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A randomised controlled trial of peer-adult-led intervention on improvement of knowledge, attitudes and behaviour of university students regarding HIV/AIDS in Malaysia

Jahanfar S, Lye M S, Rampal L

ABSTRACT

Introduction: The aim of this study was to investigate the knowledge, attitudes and behaviour of university students regarding acquired immunodeficiency syndrome (AIDS) and the human immunodeficiency virus (HIV).

Methods: A randomised controlled trial of 530 university students was done using peer-adult facilitators. Participants completed a questionnaire before and after the intervention, which was a four-hour group session. A prevention programme was developed by local experts, health educators and peer facilitators. The peer-adult-led programme was designed to provide a conceptual model of HIV risk reduction through information, motivational and behavioural skills, a harm reduction module and health promotion theme.

Results: The main outcome measured was the level of knowledge, attitudes and behaviour scores. The results suggest that relative to the control group, participants in the intervention group had higher levels of knowledge (30.37 vs. 25.40; p-value is 0.001) and a better attitude (12.27 vs. 10.84; p-value is 0.001). However, there was no difference in the behavioural score (9.47 vs. 9.41; p-value is 0.530). The correlation between the level of knowledge and age and the level of education was found in the intervention group, but not in the control group (p-value is 0.01). Attitude and gender were found to be correlated in the intervention group only (p-value is 0.01).

Conclusion: Our programme was successful in increasing knowledge and improving attitudes towards AIDS and HIV. However, it did not improve risk-taking behaviour. Peer-adult-led educational programmes for youth using various interactional activities, such as small group discussions, poster activity and empathy exercises, can be successful in changing the prevailing youth perceptions of AIDS and HIV.

Keywords: acquired immunodeficiency syndrome, health education, human immunodeficiency virus, sexually-transmitted disease

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INTRODUCTION

The human immunodeficiency virus (HIV) epidemic in Malaysia is currently in a "concentrated epidemic" stage with a cluster of intravenous (IV) drug users, sex workers and adolescents being at a higher risk.[1-3] Cross-sectional studies on the level of knowledge of these clusters suggest that although the level of knowledge is high, unprotected sex and needle-sharing remain prevalent.[4-6] The data suggests that a high level of knowledge does not necessarily lead to safe behaviour. Zulkifli and Wong have reported that the level of knowledge for adolescents who attended school was 90% more than for those who did not. However, the depth of knowledge is questionable as not much information is introduced in school regarding sexual intercourse or HIV/acquired immunodeficiency syndrome (AIDS) transmission.[4] Narimah et al have shown serious gaps and misconceptions about HIV/AIDS.[7] Reid et al have suggested that subjects were aware that needles are a source of infection but did not know that sharing other injecting equipment can also transfer the virus.[8] These gaps and misconceptions need to be rectified for groups at risk, specifically for youth who are the building blocks of the future for every nation, have the ability to learn and the flexibility to change.

Department of Public Health, Royal College of Medicine Perak, Universiti Kuala Lumpur, 3 Greentown Street, Ipoh 30450, Malaysia

Jahanfar S, MSc, PhD
Fellow

Department of Public Health, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, Serdang 43400, Malaysia

Lye MS, MD, MPH, PhD
Professor

Rampal L, MD, MPH, PhD
Professor

Correspondence to:
Dr Shayesteh Jahanfar
Tel: (60) 12 436 4230
Fax: (60) 5 243 2636
Email: jahanfar2000@yahoo.com

Table I. Sociodemographic characteristics of UTP students in the intervention and control groups.

Sociodemographics	No. (%) of intervention group (n = 292)	No. (%) of control group (n = 238)	p-value
Gender			0.436
Male	160 (54.8)	133 (55.9)	
Female	132 (45.2)	105 (44.1)	
Race			0.293*
Malay	239 (81.8)	200 (84.0)	
Chinese	23 (7.9)	9 (3.8)	
Indian	1 (0.3)	6 (2.5)	
Others	29 (9.9)	23 (9.7)	
Education level			0.28#
Foundation	76 (26)	182 (76.5)	
Undergraduate	215 (73.6)	56 (23.5)	
Postgraduate	1 (0.3)	–	
Course of study			0.699
Civil engineering	32 (11.0)	37 (15.5)	
Electrical engineering	54 (18.5)	43 (18.1)	
Mechanical engineering	54 (18.5)	40 (16.8)	
Chemical engineering	88 (30.1)	68 (28.6)	
Information technology	16 (5.5)	14 (5.9)	
Information system	36 (12.3)	23 (9.7)	
Petroleum engineering	12 (4.1)	13 (5.5)	

*Race was divided into two categories (Malay and non-Malay) as the number of subjects was less than 5 in each cell when computing chi-square using cross-tabulation.
#One record (postgraduate student) was deleted before cross-tabulation was computed.

