

College students' knowledge, beliefs and attitudes towards AIDS in predicting their safe sex behaviour

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معارف طلاب الكليات ومعتقداتهم ومواقفهم من الإيدز والسيو وسلوكهم الجنسي المأمون
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خلاصة: تم اختبار مدى قابلية تطبيق نموذج المعتقدات الصحية للتنبؤ بنوايا طلبة الكليات لاستخدام العوازل الذكورية، واستخدامهم لها فعلياً، والمعرفة ما إذا كانت مواقف هؤلاء الطلاب تجاه الإيدز ستؤثر على قراراتهم باستخدام العوازل الذكورية. وقد استجاب (282) من طلبة الولايات المتحدة الأمريكية لاستكمال الاستبيان ذي الإجابات المغلقة حول استخدام العوازل الذكورية، وذلك بعد استكمال استمارة دراسة استنتاجية ذات أسئلة مفتوحة الإجابات. وأجري تحليل تحوُّلي متعدد لتحديد القوة التنبؤية لمكونات نموذج المعتقدات الصحية. وتوضح النتائج فعالية استخدام هذا النموذج في تقييم مدى مأمونية ممارسة الجنس لدى طلبة الكليات. ومن مكونات نموذج المعتقدات الصحية نجد أن التلميح إلى القيام بالعمل؛ والحواسر والفوائد هي أكثر العوامل المنبئة قوة لكل من نوايا استخدام العازل الذكري والسلوك الفعلي لذلك، وهكذا فإن معتقدات الطلاب ومواقفهم من الإيدز لم تؤثر على قرارهم باستخدام العوازل الذكورية.

ABSTRACT We tested the applicability of the health belief model (HBM) in predicting college students' intentions to use condoms and condom use and to determine whether or not college students' attitudes toward AIDS would influence their decision to use condoms. United States university students (282) responded to a closed format questionnaire about condom use, following an elicitation open-ended survey. Multiple regression analysis was performed to determine the predictive power of the HBM components. Of HBM components, cue to action, barrier and benefit were the most powerful predictors of both condom use intentions and behaviour. Students' beliefs and attitudes toward AIDS did not influence their decision to use condoms.

Connaissances, croyances et attitudes des étudiants à l'égard du SIDA pour prévoir leur comportement sexuel sûr et responsable

RESUME Nous avons testé l'applicabilité du modèle des croyances en matière de santé pour prévoir les intentions des étudiants d'utiliser des préservatifs et l'utilisation des préservatifs ainsi que pour déterminer si les attitudes des étudiants à l'égard du SIDA influencent ou non leur décision d'utiliser des préservatifs. Des étudiants des Etats-Unis d'Amérique (282) ont répondu à un questionnaire fermé sur l'utilisation des préservatifs, suite à une enquête de révélation des opinions. On a procédé à une analyse de régression multiple pour déterminer la puissance prédictive des composantes du modèle des croyances en matière de santé. Parmi les composantes de ce modèle, les motivations, les obstacles et les bénéfices perçus étaient les prédicteurs les plus puissants des intentions d'utiliser des préservatifs ainsi que des comportements dans ce domaine. Les croyances et les attitudes des étudiants à l'égard du SIDA n'ont pas influencé leur décision d'utiliser des préservatifs.

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Introduction

Although college students in the United States (US) remain a small percentage of those who have developed AIDS in the US to date [1-3], the risk of HIV infection among this population is growing rapidly [4]. This is because a high number of these students engage in sexual behaviour that may eventually place them at risk of HIV infection [2,5-13]. Young college students may be susceptible to AIDS, because more teenagers than ever before are sexually active and engage in unprotected sexual activity [2,13-19]. Recent surveys in the US reveal that although up to 87% of US college students are sexually active, less than 20% report using condoms consistently [4,11,16,20,21]. Because of the long incubation period between being infected by HIV and developing AIDS (up to 10 years or more), it is difficult to determine how many US college students may already be HIV-positive [2,10,15,22]. However, recent studies have indicated that 1 out of every 500 US college students may test positive for HIV [1,23]. More recent research suggests that 1 out of 200 male college students in the US may be infected by HIV [10].

Surrogate evidence concerning young college students' risk of HIV infection is also available from statistics for other sexually transmitted diseases (STDs) among this group [16,24]. According to recent studies, about 12 million people become infected with STDs each year in the US [13,25]. Of those who infected with STDs, about two-thirds are younger than 25 years [13,26]. The STD infection rates among US college students are currently between 5% and 20%, and, on average, 5.5% of sexually active students reported to have had at least one episode of STD infection [7,9,27].

The current STD epidemic among US college students, along with the documented sexual risk-taking behaviour of this population, including high frequency of sexual intercourse, sex with different people and failure to use condoms, places college students at potential risk of HIV infection [4,11,20,21,23,28-31].

