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### Application of a modified health belief model to hiv preventive behavioral intentions among gay and bisexual men

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## **APPLICATION OF A MODIFIED HEALTH BELIEF MODEL TO HIV PREVENTIVE BEHAVIORAL INTENTIONS AMONG GAY AND BISEXUAL MEN**

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The utility of a modified health belief model (Janz and Becker, 1984) for predicting the intention to use condoms was tested in a study among gay and bisexual men. The model explained a reasonable amount of variance. It was found that younger men's decision to have safe sex was guided by factors other than those that influenced older men. Among younger men, the intention to use a condom was positively related to the relative number of persons with AIDS in their social environment (cues to action) and to the perceived benefits of HIV preventive behavior. Among older men, this behavioral intention was much more determined by their perception of the prevalence of HIV and by their perception of their vulnerability to HIV infection. These findings are important because they may partly explain the recent increase in AIDS-risk behavior among young gay and bisexual men. The discussion focuses on these findings and on the implications for interventions aimed at promoting safe sex.

KEY WORDS: AIDS prevention; health belief model; gay and bisexual men.

In response to the threat of the acquired immunodeficiency syndrome (AIDS) gay and bisexual men have clearly modified their sexual behavior. Several studies have shown that, over the past decade, there has been a sharp reduction in the number of partners they have sex with (Siegel, Bauman, Christ and Krown, 1988; Van Griensven *et al.*, 1988) and an increase in condom use during anogenital intercourse (De Wit, 1994; Martin, 1987; Van Griensven *et al.*, 1989). However, a recent study among a cohort of gay men in Amsterdam, The Netherlands, revealed that between 1990 and 1991 there was a sudden significant increase in the percentage of men practicing unprotected anogenital intercourse, i.e. from 34.1% to 40.7% (De Wit, Van den Hoek, Sandfort and Van Griensven, 1993). The finding that after several years of steady decline, the number of cases of anorectal and urethral gonorrhoea had, during the same time period, also increased among gay and bisexual male patients of STD clinics in Amsterdam (Van den Hoek, Van Griensven and Coutinho, 1990) suggests that these men were actually putting themselves at risk of infection with the human immunodeficiency virus (HIV).

The increased risk was particularly prevalent among younger gay and bisexual men. The median age of men diagnosed with gonorrhoea decreased significantly from 30.9 years in 1988 to 29.2 in 1991. In this same period, the percentage of younger men

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(between 25 and 30 years of age) with gonorrhoea increased from 24.5% to 38.6% (De Wit, 1994). Moreover, several other studies in Western countries have shown that particularly *young men* who engage in unprotected anogenital intercourse are increasingly at risk of AIDS and other sexually transmitted diseases (STDs; McCusker, Zapka, Stoddard and Mayer, 1989; Peterson, Ostrow and McKirnan, 1991). Why do these young men tend to engage in unsafe sexual behaviors despite the increasing threat of AIDS? Is the decision of younger men to use condoms during anal sex guided by factors other than those that influence older men? In the present study, we addressed these questions using a modified version of the health belief model (Janz and Becker, 1984). First, we will discuss its theoretical background and previous findings with the model in the context of HIV prevention.

### *The Health Belief Model*

The health belief model (HBM; Janz and Becker, 1984; Rosenstock, 1974) was developed to understand why so many people do not take precautionary measures to prevent illness. The model is an expectancy-value approach of decisions that are specifically related to one's health, and assumes that the willingness to engage in preventive health behavior depends on a two-step appraisal process: (a) the perceived threat of the disease under consideration, and (b) the result of a "cost-benefit analysis" of the preventive behavior. According to the theory, the perceived health threat is determined by three factors, namely (1) the perceived severity of the health threat, (2) the perceived vulnerability to the disease, and (3) cues to action that make the health-risk salient (e.g., illness of a friend, information about the disease communicated by the media, internal stimuli). The second step in the appraisal process, the "cost-benefit analysis" concerns a consideration of the perceived benefits of preventive action (e.g., a decreased risk for a heart attack and improved stamina after weight loss), and the barriers to taking action (e.g., physical, psychological, or financial costs related to the health-protective behavior) (Janz and Becker, 1984).

