV. Like many other health risks, AIDS-related health behavior appears to be related to low adherence to recommendations (e.g., Bauman and Siegel, 1987). Sexual behavior is firmly rooted in life-style and (sexual) identity. According to Bauman and Siegel (1987), this could partially explain the 'low changeability' of sexual behavior.

Rippetoe and Rogers (1987) used a theoretical framework [protection motivation theory (Rogers, 1975, 1983)] to demonstrate differences in cognitive mediating processes between people engaging in adaptive and people engaging in maladaptive behavior. They manipulated perceived threat, response efficacy, and self-efficacy and examined the effects of these variables on adaptive and maladaptive coping modes. Their results revealed an intriguing pattern of relations between the cognitive mediating processes and coping modes. The high-threat condition energized all coping responses, adaptive as well as maladaptive. Higher levels of response and self-efficacy created higher levels of adaptive coping, whereas lower levels of both appraisal processes increased the tendency to engage in maladaptive coping.

In the present study we opted for a framework similar to Rogers' (1983) protection motivation theory and added elements from Janis and Mann's (1977) conflict theory. Figure 1 summarizes this conceptual framework, applied to AIDS-related health behavior. Informational sources initiate two appraisal processes: threat appraisal and coping appraisal. The components of both appraisal processes may be viewed as four cells of a 2×2 table. These cognitive processes involve (a) the maladaptive and adaptive responses and (b) the variables facilitating or inhibiting the probability of occurrence of these responses. As shown in Fig. 1, the threat-appraisal process evaluates the factors associated with the response that elicits the

Fig. 1. A representation of protection motivation theory. The coping modes mentioned are derived from Janis and Mann's (1977) conflict theory.

danger and is similar to Lazarus' primary appraisal process (Lazarus and Launier, 1978). Rewards of the maladaptive behavior (e.g., perceived pleasantness of high-risk sexual techniques) facilitate the probability of the maladaptive response, whereas the severity of the consequences of AIDS and one's vulnerability to it are expected to inhibit the probability of maladaptive responses.³ The coping-appraisal process evaluates one's ability to cope with and avert the threat and is similar to Lazarus' secondary-appraisal process. The efficacy of the response (beliefs that the recommended behavior reduces the likelihood of an infection with HIV) and one's ability to perform the recommended behavior successfully should increase the likelihood of the adaptive response. Response costs such as abstaining from high-risk sexual techniques decrease the probability of occurrence of the adaptive response. Figure 1 shows that threat and coping appraisal processes mediate the persuasive effects of a fear appeal by eliciting protection motivation, an intervening variable that arouses, sustains, and directs activity to cope with a threat (Rippetoe and Rogers, 1987).

Protection motivation has generally been measured by behavioral intentions to adopt the communicator's recommended response. However, how do people cope with a threat when they do not intend to adopt an adaptive, protective response? Maladaptive, as well as adaptive, coping responses are relevant to the study of persuasion.

³Perceived vulnerability was equivalent in our operationalization to subjective probability.

Janis and Mann (1977) integrated a set of coping styles into a conceptual framework, called conflict theory. For the purpose of this study we incorporated one adaptive and two maladaptive coping styles.⁴ The adaptive coping style *vigilance*, refers to accurate and complete information search, followed by analyzing the problem and planning behavior to reduce or minimize the threat. *Defensive avoidance* is a strategy that is used to reduce stress by denying threatening information or evading the threat actively. *Hypervigilance* refers to a process of panic-like searching for appropriate responses, without reaching well-balanced decisions.

Any theory or model incorporates only a limited amount of cognitive mediating processes, compared to all possible ones. In this study we expanded the general framework of protection motivation and conflict theory by including a number and variables that have been investigated in the context of health behavior. The first is *fear*. Generally, fear is not included as a causal agent in the protection motivation literature. Sutton (1982) examined studies on fear-arousal and concluded that fear does play a significant causal role in health behavior. The question remains, however, whether this is due solely to the combined influence of severity and vulnerability, with fear only as a resulting phenomenon. *Cognitive barriers* are included in protection motivation theory, but seldom measured. We considered costs of adaptive behavior and advantages of maladaptive behavior [in this study conceived as (a) disadvantages of the adaptive response and (b) pleasantness of the maladaptive response] to be important factors with regard to AIDS. The type of adaptive behavior being recommended implies the use of condoms or refraining from high-risk sexual behavior. All other things being equal, reluctance to use condoms or finding high-risk sexual techniques more pleasant may hinder acceptance of the recommended behavior. *Social norms* and *previous behavior* are important factors in most behavioral theories (e.g., Bentler and Speckart, 1979; Chaiken and Stangor, 1987) and were also incorporated in the present study. *Knowledge* about a threatening situation is a necessary condition in order to make well-adjusted behavioral changes. Joseph *et al.* (1987a) found no relation between knowledge and behavior in a study on AIDS. In a study on cancer prevention, Janis (1986) found that especially people with higher levels of knowledge engaged in maladaptive behavior. *Perceived constraints* concern the perception of situational constraints (e.g., no condoms at hand, being under the influence of alcohol or drugs) that may hinder adaptive behavior. Fi-

⁴Two maladaptive coping styles of conflict theory, unconflicted inertia and unconflicted change, were not measured in the present study. Prevalence of these coping styles was expected to be low, because the entire public was made aware that every unprotected casual sexual contact generates risks; furthermore, public health campaigns extensively stressed the only possible adaptive responses.

nally, we supposed that *regrets about previous maladaptive behavior* form a cognitive representation with regard to previous behavior, which may be especially important for those who are afraid or convinced they already may have been infected.