Recent reports suggest that among prevention strategies, sexual abstinence and a sexual relationship with one mutually faithful uninfected partner are the only totally effective prevention strategies for AIDS and other STDs [15,25,28,32,33]. As regards other strategies, since most US college students are sexually active and have multiple sexual partners [1,5,14], it is documented that, when used correctly and consistently, latex condoms can provide a high level of protection and reduce the risk of HIV infection and other STDs [2,7,25,34]. However, many studies have reported that despite having basic knowledge of AIDS and other STDs, the rate of condom use among the US college population is relatively low [9,12,17,32,35]. As already mentioned, less than 20% of US college students use condoms consistently during sexual intercourse [4,11,16,20,21,36].

Educational programmes are a potentially important method to enable US college students to make sound decisions about their risk of HIV infection [37]. Recent studies indicate that although most US college students are knowledgeable about AIDS and other STDs [4,12,16,20-22,38,39], only a small number of them reported to practise safe sex in an attempt to reduce their risk of HIV infection [15,18,29,40-43]. In general, the results of these studies indicate that knowledge alone is not sufficient to alter risk-taking behaviour or to encourage the practice of safe sex

[1,5,44]. Other studies support the concept that, in addition to information being readily available, a change in a person's beliefs and attitudes toward the consequences of performing a risky action must also occur for behaviour changes to follow [1,45-47].

There has been a substantial number of studies attempting to assess the US college population's AIDS prevention behaviour (e.g. condom use). There is, however, a lack of and difficulty in generating useful data highlighting the factors that influence US college students engaged in unsafe sexual activities which might possibly lead to HIV infection [5,16,22]. This is because most previous research on college students' use of condoms has been either descriptive in nature [5,16,22,36], or lacked a theoretical framework that could have identified factors associated with students' risk-taking behaviour [9,12,30]. Thus, there is a need for studies to identify and examine factors that can increase the likelihood that college students will adopt behaviour to reduce risk of HIV infection. One way to accomplish this is to apply health- and behaviour-related frameworks, such as the health belief model (HBM).

The purpose of the present study was twofold. First, to test the applicability of HBM concepts in explaining and predicting college students' intentions and condom use as the primary means of minimizing their risk of HIV infection. Secondly, to determine whether safer sex behaviour is related to students' knowledge, concerns or attitudes about AIDS. Based on the findings in the literature and according to the HBM concepts, we hypothesized that: 1) condom use intention and behaviour are related more to the intensity of perceived risk and attitude about AIDS than to the knowledge about this disease; 2) the HBM components could predict a high portion of variance in

both intention to use condoms and condom use.

Methods

Subjects

The participants in this study were 282 undergraduate students in a large midwestern university in the United States aged between 18 and 30 years. The subjects were selected from elective classes in the Department of Health Promotion and Human Performance as well as from the undergraduate first-aid classes during the latter part of 1996. These classes were selected because they represented a core group of health education courses required for many undergraduate students. The participants were selected regardless of their race/ethnicity, socioeconomic status, year in college, sex, or field of study.

Instruments

The AIDS knowledge and attitudes instrument used in this study was designed by the authors to assess the students' knowledge, attitudes and behaviour regarding AIDS and HIV infection. In order to construct the main instrument and to maximize its validity and reliability, a questionnaire was given to a pilot sample of 50 people to elicit their salient beliefs about safe sex practices (e.g. condom use). This questionnaire asked the respondents to list their attitudinal beliefs about their perceived susceptibility to and severity of AIDS and about the perceived benefits of and barriers to using condoms. The salient beliefs most frequently reported by the students (based on the Fishbein and Ajzen theory of reasoned action procedure [45]) were used to construct the final instrument. Based on these findings, the authors developed the items for the final closed format question-

naire. In addition, the knowledge and cue to action items were included in the main instrument through a comprehensive review of the relevant literature. The final version of the instrument was reviewed by an expert panel of six health education professionals to ensure conceptual clarity, factual accuracy and readability. To assess the internal consistency of the instrument items and following the factor analysis approach, a Cronbach alpha formula using Kuder–Richardson 20 (KR20) was applied to measure the reliability of the HBM components. Results revealed quite high reliability rates. By basing the final closed format instrument on student perceptions, a relevant and valid final instrument was virtually guaranteed. The final questionnaire consisted of 94 items.

Procedures

In order to test whether students' knowledge, beliefs and attitudes toward AIDS are likely to be translated into safer sexual behaviour, the questionnaire developed was applied to the selected subjects. Our study examined each of the HBM components in an attempt to identify those components that could be most effectively targeted by AIDS education programmes. Briefly, HBM major components include:

- perceived susceptibility: the person's sense of vulnerability to AIDS
- perceived severity: the person's feelings about the severity and seriousness of getting AIDS
- perceived benefit: the person's sense of whether using condoms is beneficial and effective in preventing HIV infection
- perceived barriers: the person's assessment of the negative aspects of and barriers to using condoms
- peripheral cue: variables (internal or external) that influence a person's condom use
- knowledge about the disease: a person's knowledge about AIDS.