The HBM has been applied successfully to various forms of preventive health behavior, such as vaccination against infectious diseases, dental care, breast self-examination to detect cancer, dieting, exercising, abstinence from smoking, and seat belt use. Severity, vulnerability, benefits and barriers to change, have all been shown to be important determinants of health behaviors (see Janz and Becker, 1984, and Harrison, Mullen and Green, 1992, for meta-analyses). The role of cues to action has derived little research attention, however.

### *The HBM as a Predictor of HIV Preventive Behavior*

In recent years, in an increasing number of studies the HBM has been applied to AIDS-preventive behaviors, although often in a modified and expanded way. Petosa and Jackson (1991) used the HBM to predict seventh-, ninth-, and eleventh-grade students' intentions to adopt safe sex behaviors, and found that the predictive value of the model diminished in higher grade levels. In a prospective study among gay men, Aspinwall, Kemeny, Taylor, Schneider and Dudley (1991) found that, when controlling for prior sexual behavior and demographic variables, factors from the HBM, such as barriers to change and vulnerability explained a significant proportion of variance in high-risk behavior over a six-month interval. Several other studies among teenagers and students

(Abraham, Sheeran, Spears and Abrams, 1992; Walter *et al.*, 1992; Warwick, Terry and Gallois, 1993) have shown that particularly benefits of condom use and barriers to carrying and using condoms affected the intention to engage in preventive behavior, while severity and vulnerability were not or only to a limited extent related to this intention. Research among heterosexual adults has also highlighted the importance of perceived barriers and benefits of condom use (Bakker, 1995; Bakker, Buunk and Siero, 1993): particularly the perceived barriers to condom use (e.g., the fear of offending the partner by implying he or she has a disreputable past) and the perceived benefits of this behavior (prevention of AIDS and other STDs, prevention of unintended pregnancy) were found to be substantially related to the intention to use condoms. However, these two studies also showed only limited support for a relationship between vulnerability and severity on the one hand, and condom use intentions on the other.

This short overview of the literature shows that although some support has been found for each of the HBM components in the context of HIV preventive behavior, none of the empirical tests has resulted in conclusive evidence for the model. Does this mean that the model is too simplistic to account adequately for variation in people's propensity to engage in AIDS-preventive behavior (Montgomery *et al.*, 1989)? We think not, and we will present two intertwined reasons to argue that rejection of the HBM may be premature. The first reason for the lack of support for the HBM in the context of AIDS is that the model does not have clear guidelines about how variables should be operationalized. As a consequence, and as will be discussed below, there are inconsistencies in the way HBM-variables have been defined and measured in previous research (Warwick *et al.*, 1993). A second reason for the lack of support for the HBM is that the AIDS threat has a number of characteristics that distinguish it from other health threats (Montgomery *et al.*, 1989), that might not have been addressed adequately in previous research. We will address these two issues in our discussion of each model component.

### *Vulnerability*

A more closer look at the literature reveals that particularly the findings with respect to an important component of the HBM, perceived vulnerability, have been mixed. In a review of the evidence for the correlation between perceived vulnerability to HIV infection and AIDS-preventive behavior, Gerrard, Gibbons, Warner and Smith (1993) concluded that in cross-sectional as well as prospective studies, sometimes negative, sometimes zero, and sometimes positive correlations are found between perceived risk of contracting HIV and AIDS-preventive behavior. One reason for these conflicting results may be that usually what we will refer to as *absolute risk* has been assessed, i.e. the plain risk of HIV infection. It seems obvious that individuals may estimate their risk as low *because* they have taken, or intend to take precautionary measures. Thus, perceived vulnerability operationalized in this way is not a predictor, but rather an *effect* of the intention to use condoms. Therefore, a more appropriate way to operationalize vulnerability would be to assess to what extent individuals feel they would be at risk for HIV infection when they would *not* use condoms. This *conditional risk* would more likely predict condom use because it may indeed motivate individuals to take precautionary measures. In the present study, participants were explicitly asked to assess their risk of getting infected with HIV if they would not consistently use condoms during sex with a new partner in the future (cf. Ronis, 1992).