Sex education is conducted in Malaysian schools on a small scale through non-governmental organisations (NGOs) and it has not been formally introduced as a part of the curriculum. A recent study by the first author suggests that even small-scale studies in schools can greatly enhance students' knowledge of risk factors relevant to HIV/AIDS.[9] Policy-makers believe that introducing sexual health issues in schools may lead to negative perspectives and may encourage students to start engaging in sexual activities outside of marriage. Similarly, university students who are not exposed to sexual health education in a broad spectrum are left vulnerable to risky behaviours. Moreover, the media sends confusing messages to our youth, encouraging them to adopt a fashionable lifestyle of "freedom in sex". At the same time, the strong family structure of Malaysian cultures and beliefs teaches them to dress properly and act responsibly. Out-of-marriage sex is considered a sin. University students who often have to live far away from their families, experiencing for the very first time the taste of independence, may not find the challenge an easy task. Peer pressure may entrap them and lead to undesirable and risky situations.

Since neither a cure nor an effective vaccination has yet been developed, primary prevention remains the key to curbing the HIV epidemic among adolescents. Preventive programmes should focus not only on knowledge enhancement but also on behavioural change to encourage safer behaviour, such as abstinence or consistent condom use. Although several studies suggest that behavioural interventions can reduce adolescents' self-reported HIV risk-associated sexual behaviour, it is not clear which behavioural intervention is the most effective.[10,11] Intervention should engage peer facilitators to enhance its effectiveness and employ professional adults to convey the correct information. An effective intervention should be tailored according to the sociodemographical characteristics of the target group, such as age, religion and culture. The objective of this study was to test the effectiveness of a peer-adult programme with the above-mentioned characteristics.

METHODS

This study's hypothesis was that students randomised to the intervention would show improved knowledge, as well as safer attitudes and behaviour. Ethical approval was obtained from the Universiti Putra Malaysia (UPM) Ethical Committee. The field of study was Universiti Teknologi Petronas (UTP) in Perak, Malaysia. Permission to conduct the study was granted by the Ministry of Health, Ipoh Branch and UTP authorities.

With $\alpha = 0.05$, two-tailed, a total sample of 530 participants completing the trial was projected to provide a power of 80% to detect a 1.67 standard deviation (SD) difference in the level of knowledge between the intervention group and the control group. A series of analyses of variance and chi-square tests on sociodemographical characteristics and baseline measures were conducted to ensure that random allocation was successful. The effectiveness of the intervention

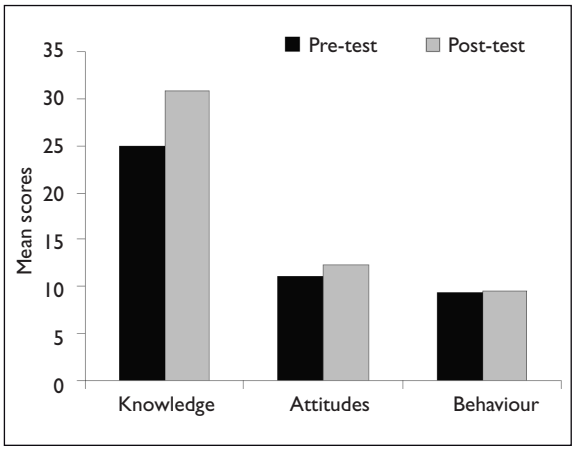

Fig. 1 Bar chart shows the comparison between the means of knowledge, attitudes and behaviour scores before and after the intervention in the intervention group (n = 292).

was assessed by comparing the knowledge, attitudes and behaviour of the intervention group with that of the control group using the paired *t*-test. Differences between the pre-test and post-test of the intervention group and those of the control group were also compared using the paired *t*-test. Correlations were computed between the quantitative variables using the Pearson's test.

The sampling technique for this study was a combined one inclusive of proportional sampling for each department and simple random sampling. A sampling frame of six departments in UTP was obtained. Subjects were randomly selected for each group proportional to the registered number of students in each department. Allocation into either the intervention or control group was done via a computer-generated random number sequence. Random sampling and allocation were double-blinded. Students were invited by peer facilitators via an invitation letter sent to their hostels. They were encouraged to attend the intervention through various media, viz. intranet, student services, lecturers and campaign.