The instrument was administered by several health educators with college level teaching experience. The students were read a brief statement explaining the purpose of the study and informing them that their participation was voluntary. Of the selected students, 19 (7%) declined to participate or turned in an uninterpretable survey, resulting in a 93% response rate.

Data analysis

An overall mean and standard deviation (SD) were derived for age, year in college, sex and race/ethnicity. Data analysis consisted of descriptive statistics including calculation of frequencies, mean scores and standard deviations for the items relevant to condom use as well as demographic variables.

In order to assess the construct validity of the instrument, factor analysis using the principal component method with varimax rotation was performed. A factor loading of 0.40 was used as the cut-off point for inclusion of items. After applying factor analysis, some items were dropped from the instrument because they did not sufficiently load on the intended subscale.

To determine the usefulness and the predictive power of the HBM components in explaining the college students' behaviour and intention to use condoms, multiple regression procedures were employed as the analytic tool to examine the relative and combined strength of all HBM variables. Multiple regression permitted us to examine the independent and simultaneous effects of HBM components (as predictor variables) on subjects' beliefs and attitudes to-

wards condom use intentions/behaviour (as criterion variables).

Results

Of the 282 students selected, 263 (93%) completed the questionnaire. Sex breakdown was 100 males (38%) and 163 females (62%). The sample used in the final data analyses ranged in age from 18 to 26 years (mean = 21.95 years, SD = 2.63).

Because of the small numbers of racial minorities in the sample, all minority group students including African-Americans, Hispanics and Asian-Americans were combined to make a "non-white" group. Of the total sample, 59 (22%) were non white and 204 (78%) were white.

An examination of the preliminary results revealed that a portion of the sample (30%) used condoms regularly during sexual intercourse. A quarter of the respondents reported that they did not use a condom because, for example, there was no condom available when it was needed, it was difficult talking about condom use, their belief that condom use reduces pleasure during sex.

Overall, 29% of respondents ($n = 76$) reported abstaining from sex at the present time, and only 22% ($n = 59$) indicated that they intended to abstain from sex for the next 6 months. With regard to the number of sexual partners and its association with sex and race, 23 of the white female students (8.7% of the total sample) reported they had no sexual partner at the present time, whereas only 6 of the non-white female students (2.3%) reported so. A majority of the students did not intend to abstain from sex or practise monogamy. In addition, of the respondents with the highest risk of AIDS ($n = 68$) (those who reported not using condoms or having multiple sex-

ual partners), 56 (82.4%) were white and 12 (17.6%) were non-white.

Knowledge of AIDS and HIV

The majority of the participants of the study were knowledgeable about AIDS and HIV, about risk-taking behaviour, the modes of transmission and the strategies to prevent HIV infection. The most noteworthy finding regarding the knowledge subscale, however, was that a significant portion of the respondents were not certain about the correct response to some items. For instance, 35% of the participants were not certain about the effectiveness of using a spermicide and being sexually abstinent in preventing HIV infection; 25% indicated that they believed there was either an effective medical treatment available for people with AIDS or a vaccine against the HIV infection. However, the vast majority of the respondents knew that intravenous drug abuse, sharing needles and having anal sex were effective ways of transmitting the HIV infection.

Susceptibility and severity of AIDS

When asked directly, a majority of the participants perceived a personal susceptibility to being infected with HIV if they used no condoms during sexual intercourse (65%). However, 17% indicated that they did not perceive a personal risk if they used no condoms. In addition, 14% of the participants reported that having multiple sexual partners and not using condoms would not put them at risk of HIV infection. Perceived susceptibility to being infected with HIV, therefore, was an important factor among the participants, explaining their use or neglect of condoms during sexual intercourse. In other words, those who believed that they could become HIV-infected were more likely to report to the use of condoms

than those who did not believe so. Furthermore, the more severe the AIDS problem was viewed, the more likely the respondents were to use condoms. In general the attitudes of the participants toward HIV/AIDS strongly influenced their use of condoms during sexual intercourse.

Barriers to and benefits of practising safe sex activity

The barriers to using condoms explained a small portion of condom use variance among the respondents of this survey. The most important barrier to using condoms reported by 22% of the participants was "being uncomfortable or inconvenienced during sexual intercourse". These results indicate that there might be other factors that may prevent college students from using condoms but the study failed to identify them. The only benefit of using condoms that the majority of the participants reported was that "using condoms would reduce their risk of getting AIDS".