### *Severity*

A second reason for the lack of support for the HBM in the context of AIDS is that the AIDS threat has a number of characteristics that distinguish it from other health threats (Montgomery *et al.*, 1989). Probably most evident is the fact that HIV infection is an extremely severe threat. As argued by Aspinwall *et al.* (1991), "... this variable [severity] may be a poor predictor of risk reduction in response to AIDS because there can be little doubt about the severity of an illness that is usually incurable and fatal". The problem is that measuring severity in the traditional way by simply asking how serious it would be to get infected may present researchers with statistical "ceiling effects". Therefore, the present study did not include severity as a determinant of the intention to engage in safe sex, but instead included a measure of the perceived prevalence of HIV. We reasoned that people will be more inclined to engage in safe sex, the more they think HIV is spread among people they could have sex with.

### *Cues to Action*

Another specific characteristic of the AIDS threat is that a great deal of media attention has been given to AIDS. Assessing cues to action may be very difficult as there are so many cues that might be noticed, including hearing that a well-known celebrity has contracted AIDS (Penner and Fritzsche, 1993) and processing AIDS education campaigns (Abraham, Sheeran, Abrams, Spears and Marks, 1991). In addition, research has shown that the impact of such general cues as safe sex campaigns is hard to trace because most people have taken notice of them leaving relatively little room for variance (Bakker, 1995). In the present study, we assumed that a more specific cue, namely knowing and seeing people who have AIDS, would have a potentially stronger impact on the intention to engage in HIV preventive behavior (cf. Aspinwall *et al.*; Bakker *et al.*, 1993). The potential impact of these cues has been outlined by De Vroome (1994) who also found that the number of people with AIDS gay men know in their immediate environment increased significantly between 1986 to 1989 from 37% to 58%.

### *Benefits and Barriers*

It must be noted that the HBM is only one possible model of the relationship between beliefs and behavioral intentions, albeit somewhat unique in focussing specifically on health behavior. However, the model proposes a number of variables that are similar to those proposed by two other well-known expectancy-value models, namely protection motivation theory (PMT: Rogers, 1983), and the model of planned behavior (Ajzen, 1991). It is important to note that support for these more recently formulated models has been found for various behaviors, including health behaviors. Most evident is that both PMT and the HBM propose severity and vulnerability as predictors of preventive action. In addition, the model of planned behavior proposes attitudinal and control beliefs as the most distal predictors of behavior, in addition to subjective norms. Although the model of planned behavior is much more precise than the HBM about how attitudinal and control beliefs affect the intention to engage in a certain behavior, these variables correspond rather closely to the benefits and the barriers constructs in the HBM.

### *The Present Study*

To summarize, the present study examined the utility of a modified version of the HBM for predicting the intention to use condoms among gay and bisexual men. Although there are several other ways to have safe sex (e.g., abstinence from anal sex), previous research has shown that condom use during anogenital intercourse is the most important coping strategy among men who have sex with other men (De Vroome, 1994). In addition, because of the recent finding that participation in unsafe sex has increased among young gay men (De Wit, 1994; De Wit *et al.*, 1993; Van den Hoek *et al.*, 1990), we examined whether younger men are guided by factors other than those that influence older men in their decision to use condoms. This investigation was exploratory and therefore no specific hypotheses regarding the impact of age were tested. For practical reasons, this study did not focus on behavior, but on the *intention* to use condoms. A number of studies have found positive relationships between behavioral intentions and HIV preventive behavior (e.g., De Vroome, 1994; Fishbein *et al.*, 1992; Nucifora, Gallois and Kashima, 1993).