The purpose of this study was to examine the effects of the cognitive mediators included in protection motivation theory on behavioral intentions, to relate these cognitive mediators to the adaptive and maladaptive coping styles of conflict theory, and to test the predictive validity of the cognitive mediators of protection motivation theory in the context of a number of additional variables.

METHOD

A total of 231 people participated, 147 homosexual and 84 heterosexual subjects. Participants were recruited through informants, ads, a municipal youth housing agency, and a longitudinal study among homosexuals conducted by the municipal health service of Amsterdam (MHSA). Of approximately 600 heterosexuals, 145 met the criteria of the study: they all had multiple sexual partners in the 6 months preceding the study, they were aged between 18 and 30, and none of them was tested HIV positive. Nearly sixty percent (46 females and 38 males) of the heterosexuals who met the criteria completed a questionnaire, described below. Fifty-one percent of the homosexuals not participating in the MHSA study (53 homosexuals) met the criteria and returned the questionnaire. Eight-nine percent of the MHSA homosexuals (94 homosexuals) completed the questionnaire; six did not meet the criteria.

The participants were handed or mailed the questionnaire, including a letter explaining the purpose and entrance criteria of the study and a stamp-free envelope in which to return the questionnaire. The questionnaire assessed sexual behavior and behavioral intentions, appraisal of the threat of AIDS, coping responses, coping styles, and other responses. Depending on the nature of sexual contacts (heterosexual or homosexual), the adaptive response was phrased either in terms of condom use or in terms of practicing safe sex. Unless otherwise specified, participants responded to the questions on 5-point Likert-type scales.

Sexual Behavior and Behavioral Intentions. The questionnaire extensively assessed the participant's sexual behavior in the 6 months preceding the study. Sexual behavior consisted of number and type of partners (regular or casual partners), frequencies of various sexual techniques per type of partner, and condom use per technique and per type of partner. Responses for frequencies were made on a 5-point scale; responses for con-

dom use, on a 3-point scale. End points for both scales were "never" and "always." Previous behavior was calculated by multiplying the number of casual partners per technique with the frequency of that technique (multiplier 0 when technique was not practiced, via .25, .50, and .75, to 1 if the technique was practiced with each sexual contact). Finally, the resulting score was multiplied by the frequency of condom use (multiplier 1 if condoms were not used at all, .5 if condoms were used irregularly, and 0 if condoms were always used). Sexual techniques incorporated in the analyses were vaginal intercourse for heterosexual participants, passive anal intercourse, and active orogenital contact (oral contact with semen) for homosexual participants. Behavioral intentions were gauged by asking (a) if participants intended to use condoms (safe sex) in future sexual encounters, (b) if they would propose condom use (safe sex) to future sexual partners, and (c) if they would persist in demanding condom use (safe sex) in the future, even if their sexual partner would not want to use condoms (safe sex). Summing yielded an index score for behavioral intentions; responses were made on a 7-point scale ranging from "absolutely not" to "absolutely."

Threat and Coping Appraisal. To assess threat appraisal, participants rated the severity of an HIV infection on a scale ranging from "not at all severe" to "very severe" (perceived severity) and estimated the chance of personally being infected with HIV in the future (perceived vulnerability). To derive a weighted score for vulnerability, the same probability estimation was assessed for an average other of one's own age. Responses were made by setting a mark on a continuum ranging from 0 to 100% chance, with every 10% point marked. Scores for the first component of coping appraisal, self-efficacy, were assessed by asking participants to indicate the extent to which they believed they could prevent an HIV infection and to what extent they would be able to persist in performing the recommended behavior (both items ranging from "not at all" to "very much"). Scores on both items were summed to yield an index for self-efficacy. A measure for the second coping appraisal process, response efficacy, was established by subtracting the perceived safety of high-risk sexual techniques with condoms, from the perceived safety of the same techniques without condoms. Difference scores for all sexual techniques were summed afterward. Scores for these items ranged from "not at all safe" to "very safe."

Coping Styles. Vigilance (seven items, e.g., "You have thought about how to raise the subject of safe sex with your sexual partner"), hypervigilance (six items, e.g., "You still have doubts about how to adapt your sex life precisely"), and defensive avoidance (seven items, e.g., "You leave the choice whether to practice safe sex or not to your sexual partner") were each assessed by asking participants to rate the extent to which they thought the items applied to themselves on a scale ranging from "not at all appli-

cable" (1) to "totally applicable" (5). Scores were summed to yield an index for each coping style. Using the "elbow criterion," factor analysis (principal-components analysis with varimax rotation) confirmed the existence of the three distinct coping styles. As estimates of the reliability of these coping styles, Cronbach's alpha equaled .82 for vigilance, .73 for hypervigilance, and .71 for defensive avoidance.