Cue to action

A majority of the sample (52%) reported that they might use condoms during sexual intercourse in future as a result of the cues indicated by this study. For instance, 49% of the respondents reported that they would use condoms or limit their sexual partners if someone close to them got AIDS/STD, and 55% indicated that they would do so if someone close to them died of AIDS.

We were particularly interested in testing the predictive power of the HBM concepts in explaining variance in condom use. The multiple regression test was applied to examine the nature of the above relationships. Stepwise entry of the independent variables into the regression equation was used to display the variances explained by each independent variable. The results are

presented in Tables 1 to 4. These tables include only those predictors which were found to be significant at the level of 0.05.

The overall multiple *R* for intention to use condoms was 0.55, indicating that 30% of the variance in condom use intention was explained by the HBM components. Among the listed variables, *barrier* and *cue to action* were the most powerful predictors and accounted for 25% of variance in this dependent variable (Table 1).

Table 1 also shows the statistics for condom use with overall multiple *R* of 0.66, meaning that 43% of total variance in condom use was explained by the combination of listed HBM variables. Among the predictor variables, the combination of *benefit*, *barrier* and *cue to action* were the most powerful predictors explaining approximately 38% of the variance in condom use.

After controlling for the respondents' sex and race, multiple regression revealed somewhat different results (Table 2). The results in Table 2 indicate that the HBM variables explained a relatively higher rate of variance in condom use among males compared with females (36% compared with 28%), whereas the variables predicted a higher rate of variance on intention to use condoms among females compared to males (33% compared with 22%). The most powerful predictors to explain condom use among male students were *benefit*, *cue to action* and *barrier* explaining 32% of total variance. Among females, the most powerful predictors to explain this variance were *cue* and *barrier*, explaining 23% of total variance. This means that the HBM dimensions were less powerful indicators for explaining the variance for condom use among females compared with males.

Table 2 also includes the results of multiple regression on intention to use con-

Table 1 Standard regression coefficient (beta weight), multiple correlation coefficients (multiple R) and variance (R^2) when components of the health belief model are used to predict intention to use condom and condom use behaviour ($n = 263$).

Variable	Multiple R	R^2	R^2 change	Beta weight
Intention to use condom				
Severity	0.13334	0.01778	0.01778	-0.155391
Benefit	0.22344	0.04993	0.03215	0.178899
Barrier	0.42192	0.17802	0.12809	0.231091
Cue	0.55188	0.30457	0.12655	0.403762
Condom use behaviour				
Susceptibility	0.0939	0.0088	0.0088	-0.091444
Severity	0.1778	0.0316	0.0288	-0.15751
Knowledge	0.23712	0.0562	0.0246	0.043342
Cue	0.41937	0.1759	0.1197	0.18698
Benefit	0.55149	0.3041	0.1202	-0.23973
Barrier	0.6579	0.4328	0.1287	0.48695

doms for both sexes. For females, 33% of the variance in condom use intention can be explained by a combination of independent variables. *Cue to action* and *barrier* were the most powerful predictors, explaining 23% of the variance. Among males, 22% of total variance on condom use intention was explained by a combination of HBM variables. The most powerful predictors were *benefit* and *cue*, explaining 16% of the variance. The results of Table 2 indicate that the HBM components were accurate in predicting some portions of the variables explaining the intention to use a condom and condom use for both sexes. In other words, the health motives outlined in the HBM may affect differently the college students' decision to use condoms, depending on the person's sex. The observed differences in part indicate that female students are more likely to discuss condom use or to convince their male partners to wear a con-

dom than ever before. This might be due to the fact that AIDS is now spreading very fast among women, leading to high rates of perceived severity and susceptibility to AIDS reported by the female participants of other recent studies [33].

Table 3 is a breakdown of results for whites and non-whites. The overall multiple R for intention to use condoms for whites was 0.57, which explains almost 33% of the total variance. The most powerful variables were *cue*, *benefit* and *barrier*, which accounted for 31% of the variance. Among non-whites, overall multiple R for intention to use condoms was 0.34, accounting for 12% of total variance.

Table 3 also includes results on condom use for whites and non-whites. The overall multiple R for whites was 0.53, explaining 28% of total variance. The most powerful variables were *cue* and *barrier*, accounting for 20% of the variance. Among non-

Table 2 Standard regression coefficient (beta weight), multiple correlation coefficients (multiple R) and variance (R^2) when components of the health belief model are used to predict intention to use condom and condom use behaviour (based on students' sex)