## METHOD

### *Participants and Procedure*

Participants were recruited in 1991 by means of announcements in national newspapers and on television. Of the 796 respondents, 57 men (67%) reported they had a homosexual orientation and 28 men (33%) indicated they had a bisexual orientation. These 85 men comprised the sample for the present study. Their mean age was 35 years ( $sd = 9$ , range = 21–64). The participants' level of education varied from elementary education only (14%) to college education (51%). The majority lived in large cities such as Amsterdam and Rotterdam (70%). Comparison of the present sample's characteristics with those of the Amsterdam cohort (De Wit *et al.*, 1993) revealed that the participants were representative in terms of age and education. Everyone who was contacted received a mailed questionnaire and a cover letter which explained the goal of the study and assured the participants that all responses would be kept strictly confidential. Participants were asked to complete the questionnaire in private and not to discuss it with others before completing it. All participants received a small gift (i.e., a ballpoint).

### *Measures*

*Intention to use condoms.* This criterion variable was measured by three items asking participants what they planned to do in the near future: "If I have anogenital intercourse with a new partner, I intend to always use a condom", "I intend to abstain from anogenital intercourse with a new partner when condom use is no option for my partner", and "I intend to insist on condom use with a new partner, even when he does not want to use condoms" (1 = strongly disagree, 5 = strongly agree). These three items were combined in one index for the behavioral intention. This scale was highly reliable: Cronbach's alpha was .91.

*Vulnerability.* To assess perceived vulnerability to HIV infection, the participants were asked to "assess your personal risk of getting infected with the virus that causes AIDS if

you do not consistently use condoms during sex with a new partner" (cf. Ronis, 1992). The answers varied from (1) "absolutely no risk" to (5) "certainly at risk".

*Prevalence of AIDS.* This variable was measured by four items, such as "To what extent has the AIDS virus been spread among people you could have sex with?", and "To what extent is AIDS a problem for people with a heterosexual orientation in The Netherlands?" (1 = not at all, 5 = to a large extent). Cronbach's  $\alpha = .72$ .

*Cues to action.* Three questions were designed to assess experience with AIDS and bereavement events that might serve as a cue to action. Participants were asked whether they personally knew people who are HIV-positive, people with AIDS, or had known people who died of AIDS (cf. Aspinwall *et al.*, 1991; 1 = none, 2 = one, 3 = several). Cronbach's  $\alpha = .78$ .

*Barriers* to condom use was represented by seven items. Three items referred to socio-emotional resistance, such as "When you always carry condoms with you, it seems as if the only thing you are looking for is sex", and "In intimate relationships, spontaneity and romance play an important role; therefore, you should not always carry condoms with you". Four items referred to practical problems, for example "The moment you really need condoms they are not available" (1 = strongly disagree, 5 = strongly agree). These measures were summed to form an index of barriers and represented a reliable scale: Cronbach's  $\alpha = .80$ .

*Benefits* of preventive behavior was investigated using a combined index of two items: "By always using condoms during sex with a new partner, I prevent infection with the virus that causes AIDS", and "By always using condoms during sex with a new partner, I get a feeling of safety" (1 = strongly disagree, 5 = strongly agree).

*AIDS-relevant behavior.* A number of questions were asked about the participants' sexual behavior in the previous five years. They were first asked how many different partners they had had sex with. Second, frequency of condom use during sex with a new partner was measured with three items. Participants indicated how often they had had unprotected sex with a new partner, had abstained from sex with a new partner when condom use was impossible, and had consistently demanded condom use with a new partner, even when he did not want to use condoms (1 = never, 5 = often). These items were combined in one index for condom use during the previous five years; Cronbach's  $\alpha = .60$ . Finally, we asked participants whether they had ever had a sexually transmitted disease, had undergone a blood test to check for HIV, and what the results of this test were.