Additional Variables. Fear was assessed by three questions; participants rated to what extent they felt they worried about AIDS. Responses ranged from "not at all" to "very much." *Cognitive barriers* included advantages and disadvantages of condom use and pleasantness of high-risk sexual techniques. After a rating of the importance of six advantages and six disadvantages (scale ranging from "totally unimportant" to "very important"), participants rated their overall attitude toward condom use on a scale with end points "disadvantages far more important than advantages" and "advantages far more important than disadvantages." Pleasantness of the maladaptive response was established by contrasting the scores on high-risk sexual techniques with condoms with the scores on the same techniques without condoms. Scores for these items ranged from "very unpleasant" to "very pleasant." Questions for *perceived social norms* were phrased, "What is the attitude towards condom use (safe sex) of your . . ." followed by the various partner types, friends, and acquaintances. Responses were given on a scale ranging from "very negative" to "very positive." Moreover, subjects also reported how many people in their social environment they perceived started using condoms (safe sex) because of AIDS. Responses ranged from "nobody" to "all of them." Summing yielded an index score for social norms. *Knowledge* was assessed by 22 questions concerning various dimensions of what people ought to know about AIDS according to the information brought by the AIDS campaign; possible responses were "true," "false," and "don't know." *Perceived situational constraints* in the last 6 months were measured by asking participants to rate how often the 10 presented constraining situations impeded them from engaging in adaptive behavior (e.g., "How often did you not practice safe sex because you were under the influence of alcohol or drugs?"). Responses ranged from "never" (1) to "always" (5). Finally, *regrets about maladaptive behavior* in the last 6 months were assessed, using the same scale.

RESULTS

LISREL VI was used to estimate the unknown coefficients in the analyses. Because the structural parameters do not, in general, coincide with coefficients of regressions among observed variables, zero-order cor-

relations are added in the figures in parentheses. The assumption of a multinormal probability density underlying the data was not violated, which enabled us to use LISREL's maximum-likelihood estimates (ML) and associated chi-square (adjusted) goodness-of-fit test (AGFI). If the chi-square obtained corresponded to a probability level greater than .05, it was concluded that the null hypothesis (the population has the proposed causal structure) could not be rejected (Jöreskog and Sörbom, 1983).

Causal analyses were performed (a) to examine the effects of the cognitive mediators of protection motivation theory on behavioral intentions, (b) to examine the role of these cognitive mediators in relation to the adaptive and maladaptive coping styles, and (c) to examine the predictive validity of the cognitive mediators of protection motivation theory as compared to the selected additional variables. For reasons of interpretability, the number of possible paths among the predictor variables was limited. This was achieved by not exploring the paths between the coping modes of conflict theory and the additional variables. Adding the additional variables to a combined protection motivation and conflict theory model would have increased the number of paths significantly, resulting in a rather unwieldy model.

For two reasons, all analyses were performed separately for heterosexuals and homosexuals. First, seroprevalence within the homosexual population is many times higher than within the heterosexual population, opposing homosexuals with a more severe and realistic threat. Second, homosexuals were confronted with AIDS at least several years earlier than heterosexuals; heterosexuals therefore had less time to reflect upon ways to cope with AIDS. Because of these differences, preliminary analyses were performed (t test for independent samples and chi-square test of independence) to compare heterosexual and homosexual participants: group differences were found for almost all selected variables. For example, homosexual participants perceived themselves to be more at risk [$t(227) = 2.7, p < 0.1$], experienced higher levels of fear [$t(223) = 3.5, p < .001$], perceived social norms to be more positive [$t(183) = 13.2, p < .001$], and had lower levels of self-efficacy [$t(214) = 3.3, p < .001$] and response efficacy [$t(225) = 10.5, p < .001$] than did heterosexuals. Moreover, previous adaptive behavior and higher behavioral intentions were more common among homosexual than among heterosexual participants [$\chi^2(1) = 42.9, p < .001$, and $t(224) = 5.2, p < .001$, respectively].

LISREL results presented are correlational in nature; average or absolute scores are not incorporated. Therefore, we briefly present the results of a one-way ANOVA test for the differences in standardized means between participants with relatively low and participants with relatively high

Table I. Differences in Standardized Means as a Function of Behavioral Intentions for Heterosexual Participants

	Intention to adopt the recommended response		Mean difference
	Low, mean (SD)	High, mean (SD)	
Protection motivation			
Severity	-.15 (.123)	+.26 (.00)	+.41
Vulnerability	-.15 (.95)	+.28 (1.04)	+.43
Response efficacy	-.22 (.96)	+.39 (.96)	+.61**
Self-efficacy	-.25 (.92)	+.45 (.99)	+.70**
Conflict theory			
Vigilance	-.24 (.99)	+.44 (.86)	+.68**
Hypervigilance	-.06 (.90)	+.10 (1.17)	+.16
Defensive avoidance	+.21 (.88)	-.39 (1.10)	-.60**
Additional variables			
Fear	-.14 (.91)	+.25 (1.11)	+.39
Disadvantages	+.38 (1.03)	-.68 (.42)	-1.06***
Pleasantness	+.28 (.63)	-.53 (1.32)	-.81***
Previous behavior	+.35 (1.02)	-.63 (.56)	-.98***
Social norms	-.28 (.86)	+.52 (1.05)	+.80**
Knowledge	-.07 (1.12)	+.11 (.73)	+.18
Regrets	-.18 (.87)	+.37 (1.17)	+.55*
Situational constraints	+.34 (.85)	-.65 (.96)	-.99***

* $p < .05$.** $p < .01$.*** $p < .001$.

behavioral intentions to adopt the recommended behavior. Table I presents these results for heterosexual; Table II, for homosexual participants.