Variable	Multiple R	R^2	R^2 change	Beta weight
Intention to use condom: males ($n = 100$)				
Barrier	0.1922	0.0369	0.0369	-0.178557
Knowledge	0.1926	0.0371	0.0002	0.061874
Severity	0.1975	0.0390	0.0019	-0.003381
Susceptibility	0.2571	0.0661	0.0271	-0.176666
Benefit	0.4027	0.1621	0.0961	0.311214
Cue	0.4724	0.2232	0.0611	0.263452
Condom use behaviour: males ($n = 100$)				
Severity	0.0508	0.0026	0.0026	-0.096896
Knowledge	0.1359	0.0185	0.0159	-0.177089
Susceptibility	0.2204	0.0486	0.0301	0.100530
Cue	0.5314	0.2824	0.2338	-0.439950
Barrier	0.5696	0.3245	0.0421	0.220164
Benefit	0.6039	0.3647	0.0421	-0.211074
Intention to use condom: females ($n = 163$)				
Severity	0.0875	0.0077	0.0077	-0.086198
Knowledge	0.0972	0.0094	0.0017	0.043342
Susceptibility	0.0976	0.0095	0.0001	-0.008893
Benefit	0.3080	0.0949	0.0854	0.308013
Cue	0.5264	0.2771	0.1822	0.481596
Barrier	0.5731	0.3284	0.0513	-0.230973
Condom use behaviour: females ($n = 163$)				
Benefit	0.1710	0.0293	0.0293	-0.185543
Susceptibility	0.2016	0.0406	0.0114	0.083763
Severity	0.2237	0.0500	0.0094	0.104460
Knowledge	0.2262	0.0512	0.0011	0.034707
Cue	0.4693	0.2202	0.169	-0.402966
Barrier	0.5259	0.2766	0.0564	0.246561

whites, the overall multiple R was 0.58, explaining 33% of total variance. The most powerful variables were *cue* and *barrier* accounting for 20% of the variance.

Table 4 shows the multiple regression results for condom use and intention to use condom adjusted for AIDS education. Regarding intention to use condoms, the HBM

Table 3 Standard regression coefficient (beta weight), multiple correlation coefficients (multiple R) and variance (R^2) when components of the health belief model are used to predict intention to use condom and condom use behaviour (based on students' race)

Variable	Multiple R	R^2	R^2 change	Beta weight
Intention to use condom: non-white ($n = 59$)				
Benefit	0.163	0.027	0.024	0.294
AIDS education	0.186	0.034	0.007	0.164
Sex	0.329	0.109	0.075	-0.140
Age	0.387	0.150	0.041	-0.394
Susceptibility	0.510	0.260	0.110	0.380
Severity	0.704	0.497	0.086	-0.334
Condom use behaviour: non-white ($n = 59$)				
Barrier	0.268	0.072	0.072	0.426
Evaluation	0.297	0.088	0.016	-0.575
AIDS education	0.645	0.415	0.158	-0.553
Cue	0.697	0.486	0.071	-0.699
Benefit	0.717	0.514	0.028	-0.149
Knowledge	0.757	0.573	0.059	-0.217
Susceptibility	0.767	0.589	0.016	0.780
Severity	0.814	0.663	0.074	-0.567
Intention to use condom: white ($n = 204$)				
Barrier	0.089	0.008	0.008	-0.105
Evaluation	0.491	0.241	0.233	0.295
Severity	0.515	0.265	0.024	-0.197
Cue	0.596	0.355	0.034	0.142
Benefit	0.631	0.399	0.044	0.261
Condom use behaviour: white ($n = 204$)				
Sex	0.096	0.009	0.009	-0.232
Age	0.181	0.033	0.024	-0.109
AIDS education	0.190	0.036	0.003	-0.075
Barrier	0.209	0.043	0.007	0.102
Susceptibility	0.210	0.044	0.001	0.105
Severity	0.215	0.046	0.002	0.099
Cue	0.283	0.080	0.034	-0.111
Evaluation	0.446	0.199	0.119	-0.396

Table 4 Standard regression coefficient (beta weight), multiple correlation coefficients (multiple R) and variance (R^2) when components of the health belief model are used to predict intention to use condom and condom use behaviour (based on students' AIDS education background)

Variable	Multiple R	R^2	R^2 change	Beta weight
Intention to use condom: received AIDS education				
Susceptibility	0.1640	0.0269	0.0269	-0.183981
Knowledge	0.1966	0.0386	0.0117	0.110175
Barrier	0.2724	0.0742	0.0356	-0.272353
Cue	0.4716	0.2224	0.1482	0.378022
Benefit	0.5163	0.2665	0.0441	0.243744
Severity	0.5515	0.3042	0.0377	-0.194647
Condom use behaviour: received AIDS education				
Severity	0.1238	0.0153	0.0153	0.080513
Knowledge	0.1275	0.0162	0.0009	-0.069355
Susceptibility	0.1914	0.0366	0.0204	0.152607
Benefit	0.3111	0.0968	0.0602	-0.281777
Barrier	0.3834	0.1470	0.0502	0.225953
Cue	0.4792	0.2296	0.0826	-0.479211
Intention to use condom: not received AIDS education				
Knowledge	0.0190	0.0004	0.0004	-0.158205
Susceptibility	0.0980	0.0096	0.0094	0.180090
Barrier	0.3940	0.1552	0.1456	-0.205125
Cue	0.5809	0.3375	0.1823	0.452963
Condom use behaviour: not received AIDS education				
Susceptibility	0.0124	0.0002	0.0002	-0.091732
Knowledge	0.3319	0.1102	0.1100	0.203960
Barrier	0.5512	0.3038	0.1936	0.351660
Cue	0.6219	0.3868	0.0829	-0.393315

components explained 34% of the variance for those who had not received AIDS education and 30% for those who had received AIDS education.

