原 著

Knowledge, attitude and practice on human immunodeficiency virus type 1 infection among new entrant university students in Taiwan

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Objectives: By the end of 2004, there were 403 students infected with human immunodeficiency virus type 1 (HIV-1) reported to Taiwan's Center for Disease Control. The objective of this study was to understand the knowledge, attitudes and practice regarding HIV-1 and acquired immunodeficiency syndrome (AIDS) among new entrant (freshman) university students in Taiwan. **Methods:** A cross-sectional study was conducted in September 2004. Self-administered questionnaires from 11,847 students of nine universities were collected and analyzed. **Results:** The mean knowledge score was high-86.8. Regarding attitude, 42.2% of students would avoid contacts with HIV/AIDS patients; and 13.6% felt embarrassed if one of their family members had AIDS. The attitude scores of the students did not correlate with the knowledge scores (Pearson correlation: 0.182 and 0.074 for male and female students, respectively). Students identified both school and television as the main sources of information. The sexual orientations were 93.3% heterosexuals, 1.1% bisexuals and 0.5% homosexuals. The mean age of first sexual intercourse was 17.1 (SD±1.5). Among 1,179 (10%) students who had sexual experiences, only 30.9% used condoms consistently. In addition, 9.9% were alcohol consumers and 157 students (1.3%) were illicit drug users which including 10 injecting drug users. Students obtained drugs mainly from friends (58.6%), in pubs (45.2%) and at school (21.6%). This is a significant finding. **Conclusions:** There were knowledge gaps and many misconceptions about transmission routes of HIV-1. More AIDS education including anti-drug information should be provided to high school students in Taiwan. (*Taiwan J Public Health. 2007;**26(4)**:324-337*)

Key Words: HIV/AIDS, Knowledge, Attitude, Practice, Students

INTRODUCTION

The HIV/AIDS pandemic is one of the most important and urgent public health challenges to governments and civil societies around the world. Adolescents are in the centre of the pandemic and they are vulnerable in terms of transmission[1]. It has been estimated that 30% of the 40 million people living with HIV/AIDS were in the 15-24 years old[1]. The vast majority of young people who are HIV positive do not know that they are infected, and few young people engaging in sex know the HIV status of their partners.

The importance of focusing on young people has been recognized at a global level by the 2001 UN General Assembly Special

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Session on HIV/AIDS which endorsed a number of goals for young people to strengthen education, including peer education and youth-specific education, and services necessary to develop the life skills required to reduce their vulnerability to HIV infection. Moreover, many studied have shown that education is an important route to prevent the HIV/AIDS epidemic[2,3]. In Taiwan, most young people aged 15-24 years are students. Students play a pivotal role in combating the HIV/AIDS pandemic since they are easy to reach, and HIV/AIDS education is easy to implement on university campuses.

In Taiwan, the first AIDS patient was reported in late 1984. By the end of 2006, 13,702 individuals (including 599 foreigners) had been reported as infected with HIV-1 to the Centers for Disease Control of Taiwan. There were 508 (3.8%) students and people with ages between 20 and 29 were the most affected groups by the AIDS epidemic in Taiwan, accounting for 5,000 cases (38.2%)[4]. Despite these low reported cases, it is feared that the HIV/AIDS situation in Taiwan may be more dramatic than officially published data indicate. In Taiwan, sexual contact is one of the major routes of HIV transmission. Taiwan' s Department of Health has promoted media campaigns recommending safe sexual behavior, yet the epidemic is progressing despite these efforts.

In this study, we conducted a survey among new entrant university students in Taiwan. Since they were new university entrant students, the results reveal the knowledge, attitude and risky behaviors of high school graduates nationwide without the influence from the peer. Therefore, the sampling strategy of this study is novel and the results will be useful for the planning of future educational program on AIDS.

MATERIAL AND METHODS

An anonymous cross-sectional study was conducted in September 2004 in Taiwan. All of 161 universities in Taiwan were classified into the following 4 groups: private, public, professional and medical schools. The target population was new entrant students and comprised of an approximate total of 164,341 students. Nine out of the 161 universities were selected based on the numbers of students and their locations to make up the study population. The data were collected through the schools administrative offices during the students' orientation day in order to avoid peer influence. We deliberately chose new entrant students because we believe they are more likely to engage in sexual intercourse given that they have more freedom upon leaving their parents for universities. Thus, we could also indirectly measure their high school knowledge about HIV/AIDS.