Table I shows that from the principal mediators of *protection motivation theory*, response efficacy [$F(1,81) = 7.5, p < .01$] and self-efficacy [$F(1,76) = 9.7, p < .01$] were significantly related to intention. The relations between *conflict theories'* coping styles and behavioral intentions revealed a theoretically expected pattern: vigilance was significantly and positively related to intention [$F(1,82) = 9.8, p < .01$], defensive avoidance significantly and negatively related [$F(1,82) = 7.5, p < .01$], whereas hypervigilance was not related to intention at all. With the exception of fear and knowledge, all other *additional variables* were significantly related to intention. Both cognitive barriers, disadvantages of adaptive behavior and pleasantness of maladaptive behavior, were negatively related to intention [$F(1,82) = 28.9, p < .001$, and $F(1,61) = 11.0, p < .01$, respectively]. Previous behavior [$F(1,82) = 23.2, p < .001$] and perceived situational constraints [$F(1,62) = 17.9, p < .001$] were negatively related to intention as well. Finally, social norms and regrets about maladaptive behavior were

Table II. Differences in Standardized Means as a Function of Behavioral Intentions for Homosexual Participants

	Intention to adopt the recommended response		Mean difference
	Low, mean (SD)	High, mean (SD)	
Protection motivation			
Severity	-.04 (.89)	+.03 (1.09)	+.07
Vulnerability	+.23 (.86)	-.22 (1.06)	-.45**
Response efficacy	-.20 (1.25)	+.18 (.64)	+.38*
Self-efficacy	-.21 (1.05)	+.17 (.92)	+.38*
Conflict theory			
Vigilance	-.32 (1.05)	+.29 (.86)	+.61***
Hypervigilance	+.07 (.96)	-.06 (1.03)	-.13
Defensive avoidance	+.25 (1.05)	-.22 (.89)	-.47**
Additional variables			
Fear	+.01 (.97)	-.01 (1.02)	-.02
Disadvantages	+.25 (1.05)	-.22 (.90)	-.47**
Pleasantness	+.07 (1.08)	-.09 (.89)	-.16
Previous behavior	+.03 (.86)	-.02 (1.10)	-.05
Social norms	-.44 (.96)	+.37 (.87)	+.81***
Knowledge	-.18 (1.05)	+.15 (.94)	+.33
Regrets	-.26 (1.02)	+.24 (.92)	+.50**
Situational constraints	+.40 (1.26)	-.35 (.47)	-.75***

* $p < .05$.

** $p < .01$.

*** $p < .001$.

positively related to intention [$F(1,61) = 10.4, p < .01$, and $F(1,67) = 4.8, p < .05$, respectively].

Table II (homosexual participants) shows that all but one of the mediators of *protection motivation theory* were significantly related to intention. Response efficacy [$F(1,134) = 4.9, p < .05$] and self-efficacy were positively related to intention [$F(1,139) = 5.0, p < .05$]. However, contradictory to theoretical assumptions, vulnerability appeared to be negatively related to intention [$F(1,139) = 7.5, p < .01$]. The relations between *conflict theories'* coping styles and intention revealed the same pattern as found within the heterosexual population: vigilance was positively related to intention [$F(1,137) = 13.9, p < .001$], and defensive avoidance negatively related [$F(1,139) = 8.5, p < .01$]. Only half of the *additional variables* were significantly related to intention. Fear, pleasantness of the maladaptive response, previous behavior, and knowledge were not significantly related to intention. Disadvantages of adaptive behavior and situational constraints were both negatively related to intention [$F(1,140) = 8.2, p < .01$, and $F(1,126) = 20.7, p < .001$, respectively]; social norms [$F(1,120) = 23.6, p < .001$]

and regrets about maladaptive behavior [$F(1,133) = 9.0, p < .01$] were both positively related.

Causal Analyses, Heterosexual Participants

Figures 2 to 4 present the causal analyses concerning the heterosexual subjects. Because every specified path tends to improve a causal model, each time analyses were repeated omitting the nonsignificant paths.

Causal Analysis of Protection Motivation Theory. Protection motivation theory predicts that the more one is convinced that (a) the recommended response diverts the danger, (b) one is able to execute the recommended behavior, (c) the threat is severe, and (d) one is at risk, the more one is inclined to adopt the recommended behavior. Fear is considered to be the result of heightened levels of threat appraisal processes, not as a causal mediator of protection motivation theory. Figure 2 presents a causal model of protection motivation's principal components with regard to behavioral intention. Fear was added because of the theoretical relation with the mediators of threat appraisal processes. Self-other difference scores of perceived risk were used as an indicator of vulnerability. Because we assumed that this concept could be more directly related to coping appraisal, we also estimated the relationships between this cognitive mediator and both appraisal processes.