Table 4 also displays the multiple regression statistics for condom use. For individuals who had received AIDS

education, 23% of the variance on this dependent variable was explained by the combination of the HBM components. For those with no AIDS education background, 39% of the variance in condom use was explained by the HBM components.

Discussion

A particular strength of the present study is that it attempted to assess both the participants' intention to use condoms and condom use as the primary means of preventing HIV infection. In this regard HBM was applied in order to identify those components that could be most effectively targeted by AIDS prevention programmes in order to bring about behaviour changes in US college students.

A number of recent studies conducted on the college population in the US have documented that some young college students engage in behaviours that may increase their risk of HIV infection [13,20]. Among the reported risk-taking behaviour "not using condom consistently" and "having multiple sex partners" are reported most [17]. These studies also indicated that beliefs about the benefits of and barriers to using condoms were associated directly with condom use among young college students [31], as was shown by the present study.

In general, the participants in this study were knowledgeable about AIDS and HIV infection. They were able to identify the significant modes of transmission, the risk-taking behaviour, and the consequences of becoming infected with HIV. However, consistent with other studies on college students' sexual behaviour [3,48,49], our results indicate that some segments of the US college student population took risks that may make them more susceptible to HIV infection. About 25% of the participants in the study reported an unwillingness to use condoms, and over 10% reported they were unlikely to limit the number of sexual partners they had in order to reduce their risk of HIV infection. Moreover, only 30% reported using a condom every time they had sexual intercourse. Fi-

nally, among the white female students only 10% reported they intended to abstain from sex or to practise monogamy. The rate among non-white female students was even lower, only 6%. These abstinence rates roughly complement the rates of sexual activity found in previous studies [11,21,25,30,38].

These results suggest that providing information about the modes of HIV transmission and the consequences of developing AIDS may be minimally effective since education by itself does not appear to change unhealthy behaviour. Therefore, in addition to providing AIDS education, there is a need to implement effective HIV prevention programmes in order to overcome barriers to US college students' practising safe sex. Recent studies on AIDS prevention behaviour among the US college population identified some of these barriers to behaviour change, including a lack of perceived susceptibility to developing AIDS (not personalizing the risk), lack of communication skills to negotiate safe sex, low motivation for self-protection, lack of self-esteem. [5,13,19]. Similarly, our findings show that perceived susceptibility to developing AIDS was not among those variables which explained the students' condom use or intention to use condoms.

Based on these findings, a beginning would be to help all US college students better understand the facts about AIDS and to correlate the risk of this fatal disease with their own risk-taking behaviour. Otherwise, it appears that a portion of US college students may separate themselves from the problem by not personalizing the risk of HIV infection. In this regard, an AIDS-prevention programme should stress that anyone can get AIDS, regardless of sex, race, age, wealth, health or sexual ori-

entation. One practical strategy could be to provide informative presentations by college students who are HIV-positive. Some studies show that this method is useful in personalizing the AIDS risk and may eventually motivate US college students to practise safe sex [5,10,36].

In addition, the benefits of using condoms must be identified and discussed. Ideas must be generated for helping students to translate their beliefs and attitudes about AIDS into safe and responsible sexual activity. In this regard, an AIDS-prevention programme should establish a link between AIDS knowledge, the negative consequences of getting AIDS and other STDs, and condom use [50].

The findings of this study show that, in general, the HBM variables explained some portion of variance in both condom use and intention to use condoms among the students. The results clearly show that health-related factors outlined in HBM in part explained the variability of the students' decision to use condoms during sexual activity.

Conclusion

We applied HBM to assess college students' knowledge, beliefs and attitudes towards safer sex behaviour. Health-related motivations outlined in HBM explained some portion of variance in condom use and intention. It seems, therefore, that factors other than health concerns may have influenced the participants' decision to use or not use condoms during sexual intercourse.

Based on our findings, as has also been shown by other studies [11,13,28-30,41,50], before conducting AIDS educational intervention to alter risk-taking behaviour among young US college students, we need first to address the social, cultural and environmental forces and motives which may have immediate and direct impact on their personal health behaviour and practices regarding safer sexual activity. Next, we should look for methods to enhance communication skills, teach self-protection and investigate ways of creating a sense of vulnerability to AIDS. Further research may prove useful in this regard.