## RESULTS

### *Descriptive Data*

To determine whether there were differences in AIDS-related beliefs and behaviors between younger and older gay and bisexual men, the sample was split into two groups at the median (33 years). Younger men ( $N = 42$ ) had a mean age of 27 years (range 21–32,  $sd = 3.60$ ). Older men ( $N = 43$ ) had a mean age of 42 years (range 33–64,  $sd = 7.29$ ). The two groups did not differ in the number of partners they had had sex with during the preceding five years,  $t(84) = .23$ , *n.s.* The mean number of sex partners during this period was 32 ( $sd = 115$ ; Median = 9). In the preceding five years, participants did not always use condoms when having sex with a new partner,  $M = 3.06$ ,  $sd = 1.14$  (1 = never, 5 = often). As the data indicate, this behavior was not without risks. Indeed, 32 participants

(38%) had had an STD at least once. The fact that 32 (partly other) participants had checked whether they were HIV-positive suggests that they were aware of the risks they ran. Two men reported that they were HIV-positive. Their data were not included in the final analyses. There were no differences between younger and older men in the frequency of condom use, the number of times they had had an STD or the number of men who had been tested for HIV-antibodies.

The scores of the younger and older participants on the HBM variables also hardly differed. There was only a marginal difference in the degree to which younger ( $M = 1.45$ ) and older men ( $M = 1.68$ ) personally knew people who were HIV-positive or who had AIDS,  $t(82) = 1.62, p < .10$ . In general, the participants had a rather strong inclination to use condoms when having sex with a new partner ( $M = 4.07, sd = 1.07$ ). In addition, they did not think that the chance of getting infected was very high ( $M = 3.82$ ), although the assessments showed a great deal of variance ( $sd = 1.46$ ). The participants indicated that it was well possible that HIV had been spread among people they could have sex with ( $M = 4.10, sd = .77$ ). Finally, the men perceived relatively few barriers to using condoms ( $M = 1.84, sd = .84$ ), and they thought that having sex with condoms results in many benefits ( $M = 4.42, sd = .77$ ).

To gain insight into the correlations between the modified HBM variables, Pearson correlations were calculated for both younger and older men (see Table 1). The Box-M-test (Winer, 1971) was used to determine whether the correlation pattern (the covariance matrix) for younger men differed significantly from that for older men. The results showed that this was indeed the case:  $\chi^2(21) = 48.55, p < .001$ , and suggested that it was appropriate to test the predictive value of the HBM for younger and older men separately.

#### *Test of the Modified Health Belief Model*

We assumed that the appraisal of the AIDS threat precedes the cost-benefit appraisal of condom use. Therefore, the modified HBM was tested for younger and older men separately using hierarchical regression analyses. The first step was to assess what contribution vulnerability, prevalence of HIV, and cues to action made to the explanation of the

**Table 1** Intercorrelations between the HBM variables for younger and older gay and bisexual men

	1	2	3	4	5	6
<b>Younger men (<math>n = 41</math>)</b>						
1. Intention	-	.22	.37**	.30*	-.35**	.42**
2. Vulnerability		-	.38*	.08	.06	.20
3. Prevalence of HIV			-	.31*	-.44**	.46**
4. Cues to action				-	-.07	-.12
5. Barriers					-	-.36**
6. Benefits						-
<b>Older men (<math>n = 42</math>)</b>						
1. Intention	-	.39**	.55***	.07	.05	.19
2. Vulnerability		-	.09	.23	-.27*	.19
3. Prevalence of HIV			-	-.21	.29*	.20
4. Cues to action				-	-.12	.05
5. Barriers					-	-.07
6. Benefits						-

Note: \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .



variance in intended condom use with a new partner. Next, an examination was made to determine the unique contribution of barriers to condom use and of the perceived benefits of this behavior. Table 2 shows that the combination of all variables from the modified HBM explained 35% of the variance for younger men and 43% for older men.<sup>1</sup>