Fig. 2. Heterosexual participants. Causal paths of the mediators of protection motivation theory, fear, and behavioral intentions. Adjusted goodness-of-fit index = .97. Explained variance in intention = 49%. Chi-square(9) = 4.0; probability level = .91.

Fig. 3. Heterosexual participants. Causal paths of the mediators of protection motivation theory, coping modes of conflict theory, fear, and behavioral intentions. Adjusted goodness-of-fit index = .94. Explained variance in intention = 55%. Chi-square(23) = 11.7; probability level = .98.

Fig. 4. Heterosexual participants. Causal paths of the mediators of protection motivation theory, additional variables, and behavioral intentions. Adjusted goodness-of-fit index = .93. Explained variance in intention = 73%. Chi-square(29) = 15.1; probability level = .99.

Results indicated that the proposed theory is tenable [$AGFI = .97$, $\chi^2(9) = 4.0$, $p = .91$]. All but one of the specified paths were significant. Response efficacy ($ML = .38$, $t = 4.89$, $p < .01$), vulnerability ($ML = .39$, $t = 4.90$, $p < .01$), and self-efficacy ($ML = .47$, $t = 5.81$, $p < .01$) were the most powerful predictors of behavioral intention in the causal model. Self-efficacy was negatively related to vulnerability ($ML = .25$, $t = 2.32$, $p < .05$): being convinced to be able to perform the recommended behavior reduced the perceived probability of contracting HIV in the future. The specified path between fear and intention was significant ($ML = .25$, $t = 3.13$, $p < .01$). Among the components of protection motivation theory, fear appeared to be an independent predictor of intention. Although not significantly related to intention, severity did influence fear ($ML = .31$, $t = 2.93$, $p < .01$). Apparently, the adaptive role of severity is not direct, but indirect via increasing the level of fear. Surprisingly, neither fear nor response efficacy was significantly related to perceived vulnerability.

Causal Analysis of Protection Motivation and Conflict Theory. In accordance with the literature (Rippetoe and Rogers, 1987), both unidirectional and reciprocal relations between coping styles and cognitive mediators were examined. However, when reciprocal relations were considered, causal paths appeared to be significant in one direction only. We therefore choose to present the results of the univariate analysis. Adding the adaptive and maladaptive coping styles of conflict theory to the causal model hardly changed the relations between the cognitive mediating processes and intention, as shown in Fig. 3.

Although the explained variance in intention increased by only 6% (due to the vigilant coping response), the added coping styles could be interpreted as either maladaptive or adaptive in terms of their effect on the cognitive mediators. Vigilance proved to be an adaptive coping style, not only by strengthening behavioral intentions ($ML = .26$, $t = 3.45$, $p < .01$) but also by increasing feelings of vulnerability ($ML = .21$, $t = 1.97$, $p < .05$). Although higher scores on fear were associated with higher scores on hypervigilance ($ML = .38$, $t = 3.75$, $p < .01$), hypervigilance appeared to be neither adaptive nor maladaptive; hypervigilance did not influence any of the variables in return. A defensive response was clearly maladaptive: avoidance coping decreased the feeling of being able to perform the recommended behavior ($ML = .24$, $t = 2.23$, $p < .05$), decreased the perceived severity of AIDS ($ML = .30$, $t = 2.83$, $p < .05$), and decreased fear ($ML = .24$, $t = 2.26$, $p < .05$). None of the coping styles were significantly related to response efficacy.

Causal Analysis of Protection Motivation Theory and Additional Variables. From the variables specified in Table I, perceived advantages of maladaptive behavior and knowledge were not significantly related to in-

tention. Furthermore, knowledge was also unrelated to any of the mediators of protection motivation theory. These variables were therefore discarded from further analyses. As can be seen in Fig. 4, the proposed causal structure is tenable. [AGFI = .93, $\chi^2(29) = 15.1$, $p = .99$]. Again, adding other variables hardly changed the causal paths among the mediators of protection motivation theory and intention. The explained variance in intention, however, increased considerably, by 24%.

Participants who behaved maladaptively in the past (previous behavior) and participants who rated maladaptive behavior as extremely pleasant (pleasantness) were less inclined to behave adaptively in the future (ML = .23, $t = 3.59$, $p < .01$, and ML = .22, $t = 3.75$, $p < .01$, respectively). Regrets about maladaptive behavior in the past, on the contrary, increased the intention to adopt adaptive behavior (ML = .20, $t = 3.46$, $p < .01$). Similarly, positive attitudes toward adaptive behavior in one's social environment made participants intent to behave adaptively themselves as well (ML = .19, $t = 3.21$, $p < .01$). All added variables influenced intention also indirectly. Perceiving social norms as positive increased feelings of vulnerability (ML = .21, $t = 2.01$, $p < .05$), and decreased the prevalence (ML = .23, $t = 2.23$, $p < .05$) and pleasantness (ML = .25, $t = 2.31$, $p < .01$) of maladaptive behavior. Participants with higher ratings of the pleasantness of unsafe techniques were more likely to have engaged in maladaptive behavior (not shown in Fig. 4; ML = .29, $t = 2.27$, $p < .05$). Having engaged in maladaptive behavior reduced the reported ability to behave adaptively (ML = .36, $t = 3.50$, $p < .01$). Apparently, people who behaved maladaptively in the past were more aware of factors blocking adaptive behavior. Finally, as indicated in Fig. 4, regrets about maladaptive behavior significantly increased levels of fear (ML = .34, $t = 3.52$, $p < .01$).