Data was collected using a 74-item questionnaire, once before intervention and another immediately after intervention. The questionnaire was designed by the authors after an extensive literature review, brainstorming and getting ideas from experts. All questions had been pilot-tested to ensure their clarity and simplicity. The completed questionnaire was checked for consistency and completeness before it was used. It was divided into three broad sections: knowledge concerning AIDS/HIV (36 items) (including its symptoms, sources and modes of transmission); beliefs and attitudes (20 items) (origin, people, role of society, etc); and risk-taking behaviours (18 items) (drug use and sexual behaviour). Sociodemographic characteristics (ten items) were recorded at the pre-test stage. Level of knowledge and score of behaviour were respectively categorised into three categories: low, medium and high level of knowledge, and no risk, low risk and high risk behaviour, using mean ± one and two SDs, while the score of attitude was categorised into two major groups of bad or good attitude using the mean as a cut-off point. Participants were required to read a fact sheet about the study and sign an agreement to participate in the study. During the tests, they were seated apart from one another to ensure the confidentiality of their answers. They were reminded to respond honestly as the information would be used for the development of educational materials for the adolescents' benefit. Confidentiality was assured as the students did not have to record their names on the questionnaire; rather, the same unique code number for each student was used for the pre- and post-tests so that the data could be linked. The questionnaire was collected by the peer facilitators rather than the adult instructors.

A modified intervention was used, after obtaining permission from the author of the Health Improvement Project Intervention Manual.[12] It consisted of four conceptual foundations, viz. information-motivation-behavioural skills models of AIDS risk-reduction, motivational enhancement approach, harm reduction models and a health promotion theme. The designed intervention was desensitised according to the cultural and religious backgrounds of Malaysians. Religious teachings were emphasised to encourage abstinence. However, as it is acknowledged that abstinence may not always be feasible, harm reduction principles to reduce the risks of HIV infection, such as condom use, were also promoted. Intervention was designed to enhance knowledge of HIV/AIDS, strengthen behavioural beliefs supporting abstinence and increase self-management skills regarding the ability to identify dangerous situations, negotiate abstinence or practise safe sex, resist peer pressure to have sexual intercourse or abuse drugs. The safer sex intervention promotes abstinence before marriage as the first (and best) choice, in keeping with religious beliefs; however, if the student decides to engage in sexual activities, the importance of condom use was emphasised to reduce the risks of HIV infection, pregnancy and other sexually-transmitted diseases.

Intervention was pilot-tested by both adult and peer facilitators on a group of student leaders and facilitators from the study population who were not involved in the actual study. Each intervention consisted of four hours of lecture and other activities conducted on a

Table II. Comparison between pre-test and post-test results of the intervention and control groups for level of knowledge, attitude and behaviour scores.

Variable	Pre-test (n = 238)		p-value	Post-test (n = 238)		p-value
	Intervention gp	Control gp		Intervention gp	Control gp	
Level of knowledge	24.74 ± 4.79	24.39 ± 4.582	0.405	30.70 ± 2.65	25.40 ± 4.29	0.000
Attitude score	10.95 ± 2.63	10.81 ± 2.81	0.561	12.27 ± 2.71	10.84 ± 3.22	0.000
Behaviour score	9.42 ± 1.24	9.28 ± 1.27	0.229	9.47 ± 1.29	9.41 ± 1.22	0.530

Table III. Mean and standard deviation of differences between pre- and post-tests of the intervention and control groups for knowledge, attitude and behaviour scores.

Variable	Mean ± SD intervention group	Mean ± SD control group	p-value
Difference between knowledge levels	5.96 ± 4.49	1.01 ± 2.60	0.000
Difference between attitude scores	1.30 ± 2.51	0.01 ± 2.8	0.000
Difference between behaviour scores	0.12 ± 1.17	1.25 ± 1.01	0.933