The questionnaire was self-administered. A board of six professors reviewed the questionnaires. Content validity was established by approval of a majority of experts. Only 12 close-ended and open-ended for responsible for students Councils and 56 questions for students were judged as valid and included in the study. The KAP questionnaire covered the following issues: students' demographic data, knowledge about various aspects of HIV/AIDS, attitudes towards HIV infected people, and practice. The questions of this section were administered to 20 students of the same age as the target group in one university. Then, the questionnaire form was revised for clarity to the final form. Students were fully informed that their participation was voluntary. The Cronbach's alpha was calculated to assess the internal consistency of the knowledge and attitude questions and the values were 0.46 and 0.61, respectively. The research design received

approval from the Ministry of Education of the Republic of China. In addition, the Ministry of Education provided a grant and instructed Universities to cooperate with researchers.

Twenty-five knowledge questions were answered using the options "true" and "false." A total score for knowledge was obtained by adding the points given for each answer. For each correct answer, 4 points was assigned, therefore, full score for knowledge part is 100. The attitude score was computed using the categories: SA, strongly agree; A, agree; N, neutral; D, disagree; SD, strongly disagree. Scores 1 to 5 were assigned to SD, D, N, A and SA, respectively if the answers demonstrate positive attitude. The sum makes up the total scores which ranged from 15 to 75. A higher score indicates more positive attitude towards HIV/AIDS.

The data were analyzed using the Statistical Package of Social Sciences (SPSS 11.0). Open-ended questions were analyzed manually. The data were assessed by Chi square test, analysis of variance and Pearson correlation test.

RESULTS

Socio-demographic data of the participants: A total of 11,847 students (response rate 82.2%) from nine universities answered the questionnaire. Among them, 6,009 (50.7%) were male and 5,758 (48.6%) were female. Eighty participants did not specify their gender. The mean age of the subjects was 18.7 ± 1.1 years old and the range was from 15 to 39 years old. The distribution of the educational levels of their parents was as follows: primary school (9.0%, 12.8% for father and mother, respectively), junior high school (15.2%, 18.1%), senior high school (38.4%, 44.0%), university (30.0%, 21.7%) and graduate school (5.9%, 2.0%).

Knowledge of HIV/AIDS: The majority of students had accurate knowledge about HIV/AIDS, with 63.2 to 99% students correctly answering each question (Table 1). The mean knowledge score was 86.8. However, there was a knowledge gap concerning the definition of the AIDS acronym. Indeed, 36.7% of respondents failed to give the correct answer. 36.8% were unaware that oral sex carries risk for transmitting the AIDS virus and 26.9% supported that keeping in good physical condition is the best way to prevent exposure to the AIDS virus. There was misconception on the transmission routes of HIV-1 infection, e.g., 23.5% of students believed that the AIDS virus can be transmitted via mosquito bites. Female students showed significantly higher knowledge levels than the male students (Table 1). The mean knowledge scores for students from public, private and technical universities were 88.4 ± 8.8, 87.2 ± 7.8 and 83.2 ± 9.0, respectively ($p < 0.001$). A positive linear association was found between students' knowledge levels and their father's education level. A similar situation was found with their mother's education level. However, negative association occurred at the mother's highest education level (Figure 1a). When combining both parents` education levels and comparing that with the student's knowledge, there was a significant difference between the groups (Father low & Mother low vs. Father high & Mother high, and Father low & Mother high vs. Father high & Mother high, ANOVA test, $p < 0.0001$) (Figure 1b).

Attitude toward HIV/AIDS: As shown in Table 2, most students had a relatively positive attitude. The mean attitude score was 56.2 ± 5.2 (the total score is 75). 64.1% of respondents either agreed or strongly agreed that the identifications of HIV/AIDS patients should be kept confidential in order to protect their privacy. Moreover, 86.2% of them believed that

Table 1. Knowledge scores to HIV/AIDS among new entrant university students in Taiwan