Causal Analyses, Homosexual Participants

Figures 5 to 7 present the analyses concerning the homosexual subjects. Again, analyses were repeated for each causal model, omitting the nonsignificant paths to avoid unjustified improvement of the model.

Causal Analysis of Protection Motivation Theory. As theoretically assumed, response efficacy (ML = .17, $t = 2.28$, $p < .05$), self-efficacy (ML = .31, $t = 4.06$, $p < .01$), and severity (ML = .17, $t = 2.11$, $p < .05$) were significantly and positively related to behavioral intentions. Contrary to theoretical assumptions, vulnerability was significantly but negatively related to intention (ML = .25, $t = 3.36$, $p < .01$), i.e., higher perceived vulnerability was associated with decreased intention to adopt safe techniques. Throughout the analyses concerning the homosexual subjects (see

Fig. 5. Homosexual participants. Causal paths of the mediators of protection motivation theory, fear, and behavioral intentions. Adjusted goodness-of-fit index = .98. Explained variance in intention = 22%. Chi-square(8) = 4.7; probability level = .79.

Fig. 6. Homosexual participants. Causal paths of the mediators of protection motivation theory, coping modes of conflict theory, fear, and behavioral intentions. Adjusted goodness-of-fit index = .96. Explained variance in intention = 33%. Chi-square(23) = 13.4; probability level = .94.

Fig. 7. Homosexual participants. Causal paths of the mediators of protection motivation theory, additional variables, and behavioral intentions. Adjusted goodness-of-fit index = .96. Explained variance in intention = 44%. Chi-square(26) = 17.1; probability level = .91.

also Figs. 6 and 7), this pattern of findings remains unchanged. Figure 5 presents the above-mentioned causal paths. As indicated in this figure, the proposed model is tenable [$AGFI = .98$, $\chi^2(8) = 4.7$, $p = .79$].

Similar to the heterosexual causal model, fear appeared to be an independent predictor of intention ($ML = .16$, $t = 2.03$, $p < .05$). Again, fear was influenced by the perceived severity of AIDS ($ML = .20$, $t = 2.48$, $p < .05$). Contrary to the heterosexual model, self-efficacy did not influence vulnerability. However, perceived ability to perform the recommended behavior (self-efficacy) reduced the perceived severity of AIDS ($ML = .22$, $t = 2.69$, $p < .01$). Although one extra cognitive mediator (severity) was significantly related to intention, the explained variance in intention was less: 22%, as opposed to 49% within the heterosexual causal model.

Causal Analysis of Protection Motivation and Conflict Theory. Adding the adaptive and maladaptive coping styles of conflict theory to the causal model barely changed the causal paths between the mediators of protection motivation theory and intention, as shown in Fig. 6. Contrary to the heterosexual causal model, adding the coping styles made the causal relation between fear and intention disappear. Again, univariate analyses are presented: when reciprocal relations were considered between the coping styles

and the mediators of protection motivation theory, causal paths were significant in one direction only.

None of the coping styles influenced any of the mediators of protection motivation theory. Vigilance and defensive avoidance coping did, however, influence behavioral intentions directly: defensive avoidance coping decreased the intention to behave adaptively ($ML = .17, t = 2.29, p < .05$), whereas vigilance increased the intention to behave adaptively ($ML = .32, t = 4.31, p < .01$). Because of these relations, the explained variance in intention rose 11%. Although hypervigilance was related to one of the mediators of protection motivation theory (reduced feelings of being able to perform the recommended behavior increased hypervigilance), this response was neither maladaptive nor adaptive because it did not influence behavioral intentions. Similar to the findings obtained in the heterosexual sample, fear increased both vigilance and hypervigilance ($ML = .22, t = 2.90, p < .05$, and $ML = .33, t = 4.26, p < .01$, respectively).

Causal Analysis of Protection Motivation Theory and Additional Variables. Some of the additional variables specified in Table II were not incorporated in the analysis. Pleasantness of the maladaptive response was not related to behavioral intentions and, therefore, was discarded from further analyses. Regrets about maladaptive behavior in the past was energized by virtually all variables but did not influence any of the variables in the analysis in return. Knowledge influenced all cognitive mediators of protection motivation theory (response efficacy negatively, all other positively) and was also directly related to intention ($ML = .20, t = 2.91, p < .05$). Furthermore, introducing knowledge in the analysis reduced the influence of two cognitive mediators (perceived severity and self-efficacy) on behavioral intentions to a nonsignificant level. However, adding knowledge to the causal model created instability, which could not be resolved by freeing additional parameters. As a result, the probability of the causal model dropped to an unacceptable level [$\chi^2(30) = 26.2, p = .66$]. We therefore decided not to incorporate knowledge in the analysis.

As shown in Fig. 7, the proposed causal structure is tenable [$AGFI = .96, \chi^2(26) = 17.1, p = .91$]. The explained variance in intention increased by 22% to 44%. Adding other variables left the causal paths between the cognitive mediators and intention practically unchanged. One causal path (not shown in Fig. 7) reached significance, however: self-efficacy increased feelings of vulnerability ($ML = .21, t = 2.55, p < .05$).