Saturday morning or afternoon with a 20-minute break in between. The sessions were designed to be educational but entertaining as well as culturally relevant. Activities included small group discussions, games, brainstorming, experimental exercises, skill-building activities and role play. Each intervention was highly structured and was implemented by adult educators (n = 8) with medical degrees or a specialty in public health as well as peer facilitators (n = 6) who operated in smaller groups, providing advice or answering queries. Peer facilitators were also responsible for conducting comedy pantomimes, empathy exercises and poster activities. The theme for the intervention workshop was "healthy lifestyle". The peer educators were recent graduates of UTP or UPM and had the experience of being student leaders or facilitators. The selection of peer educators was based on recommendations from university authorities and interviews. Both adults and peer facilitators attended three series of intensive training workshops over two days. The objectives of these training workshops were to familiarise trainers with the programme and to teach them the basic skills of facilitating small groups and conducting brainstorming and role playing sessions. A training manual was prepared to assist both adults and peer facilitators with the intervention implementation. Facilitators were monitored during each intervention to ensure that they delivered the same information to all the groups. The facilitators of the control group also received four hours of training in two sessions with a 20-minute break at the same time and location, but the training was on career improvement, which comprised four lectures on how to build up one's skills for job hunting, how to write a curriculum vitae, how to look for a job and how to prepare for an interview.

RESULTS

530 subjects attended the programme, 292 in the intervention group and 238 in the control group. The mean and SD age of participants in the intervention group was 19.96 ± 1.69 (range 17–27) years. Using Student's *t*-test, there was no significant difference between the mean ages of the two groups (p = 0.966). The mean and SD pocket money for the intervention group was 453.86 ± 115.42 Malaysian Ringgit (RM) (1 USD was equivalent to RM 3.5 at the time of the study), while that for the control group was RM 440.04 ± 109.46. There was no statistically significant difference between the two groups in terms of average pocket money (p = 0.176), cigarette smoking (p = 0.256) or alcohol consumption (p = 0.347). Table I compares other sociodemographic aspects of the intervention and control groups.

The results show that 57.4% of subjects had a high level of knowledge, while only 17.2% had a low level. 53.6% of subjects had a bad attitude towards HIV/AIDS and 46% showed a good attitude. The majority (91.9%) exhibited low-risk behaviour (one out of five risky behaviours), while only 1% exhibited high-risk behaviour. 2% claimed to have tested positive for HIV. Tobacco use was 21.2%, alcohol consumption was 9.7% and the use of other drugs, such as ecstasy, cannabis and amphetamine, was rare. 1.7% reported experimenting with IV drug use while no needle sharing was reported. 0.6% reported having been overdosed before or having seen someone with the condition. The most common reasons given for taking drugs were peer pressure (63.9%) and lack of guidance (23.9%). Risk-taking behaviour was rare among UTP students. 91.9% (475/517) of students exhibited no risky sexual behaviour, 7.2% (37) of students were at low risk and 1% (5) was at high risk. The majority (97.7%,

Table IV. Comparison of the responses to two open-ended questions about HIV/AIDS between the intervention and control groups.

Question and categorised answers	No. (%) intervention group	No. (%) control group	p-value
When did you hear about HIV/AIDS?			0.005
During:			
Childhood	27 (15.3)	30 (17.4)	
Primary/secondary school	88 (50.0)	109 (63.4)	
High school	61 (34.7)	33 (19.2)	
Total	176 (100)	172 (100)	
How did you hear about HIV/AIDS?			
From:			0.766
School/university	31 (12.1)	21 (10.4)	
TV/Internet/video	156 (60.7)	130 (64.4)	
Healthcare services	29 (11.3)	22 (10.9)	
Parents	9 (3.5)	5 (2.5)	
Family and friends	10 (3.9)	4 (2.0)	
Books/newspapers/advertisements	22 (8.6)	20 (9.9)	
Total	257 (100)	202 (100)	

511/523) of the students did not report any sexual activity during the last 12 months, while the remaining 2.3% of students reported sexual activity during this period. Eight out of 12 of these students were male.

In order to ensure that randomisation and allocation were done correctly, a comparison was made between the level of knowledge, attitudes and behaviour of both groups before the intervention. Table II shows no significant difference between the pre-test results of the intervention and control groups, most likely due to the randomised selection of the students. After the intervention programme, post-test results showed a significant difference between the two groups for the knowledge ($p = 0.000$) and attitudes ($p = 0.000$) scores, while no difference was found between the two groups for the behaviour score ($p = 0.530$) (Table II). This showed that the intervention had been successful in increasing the level of knowledge and had resulted in a better attitude towards HIV/AIDS, while there was no observable change in the students' behaviour. Comparing the mean of the knowledge level within the intervention group before (25.03 ± 4.63) and after (30.90 ± 2.57) the intervention, a significant difference was observed ($p = 0.000$). Similarly, using the paired *t*-test, the total score for attitude was significantly increased after the intervention – from 11.11 ± 2.59 before to 12.38 ± 2.62 after the intervention ($p = 0.000$). On the other hand, a comparison between pre- (9.43 ± 1.25) and post-test (9.53 ± 1.19) scores of behaviour did not show any significant difference ($p = 0.111$), using the Wilcoxon signed-rank test.