Knowledge questions	Choosing correct answer (%)						
	Male n=5,923	Female n=5,722	Total n=11,645	p value	No sexual experience n=10,483	Had sexual experience n=1,179	p value*
HIV means Human Immunodeficiency Virus Human Imaginary Vision	88.9	91.2	90.0	<0.001	89.5	80.0	<0.001
AIDS means: Active Infectious Disease Surveillance Acquired Immuno-Deficiency Syndrome	63.0	63.6	63.3	<0.001	64.6	50.7	<0.001
AIDS is a threat for Taiwanese	81.5	76.7	79.1	<0.001	78.6	80.2	0.220
Most people who transmit the AIDS virus look unhealthy.	82.0	85.6	83.7	<0.000	84.0	79.6	<0.001
STI (Sexual Transmitted Infection) infected people are at risk for contracting AIDS virus.	72.4	81.7	76.9	<0.001	76.8	75.2	0.217
Anal intercourse is high risk for transmitting the AIDS virus.	89.2	89.6	89.4	0.488	89.3	88.2	0.024
Oral intercourse carries risk for AIDS virus transmission.	63.0	63.4	63.2	0.586	63.2	60.4	0.088
AIDS virus may be transmitted through mosquito bites.	77.6	75.4	76.5	0.006	77.0	70.6	<0.001
HIV-positive mothers may transmit the virus to her child	93.7	94.8	94.2	0.015	94.1	93.8	0.644
Sharing the same public facilities (toilets, dormitory, restaurant etc.) with AIDS infected students exposes others to AIDS virus.	93.0	95.2	94.1	<0.000	94.3	91.2	<0.001
A person can be exposed to the AIDS virus in one sexual contact.	98.3	98.1	98.2	0.603	98.2	97.4	0.057
Keeping in good physical condition is the best way to prevent exposure to the AIDS virus.	73.7	72.6	73.1	0.163	73.3	70.6	0.004
It is unwise to touch a person with AIDS.	90.4	94.5	92.4	<0.001	82.8	88.3	<0.001
Condoms make intercourse completely safe.	83.6	85.6	84.6	0.002	85.1	78.6	<0.001
When people become sexually exclusive with one another, they no longer need to follow 'safe sex' guidelines.	94.9	97.9	96.4	<0.001	96.5	93.4	<0.001
HIV can be detected by a blood test.	90.1	91.6	90.8	0.004	90.4	93.0	0.004
Most people who have been exposed to the AIDS virus quickly show symptoms of serious illness.	95.9	97.4	96.6	<0.001	96.8	94.7	<0.001
By reducing the number of different sexual partners and using condoms, you are effectively protected from AIDS.	95.9	95.5	95.7	0.242	95.6	95.5	0.889
Female-to-male transmission of the AIDS virus never occurs.	97.5	99.0	98.2	<0.001	98.2	97.5	0.071
Sharing toothbrushes and razors can transmit the AIDS virus.	84.3	82.5	83.4	0.008	83.0	85.1	0.071
AIDS causes death.	86.1	95.0	90.5	<0.001	90.1	91.7	0.086
The chances of contracting AIDS can be significantly reduced by using a condom.	95.2	93.9	94.6	0.004	94.3	94.9	0.351
One condom may be used several times.	98.3	99.6	99.0	<0.001	98.9	98.1	0.020
The chances of contracting AIDS are low by having sex with only one partner.	84.5	81.7	83.1	<0.001	82.7	84.7	0.081
I can get AIDS even if I am only having sex with one partner.	95.6	96.9	96.6	<0.001	96.3	94.7	0.009

* p value base on chi-square test.

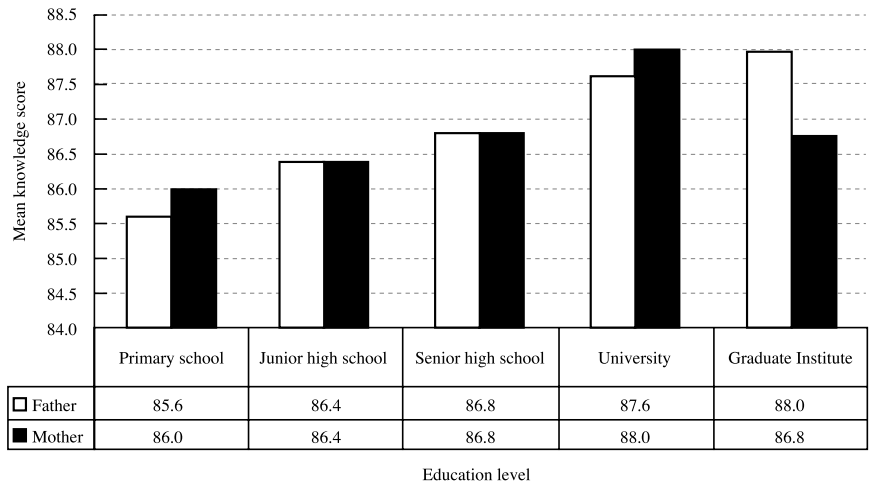


Figure 1a: The students were divided into different groups based on their fathers' or their mothers' educational levels;

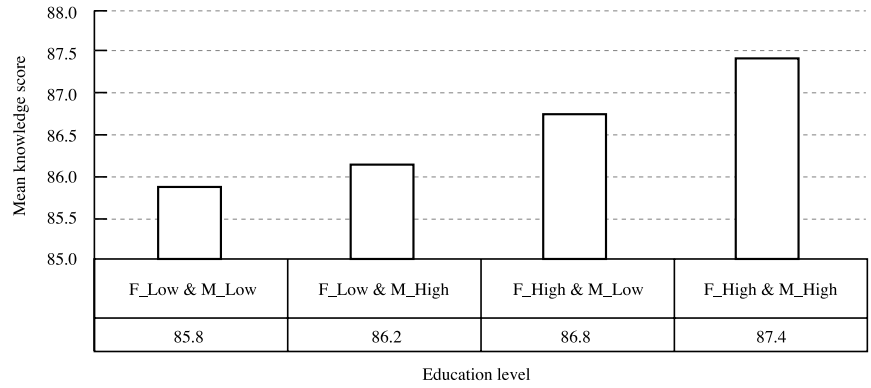


Figure 1b: The students were divided into four groups according to the combinations of their parents' educational levels. F, father; M, mother; L, low educational level (primary school to senior high school); H, high educational level (university and graduate school).