References

1. McGuire E et al. Sexual behavior, knowledge, and attitudes about AIDS among college freshmen. *American journal of preventive medicine*, 1992, 8(4):226-34.
2. Richwald GA, Friedland JM, Morisky DE. Condom sales at public universities in California: implications for campus AIDS prevention. *Journal of American college health*, 1989, 37:272-7.
3. Valois RF, Waring KA. An analysis of college students' anonymous questions about human sexuality. *Journal of American college health*, 1991, 39:263-8.
4. Hernandez JT, Smith FJ. Inconsistencies and misperceptions putting college age students at risk of HIV infection. *Journal of adolescent health care*, 1990, 11(4): 205-7.
5. Edgar T et al. Communicating the AIDS risk to college students: the problem of motivating change. *Health education research*, 1988, 3(1):59-65.
6. Jadack RA, Hyde JS, Keller ML. Gender and knowledge about HIV, risky sexual behavior and safer sex practice. *Research in nursing and health*, 1995, 18(4):313-24.

7. MacDonald NE et al. High-risk STD/HIV behavior among college students. *Journal of the American Medical Association*, 1990, 263(23):3155-9.
8. Nokes KM. Intervention to promote safer sexual behaviors and educating peers about HIV/AIDS. *Journal of nursing education*, 1996, 35(5):227-9.
9. Sawyer RG, Moss DJ. STDs in college men: a preliminary clinical investigation. *Journal of American college health*, 1993, 42:111-5.
10. Sheer CV, Cline JR. The development and validation of a model explaining sexual behaviour among college students. *Human communication research*, 1994, 21(2):280-304.
11. Taylor SE et al. A comparison of AIDS-related sexual risk behaviors among African-American college students. *Journal of the National Medical Association*, 1997, 89(6):397-403.
12. Turner JC et al. Reduction in sexual risk behaviors among college students following a comprehensive health education intervention. *Journal of American college health*, 1993, 41:187-93.
13. *White House: youth & HIV/AIDS 2000*. Washington DC, White House Press Office, 2000:1-36.
14. Brown LK, DiClemente RJ, Park T. Predictors of condom use in sexually active adolescents. *Journal of adolescent health*, 1992, 13(8):651-7.
15. Holtzman D et al. HIV instruction, HIV knowledge, and drug injection among high school students in the United States. *American journal of public health*, 1991, 81(12):1596-601.
16. McDonnell CB et al. AIDS, college students, and campus health services. *Health values*, 1992, 16(6):10-6.
17. Miret M et al. Conductas de riesgo relacionadas con la infección por el virus de la inmunodeficiencia humana en los adolescentes escolarizados en Cataluña. [Risk behaviors related with infection by HIV among adolescent students in Catalonia.] *Gaceta sanitaria/ G.C.P.A.G.*, 1997, 11(2):66-73.
18. Thurman C, Franklin KM. AIDS and college health: knowledge, threat, and prevention at a north-eastern university. *Journal of American college health*, 1990, 38:179-83.
19. Weinhardt LS, Carey KB, Cary MP. HIV risk sensitization following a detailed sexual behaviour interview: a preliminary investigation. *Journal of behavioral medicine*, 2000, 23(4):393-8.
20. Petosa R, Jackson K. Using the health belief model to predict safer sex intentions among adolescents. *Health education quarterly*, 1991, 18(4):463-76.
21. Shorokhov SSW, Poletaeva TA, Makarova LN. Formy i analiz rezul'tatov raboty po profilaktike VICH-infekstii sredi molodezhi. [The forms and analysis of the results of work in prevention of HIV infection among youth.] *Zhurnal mikrobiologii, epidemiologii, i immuno-biologii*, 1999, (1):89-91.
22. Fan PD, Shaffer CL. Use of open-ended assays and computer content analysis to survey college students' knowledge of AIDS. *Journal of American college health*, 1990, 38:221-9.
23. Strader MK, Beaman ML. Comparison of selected college students' and STD clinic patients' knowledge about AIDS, risk behaviors and beliefs about condom use. *Journal of advanced nursing*, 1991, 16:584-90.
24. Maxwell AE et al. AIDS Risk behaviors and correlates in teenagers attending STD clinics in Los Angeles. *Genitourinary medicine*, 1995, 71(2):82-7.
25. Selected behaviors that increase risk for HIV infection, other STDs, and unwanted