Adding variables to the mediators of protection motivation theory provided some explanation for the contradictory findings concerning the relation between vulnerability and intention. Participants who rated the disadvantages of the adaptive behavior as extremely important were more likely to have engaged in maladaptive behavior ($ML = .21, t = 2.57, p <$

.05) and were less likely to plan adaptive behavior in the future ($ML = .15, t = 2.20, p < .05$). Perceiving the disadvantages to be important (not shown in Fig. 7, $ML = .16, t = 2.06, p < .05$), as well as having behaved maladaptively in the past ($ML = .24, t = 2.95, p < .01$), increased feelings of vulnerability. Apparently, for some participants the disadvantages of adaptive behavior are so important that they prefer to engage in maladaptive behavior and do not plan to behave adaptively in the future, while willingly accepting the risk of becoming infected with HIV. The maladaptive function of disadvantages and previous behavior stretched even further (the total effect of disadvantages, which includes the effects through other variables as well, was $-.29$). Past maladaptive behavior reduced levels of self-efficacy ($ML = .18, t = 2.25, p < .05$), whereas higher scores on disadvantages made prevalence of situational constraints more likely ($ML = .29, t = 3.71, p < .01$). The latter variable, having experienced constraining situations that blocked adaptive behavior, was found to be the most powerful predictor of intention ($ML = .40, t = 6.01, p < .01$).

Two causal relations counteract the maladaptive effects of disadvantages and situational constraints: positive attitudes toward adaptive behavior in one's social environment reduced the impact of constraints ($ML = .25, t = 3.22, p < .01$), while heightened levels of fear reduced the importance of the disadvantages of adaptive behavior ($ML = .30, t = 3.71, p < .01$). Positive social norms had more beneficial effects. It made participants intent to behave adaptively themselves ($ML = .22, t = 3.14, p < .01$), reduced feelings of vulnerability ($ML = .20, t = 2.51, p < .05$), and finally, increased levels of self-efficacy ($ML = .16, t = 1.97, p < .05$).

Causal Analyses, Summary

It seems helpful to display simultaneously the LISREL VI-generated test statistics (chi-square, degrees of freedom, and goodness-of-fit indices) and the explained variances of all tested models. Table III presents these statistics, for heterosexual as well as homosexual participants.

DISCUSSION

The results of the present study indicate that protection motivation theory can be applied to AIDS-related behavioral intentions. The obtained effects of self-efficacy and response efficacy confirm earlier research indicating that coping-appraisal processes independently affect behavior intentions to adopt the recommended response (e.g., Prentice-Dunn and Jacobs,

Table III. Results of LISREL Analyses^a

	Heterosexual sample				Homosexual sample			
	df	χ^2	AGFI	R ²	df	χ^2	AGFI	R ²
Protection motivation theory	9	4.0	.97	.49	8	4.7	.98	.22
Protection motivation and conflict theory	23	11.7	.94	.55	23	13.4	.96	.33
Protection motivation and additional variables	29	15.1	.93	.73	26	17.1	.96	.44

^adf, degrees of freedom; χ^2 chi-square; AGFI, LISREL adjusted goodness-of-fit index; R², explained variance in behavioral intentions.

1986; Rippetoe and Rogers, 1987). Mixed support, however, was found for the threat-appraisal processes: perceived severity and vulnerability. This is not surprising, given the inconsistency in findings reported thus far (see, e.g., Sutton, 1982). Some studies reported the predicted main effects of both variables, some reported interaction effects only, and still others reported no effect or even reverse effects.

Fear and Threat Appraisal

The lack of a significant relationship between perceived severity and behavioral intentions within the heterosexual sample is due to the added fear component. In fact, when fear was deleted from the analyses, severity was, indeed, significantly related to behavioral intentions. The fact that fear had direct and positive effects on intentions seems to be contradictory to previous findings, where fear was examined simultaneously with the mediators of protection motivation theory (e.g., Rippetoe and Rogers, 1987). It needs to be noted, however, that we did not, as is usually done, assess the momentary state of fear, but rather tried to capture the long-sustained effects of fear arousal by operationalizing fear as "worry." Our findings concerning worry seem to be in accordance with Weinstein's (1982) suggestion that both motivational and cognitive factors may influence protection motivation. In his study, risk reduction motivation was found to vary with worry, even when threat appraisal processes were held constant.

According to Maddux and Rogers (1983) and analogous to Leventhal (1971), people with low expectations of being exposed to the danger (equivalent to our heterosexual sample) are expected to direct their efforts primarily to avoid the danger, whereas people with high expectations of being exposed to the danger (equivalent to our homosexual sample) direct their efforts at both avoiding danger and reducing anxiety. Our results par-

allel their findings. Within the heterosexual sample, increased levels of self-efficacy led to reduced levels of vulnerability, which was not related to fear. Within the homosexual sample, however, self-efficacy was directed at reducing the perceived severity of AIDS, which, indeed, was related to fear.