Within the intervention group, the mean level of knowledge for undergraduate students was found to be significantly higher (25.46 ± 4.30) than that of the foundation group (23.88 ± 5.31) ($p = 0.01$). Students with a higher level of knowledge were also older ($p = 0.01$). Attitude scores and gender were found to be correlated ($p = 0.01$). No significant correlation was found for any two other quantitative variables between the intervention or control groups.

Two newly-created variables were: the difference between the pre-test and post-test scores of the intervention group, and the difference between the pre-test and post-test scores of the control group. Paired *t*-test was then performed between these two variables. There was a significant difference between these two variables ($p = 0.000$), where the mean ± SD of the first variable was 5.96 ± 4.49 and that of the second variable was 1.01 ± 2.60. The same comparisons were made for the attitude and behaviour scores (Table III), where the attitude scores were significantly higher in the intervention group than in the control group ($p = 0.000$). This difference was not seen in the behaviour scores.

98.7% of students responded positively to the question, "Have you heard of HIV/AIDS?" Only five students (0.9%) had not encountered these terms. There were two open-ended questions on the questionnaire; viz. "When did you hear of HIV/AIDS?" and "How did you hear of HIV/AIDS?" For the first question, a significant difference between the control and intervention groups was observed ($p = 0.005$); 63.4% (109/172) of subjects in the control group had heard of HIV/AIDS in their primary or secondary school as opposed to 50% (88/176) of students in the intervention group. For the second question, there was no significant difference found between the two groups ($p = 0.766$). The media, such as television, the Internet and video, was the most common form of information transfer for UTP students (62.3%). 11.3% quoted healthcare centres, including hospitals, clinics and educational activities conducted by the Ministry of Health, as a source. Having heard of HIV/AIDS via parents (3.1%) and family and friends (3.1%) were found to be negligible (Table IV).

DISCUSSION

This study examined the impact of the HIV/AIDS prevention programme through peer-adult education among university students. The effectiveness of this programme was assessed by measuring the knowledge, attitudes and intention to practise abstinence or safer behaviours with regard to sexual activities and drug use. Greater changes were observed in the intervention group compared to the control group. Changes were observed in the level of knowledge and attitudes but not in behaviour. Comparing the post-test results of the two groups showed a significantly higher level of knowledge (30.37 vs. 25.40) ($p = 0.000$) and better attitude (12.27 vs. 10.84) for the intervention group, but no significant difference for behaviour (9.47 vs. 9.41) ($p = 0.530$). Many studies evaluating sex education programmes in developed countries variously found the programmes to be effective,[11-15] partially effective,[16-19] ineffective,[20,21] unclear[22,23] or even harmful.[24] Comparison of our data with that of the developed countries might not be feasible as sociodemographic characteristics in developed countries are different.

In developing countries, a positive effect of interventional programmes has been reported by the majority of studies.[25-29] Abolfotouh, however, reported a failure in the change of subject knowledge after a 45-minute lecture-formatted module was conducted.[30] The failure of the educational intervention to enhance students' knowledge about AIDS may reflect the insufficiency of a one-session lecture provided in isolation from a comprehensive AIDS curriculum. Although a controlled study of the preventive effect of peer education was done in Turkey using a single-session educational lecture on HIV/AIDS, the knowledge and attitudes showed a significant change among university students.[29] Perhaps adding the element of peer education was the key to success in this study. The majority of the above-mentioned studies agree that every intervention has to be tailored according to the sociodemographic characteristics of the target population.[31] For a sensitive topic such as HIV, this is not a surprising finding.

Successful interventions have used health educators,[29] teachers[30] as well as peers[27] to design an effective module. Our study benefited from the contributions of all these subgroups to design a culturally- and religious-sensitive module targeted towards Malaysian students. Klepp et al's study, as an example of a successful programme, is similar to ours in terms of adopting various activities, such as making posters, small group discussions, performing songs and other feasible activities.[26] It seems that using activities and concentrating on small groups can enhance the effectiveness of the intervention. It was therefore our intention to create an interesting and attractive programme out of the usual framework of boring lectures to draw students' attention and participation. Unlike Fitzgerald et al's study, our results did not show any significant change in behaviour.[24] It is worth noting that Fitzgerald et al concentrated on condom use, while risk-taking behaviour in our study included a combination of sexual activity and drug use.