- pregnancy among high school students — United States. *Morbidity and mortality weekly report*, 1992, 41(50):945–50.
26. Grimley DM et al. Assessing the stages of change and decision making for contraceptive use for the prevention of pregnancy, STDs, and AIDS. *Health education quarterly*, 1993, 20(4):455–70.
 27. Keim J, Woodard MP, Anderson MK. Screening for *Chlamydia trachomatis* in college women on routine gynecological exams. *Journal of American college health*, 1992, 41:17–23.
 28. Ahia RN. Compliance with safer-sex guidelines among adolescent males: application of the HBM and PMT. *Journal of health education*, 1991, 22(1):49–52.
 29. Gilbert L, Alexander LA. Profile of sexual health behaviors among college women students. *Psychological reports*, 1998, 82(1):107–16.
 30. Whitley BE, Hern AL. Perceptions of vulnerability to pregnancy and the use of effective contraception. *Personality social psychology bulletin*, 1991, 17(1): 104–10.
 31. Yep GA. HIV prevention among Asian-American college students: does the health belief model work? *Journal of American college health*. 1993, 41(5): 199–205.
 32. Comstock KG. A peer educator STD prevention project for women students. *Public health reports*, 1994, 109(2):181–2.
 33. Jemmott LS. Applying the theory of reasoned action to AIDS risk behaviour: condom use among black women. *Nursing research*, 1991, 40(4):228–34.
 34. Risk assessment: consistent condom use prevents heterosexual transmission of the HIV [Editorial]. *Internal medicine world report*, 1995, 10:30.
 35. Lewis JE, Malow RM, Ireland SJ. HIV/AIDS risk in heterosexual college students: a review of a decade of literature. *Journal of American college health*, 1997, 45(4):147–58.
 36. Boyd B, Wandersman A. Predicting undergraduate condom use with Fishbein and Ajzen and the triandis attitude-behaviour models: implications for public health interventions. *Journal of applied social psychology*, 1991, 21(22): 1810–30.
 37. Peipert JF et al. Sexual behaviour and contraceptive use. Changes from 1975 to 1995 in college women. *Journal of reproductive medicine*, 1997, 42(10):651–7.
 38. DiClemente RJ et al. Comparison of AIDS Knowledge, attitudes, and behaviors among incarcerated adolescents and a public school samples in San Francisco. *American journal of public health*, 1991, 81(5):628–30.
 39. Rhodes F, Wolitski R. Effect of instructional videotapes on AIDS knowledge and attitudes. *Journal of American college health*, 1989, 37:266–71.
 40. Lipson JM, Brown LT. Do videotapes improve knowledge and attitudes about AIDS? *Journal of American college health*, 1991, 39:235–43.
 41. Manning D et al. Susceptibility to AIDS: what college students do and don't believe. *Journal of American college health*, 1989, 38:67–73
 42. Karl R, Stephens J. AIDS: knowledge, attitudes and reported sexual behaviour among students in West Glamorgan. *Health education journal*, 1991, 50(3): 128–30.
 43. Katzman EM, Mulholland M, Sutherland E. College students and AIDS: a preliminary survey of knowledge, attitudes, and behavior. *Journal of American college health*, 1988, 37:127–30.

44. Janz N, Becker M. The health belief model: a decade later. *Health education quarterly*, 1984, 11:1-47.
45. Fishbein M, Ajzen I. Changing the behavior of alcoholics: effects of persuasive communication. In: Ajzen I, Fishbein M, eds. *Understanding attitudes and predicting social behavior*. Englewood Cliffs, New Jersey, Prentice Hall, 1980: 217-42.
46. Rippetoe PA, Rogers RW. Effects of components of protection-motivation theory on adaptive and maladaptive coping with a health threat. *Journal of personality and social psychology*, 1987, 52(3): 590-604.
47. Rogers RW. Cognitive and physiological processes in fear appeals and attitude change: a revised theory of protection motivation. In: Cacioppo J, Petty R, eds. *Social psychophysiology*. New York, Guilford Press, 1983.
48. Oswalt R, Matsen K. Sex, AIDS, and the use of condoms: a survey of compliance in college students. *Psychological reports*, 1993, 72:764-6.
49. Walter JH et al. Factors associated with AIDS risk behaviors among high school students in an AIDS epicenter. *American journal of public health*, 1992, 82(4): 528-32.
50. Richter DL et al. Correlates of condom use and number of sexual partners among high school adolescents. *Journal of school health*, 1993, 63(2):91-6.

EMRO website for AIDS and Sexually Transmitted Diseases

We would like to draw our readers attention to the WHO EMRO website for AIDS and Sexually Transmitted Diseases. The website provides comprehensive information on the WHO AIDS and Sexually Transmitted Diseases Programme with a focus on regional and country situations, concerns, strategies and activities. The site includes the EMRO AIDS Information Exchange Centre, which aims to disseminate up-to-date, accurate and culturally adapted information on HIV, AIDS and sexually transmitted infections. The website can be accessed at: <http://www.emro.who.int/ASD/index.htm>