There were clear differences between younger and older gay and bisexual men with respect to the variables that uniquely contributed to the explanation of the variance in their intention to use condoms. First, it is notable that for *older men*, all variance in this intention was explained by the perceived threat of AIDS. The estimated risk of getting infected with HIV and the perceived prevalence of HIV showed an independent and strong association with the intention to use condoms: The higher the perceived threat of AIDS, the more older gay and bisexual men were inclined to protect themselves. The finding that for older men the perceived benefits of and barriers to condom use were not included in the regression equation suggests that these factors did not play a significant role in their decision to engage in HIV preventive behavior (see beta-coefficients in Table 2). Finally, the number of people with AIDS that older men personally knew (i.e., cues to action) also appeared to be an insignificant motive for them to have safe sex ( $\beta = .10, n.s.$ )

These cues were, however, relatively strongly associated with the inclination to use condoms among *younger* homosexually active men. Among young men, cues to action turned out to be the most important predictor from the first phase of the appraisal process ( $\beta = .34, p < .05$ ). As shown in Table 2, the perceived risk of infection (vulnerability) and the estimated prevalence of HIV were hardly related to younger men's motivation to use condoms. Younger men were much more guided by the second phase of the appraisal

**Table 2** Hierarchical regressions of the intention to use condoms on the HBM variables for younger and older gay and bisexual men

	$R^2$	$R^2_{ch}$	$F_{ch}$	$\beta^2$
<b>Younger men (<math>n = 41</math>)</b>				
1. Health threat	.18	.18	2.65*	
Vulnerability				.16
Prevalence of HIV				-.08
Cues to action				.34*
2. Cost-benefit analysis	.35	.17	4.45*	
Barriers				-.24
Benefits				.38*
<b>Older men (<math>n = 42</math>)</b>				
1. Health threat	.43	.43	9.55***	
Vulnerability				.32*
Prevalence of HIV				.54***
Cues to action				.10
2. Cost-benefit analysis	.43	.00	<1	
Barriers				-.01
Benefits				.01

Note:  $R^2_{ch}$  = change in explained variance on step;  $F_{ch}$  = change in F;  $\beta$  = standardized regression coefficient; \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

<sup>1</sup>In additional analyses, we included all interaction terms in the regression equations to examine possible interaction effects. None of these effects approached significance.

process, particularly by the benefits they associated with condom use. The more younger men thought that condom use gave them a feeling of safety and offered protection against HIV infection, the stronger their inclination to use condoms was.

## DISCUSSION

This study assessed the utility of a modified version of the HBM (Janz and Becker, 1984; Rosenstock, 1974) for predicting the intention to use condoms among gay and bisexual men who are potentially at risk for HIV infection. The results clearly showed that – if problems with measuring the HBM components are properly addressed and if the specific characteristics of the AIDS threat are taken into account – the model can explain a reasonable amount of variance in the intention to have safe sex. Moreover, the observed correlations corresponded with our theoretical predictions. Particularly noteworthy was the finding that younger men were guided by considerations other than those that influenced older men in their decision to have safe sex.

The results showed that younger men, as opposed to older men, were only marginally guided by the risks that are associated with unprotected sex and by the perceived prevalence of HIV. This is remarkable because during the past five years, media attention to AIDS and safe sex has greatly increased in the Netherlands (e.g., recently the world AIDS conference, world AIDS day, and the Gay Games were organized in the Netherlands). One possible explanation for the finding that young men were not influenced by the general threat of AIDS is that they have become more or less inured to the horrible consequences of AIDS because of repeated confrontations with the facts in the media. However, as predicted, signals from young men's *personal* environment had a motivating impact on the inclination to use condoms. This is not surprising because, in general, one might expect that the loss of a close friend would make a deep impression, particularly among young men. Particularly for the younger generation, it is very confronting to personally know someone who has AIDS. The implication is that media coverage of young men who have been infected with HIV after having sex with a male partner has a potentially positive effect on the sexual behavior of other young men. It is therefore recommended that such cues to action be used in safe sex messages to promote AIDS preventive behavior among younger gay and bisexual men.