Although this may shed some light on the effects of fear and the interrelations among the cognitive mediating processes, it does not explain our reverse effects between perceived vulnerability and intention within the homosexual sample. This finding does not support theoretical predictions. Nevertheless, Rogers and Mewborn (1976) reported similar results; they found that when recommendations were presented as relatively ineffective, an increase in the threat's probability of occurrence *decreased* behavioral intentions. Because we did not test this prediction, we cannot substantiate their findings. The homosexual sample did, however, perceive the recommendations to be less effective than the heterosexual sample. Similarly, in a study on AIDS, Joseph *et al.* (1987b) found that those who believed themselves to be at higher risk were less likely to change their behavior in order to reduce risks. They concluded that this was due partly to the confounding influence of previous behavior. Our results parallel their findings. Apparently, adopting the recommended behavior implied a greater sacrifice for homosexuals, a sacrifice some did not want to make. These participants, consequently, had the highest level of baseline behavioral risk, the highest level of perceived risk, and the lowest level of behavioral intentions.

Coping and Protection Motivation

When coping styles were added, causal paths among the cognitive mediators did not change. Our findings with regard to hypervigilance indicate that this coping style had neither a maladaptive nor an adaptive influence on behavioral intentions. Given Janis and Mann's (1977) theoretical definition of hypervigilance (a process of panic-like searching for appropriate responses without reaching well-balanced decisions), our findings support that definition. Contrary to the findings of Rippetoe and Rogers (1987), our results revealed that the coping styles (with the exception of hypervigilance in the homosexual sample) were not influenced by the cognitive mediators. Apparently, participants in our study had already established a preferred coping style. These findings might be explained by considering differences in the elapse of time between confrontation with the threat and measurement of coping. Rippetoe and Rogers' study dealt primarily with the *development or formation* of ways of coping with a threat; they confronted their subjects with a new and more remote threat (breast

cancer), whereby excluding all subjects who had practiced adaptive behavior prior to the study and subjects with a history of breast cancer. In contrast, our study focused primarily on *existing coping styles*; we selected—in accordance with our entrance criteria—only those participants who, because of their behavior, had been confronted with AIDS prior to this study. Apparently, depending on subjects' experience with a specific health threat, coping styles may have a different (causal) role in protection motivation processes. Differences in experience with the threat existed between our samples, too; homosexuals were first confronted with AIDS several years earlier than heterosexuals. It is not unlikely that this, in part, might explain why coping styles affected intention primarily directly within the homosexual sample and primarily via the cognitive mediators within the heterosexual sample.

Our data do not provide a conclusive explanation for these differences. This emphasizes the notions of Parkes (1986), who stressed the necessity "to take into account the complex processes of reciprocal causation between appraisal, reappraisal, coping, and affective reactions that occur over time during stressful encounters . . . to accommodate the unpredictable time course of stressful transactions and capture the fluctuating nature of emotions, coping, and cognitive appraisal."

Additional Variables and Protection Motivation

In discussing the limitations of protection motivation theory, Rogers (1975) noted that protection motivation theory does not attempt to specify all the possible factors in fear appeal that might effect persuasion but, rather, proposes a limited set of components and cognitive mediating processes that might account for a large portion of the variance in acceptance of a communicator's recommendations. Considering the proportion of variance explained by protection motivation theory alone, we agree with Rogers that other variables need to be added in the context of AIDS.

Again, when other variables were added, causal paths among the mediators of protection motivation theory remained stable, the only exception being "knowledge" in one of our samples. Inclusion of this factor, however, also resulted in an unacceptable instability of the model. Unfortunately, present data do not provide an explanation for this inconsistency.

Corroborating earlier findings (e.g., Bentler and Speckart, 1979), social norms and previous behavior proved to be among the most important added variables in both samples. Of special interest were the detrimental effects on intention of other factors that were related to past behavior;

especially, situational constraints and cognitive barriers were related to the prevalence of maladaptive behavior.

Conclusions

The purpose of this study was not to test alternative or competitive models. Using protection motivation theory as a starting point, we examined the causal role of other relevant variables in the context of AIDS-related health behavior. Some of our findings have direct implications for health information programs. For instance, our data point to the importance of constraining situations, as well as the important role of both social norms in one's immediate environment and cognitive barriers. The first finding suggests that, in order to counteract the detrimental effects, information programs should emphasize how to handle possible constraining situations. The latter finding suggests that the immediate positive effects of the recommended behavior (e.g., pleasantness of different sexual techniques) should be stressed. It should be noted, however, that the importance of these aspects might be different for (sub)populations for whom the severity or experience with the threat is different: conveying population-specific messages might therefore be more effective than general information programs. Finally, the data suggest that motivational factors come into play at higher fear levels. Higher levels of fear not only tended to weaken the relationship between fear and behavioral intentions, but also resulted in directing more effort to reducing anxiety instead of avoiding danger; suggesting that information programs should not focus on fear and try to prevent excessive fear arousal.

Although the present study clarifies some of the processes underlying AIDS-related health behavior, there are some limitations to the present study. First, for heuristic reasons, nonreciprocal models were presented, despite the fact that reciprocal causality within the models is plausible. Second, our outcome measure, behavioral intentions, was based on just a three-item scale. A more extensive scale would benefit the assessment of its reliability. Future research should use a more extensive measure of behavioral intentions, preferably supplemented with behavioral outcome measures.

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