This study showed a positive correlation between the age and level of knowledge ($p = 0.01$). The mean level of knowledge for undergraduate students was found to be significantly higher (25.46 ± 4.30) compared to that of the foundation group (23.88 ± 5.31) ($p = 0.01$). This finding suggests that foundation students (freshmen) do not know much about HIV but gradually pick up this knowledge from their peers or through other modalities. However, it is not clear if the information is correctly and accurately given and received and if bad judgments and wrong decision-making regarding sexual behaviour are also passed along from one generation of students to the next. This raises the question of the right time to start sexual education. Siegel et al have suggested that the most appropriate time for intervention implementation is during early adolescence, before the onset of risky behaviours.[32] This quasi-experimental study, which was done on a large group of middle school and high school students ($n = 4,001$), found that subjects who are already sexually active at pre-test were less likely to show a positive interventional effect. The risky behaviour score was low in our study population, making it suitable for engaging students in an effective preventive programme.

Sexual activity was found to be low among our study population. In 1986, Low conducted a study among 1,200 15- to 21-year-old unmarried Malaysians in Kuala Lumpur, the capital of Malaysia, using face-to-face interviews on sexual knowledge, attitudes and behaviour.[33] The result suggested that 20% of adolescents had had sexual intercourse, where 93% were boys and 7% were girls. Comparing the rate of sexual activity between UTP students and students from other neighbouring countries revealed interesting results. 11% of 804 students from four public high schools in the Philippines reported having had intercourse, with a higher rate among males ($p = 0.001$).[27] The rate of sexual activity among our target population is quite low compared to other developed countries, such as the USA, where sexual activity was reported to be 89% among

college students.[31] As for studies conducted on other continents, a study in Zimbabwe on sexual behaviour found that out of 511 male students between the ages of 11 and 19 years, 37% had experienced sexual intercourse, of which up to 63% had had more than one partner.[34] Teenagers in Gambia were more sexually active (73% of the married boys and 28% of the unmarried girls), as were those in the 17 years age group in Nigeria (60% of boys and 38% of girls). In Taiwan, however, the figures were more conservative, with only 4% having experienced sexual intercourse between the ages of 15 and 21 years.

Another finding in this study suggests that sexual risk-taking behaviour was higher among boys than girls ($p = 0.01$). On the whole, adolescent girls engage in much less sexual activity than adolescent boys. One reason for this is undoubtedly the double standard of morality that threatens females with much harsher consequences for sexual infractions than males. Parents' role in teaching sexual behaviour can be of immeasurable value, yet most studies including this one verify that parents play almost a negligible role in the sexual education of their adolescents. Aspy et al studied the role of parental communication and instructions to their youths concerning sexual behaviour in a community-based sample of 1,083 13–17-year-old teenagers.[35] He concluded that parents have the opportunity and ability to influence their children's decisions on their sexual behaviour. In his study, youths were much less likely to have initiated sexual intercourse if their parents taught them to say no, set clear rules, talked about what is right and wrong, and about delaying sexual activity; if these youths were sexually active, they were more likely to use birth control.

In conclusion, our study module was found to be an effective one in enhancing the level of knowledge and improving the attitude of youths. However, it did not improve their risk-taking behaviour. Comparing various modules of intervention suggests that an effective module should start in early adolescence before sexual activity is experienced. Peer educators and adult healthcare specialists should be involved in the facilitation and design of the modules. More interactive activities, such as small group discussions, poster activities and empathy exercises, held for a longer period of time, may produce more successful results. Our study module included most of the above characteristics, which may be the reason for its success. One limitation of our study was that we did not follow-up on the subjects to measure the long-term effects of this module on their level of knowledge, attitudes and behaviour. Future studies should be conducted to check on the effectiveness of this intervention over a longer period of time. Another limitation was the study design of having one long single session lasting four hours, rather than multiple shorter sessions, which have been shown to be successful in improving behaviour. A long single session could lead to a decrease in learning due to the short concentration span, tolerance or comprehension ability of some students. It is therefore recommended that future studies hold multiple shorter sessions of interventions to improve risk-taking behaviour.

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