Why did these signals not play the same role for older gay and bisexual men? The results showed that older men had lost even more friends because of AIDS than younger men. A closer inspection of the variance on "cues to action" indicates that the scores on this variable did not show less variance for older men, suggesting that this finding cannot be ascribed to a ceiling effect. When it comes to the decision to use condoms, older men (as opposed to younger men) were much more guided by their perception of the risk of unprotected sex and by the perceived prevalence of AIDS. Besides the fact that older men, because of their age, may have been confronted more often with the loss of a close friend who died of AIDS, it is conceivable that external signals played a less important role in the formation of the intention to use condoms because the cognitions that are related to the threat of AIDS were already internally activated.

The present findings thus point at two main reasons why there was an increase in the number of young gay and bisexual men engaging in unprotected anogenital intercourse (De Wit, 1994; De Wit *et al.*, 1993; Van den Hoek *et al.*, 1990). First, our findings indicate that younger men's perceptions of their vulnerability to HIV infection and of the

prevalence of HIV (as opposed to older men's) are not significantly related to their intention to engage in safe sex. This suggests that, among younger men, the main argument for HIV preventive behavior (i.e., vulnerability to HIV infection) did not operate as one would expect (i.e., vulnerability is not an important motive to use condoms). The reason may be the increased media coverage of AIDS in recent years. Second, the results showed that the perceived benefits of condom use *did* contribute to young men's intention to engage in this behavior. Thus, one may argue that the increase in the percentage of younger men engaging in unsafe sex was produced by a decrease in the number of benefits associated with condom use. This reasoning is speculative because we link the cognitions of our sample to the behavior of comparable (but not the same) samples who showed an increase in unsafe sex. One should, of course, be careful when using the present findings to explain the behavior of the Amsterdam cohort. However, the fact that the present study was conducted at the same time as the cohort study, and the fact that our participants were representative of the Amsterdam cohort seems to, at least partly, justify such a generalization.

One advantage of using the HBM in assessing determinants of condom use is the direct implications it holds for intervention design. Each component of the HBM is potentially modifiable using traditional health education strategies (Petosa and Jackson, 1991). For example, an educator may present several realistic strategies men can employ to encourage condom use during anogenital intercourse. These strategies may substantially reduce the perceived barriers to condom use. Another example, such as stressing that condoms prevent transmission of HIV and other STDs, or that condom use indicates that one is a responsible and caring person, could reinforce the perceived benefits of condom use. The present study indicates that such educational AIDS messages should be aimed particularly at younger men because young men's intention to use condoms (as compared to older men's) was much more determined by the perceived benefits of this behavior. It seems advisable to direct future research attention to specific beliefs that are related to condom use and anal sex among gay and bisexual men. Supplementary information about these attitudinal and control beliefs could provide a clear basis for health messages aimed at the promotion of safe sex.

The present study has some limitations. First, because it is, strictly speaking, not possible to deduce causal relationships from cross-sectional data, the results should be interpreted with some caution. Second, our sample size was rather small which may have resulted in unstable correlations and regression coefficients. Note, however, that the direction of all observed correlations corresponded with our theoretical predictions. This suggests a reasonably stable pattern in our findings. Furthermore, some of the HBM variables were measured by only a limited set of questions. For example, only two benefits of the recommended action (condom use), namely, "feelings of safety" and "preventing HIV infection", were assessed. There are, of course, several other benefits of condoms use that were not assessed, for example, preventing infection with other STDs and showing that you are a caring and responsible person. These limitations restrict the validity of our findings, and it is therefore desirable to cross-validate our modified HBM in future research.

Finally, it must be noted that the sample in the present study (like the Amsterdam cohort) is not representative of the whole Dutch gay and bisexual population. A large part of the sample was sexually active and had run certain risks of getting infected with HIV. No less than 38 percent of the participants had had a sexually transmitted disease at least once in their lives. Because behavioral change is particularly important among people who engage in unsafe sexual behavior, we think that the results of the present study are

particularly relevant. The present application of a modified version of the HBM to HIV preventive behavioral intentions has shown the importance of using a theory-based model in conducting health education research and provides preliminary evidence for differences between younger and older gay and bisexual men's determinants of the intention to practice safe sex.

#### Author's note

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