Figure 1. The average knowledge scores of different student groups based on the educational levels of their parents.

more government funds should be allocated to support caring services for people living with HIV-1/AIDS, while 42.9% of students would avoid contacts with HIV-1/AIDS patients and 13.6% felt embarrassed if one of their family members had AIDS. Although 87.1% of students stated that using a condom is not an insult to their partner, 26.2% of the students felt embarrassed to buy condoms from stores. The attitudes towards HIV-1/AIDS were slightly correlated to their parents' educational level. When the education level of both parents was high, students had a negative attitude towards HIV-1/AIDS. However, a better attitude score was obtained when the father's education level was high and the mother's education level

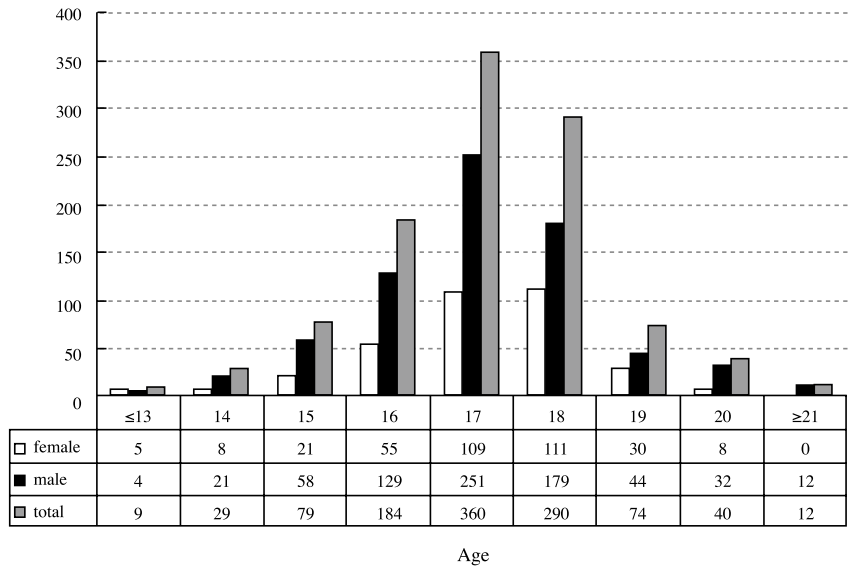
Table 2. Distributions (in percentages) of different attitude toward HIV-1/AIDS among new entrant university students in Taiwan

	Percentages of students having different attitude*				
Attitude questions	SA	A	N	D	SD
There is no need for the average person to be concerned about AIDS.	2.0	8.3	17.5	47.1	25.1
The names of individuals with AIDS should be kept confidential in order to protect them against discrimination.	25.3	39.1	19.7	11.6	4.3
There is no need for a girl to learn how to wear a condom.	1.0	1.5	8.3	44.2	44.9
If I get AIDS I will avoid transmitting the disease.	41.9	46.5	7.0	2.9	1.8
More government funds should be spent on providing support services for people with AIDS.	46.7	40.0	11.2	1.2	1.0
I would avoid having contact with persons who have AIDS.	12.0	31.0	37.0	15.3	4.7
I would feel embarrassed if one of my family members had AIDS.	2.9	10.8	25.1	37.8	23.2
I would immediately go to visit a doctor if I get a Sexual Transmitted Infection.	51.2	41.4	6.3	0.6	0.4
It is important to exercise safety precautions in one's sex behavior in order to prevent AIDS.	66.9	28.7	3.4	0.5	0.5
Students with AIDS should be allowed to attend school with students who don't have AIDS.	31.1	39.4	19.0	7.4	3.1
I would rather have any cancer than AIDS.	11.1	18.1	47.5	12.9	10.5
If a condom is not available during sexual intercourse it should be wise to avoid penetration.	9.0	23.8	40.1	16.8	10.3
It is embarrassing (to me) to buy condoms.	4.5	22.0	33.5	25.9	14.2
I am afraid I might contract AIDS.	23.1	27.3	23.7	12.2	13.8
Using a condom seems like an insult to my partner.	1.1	0.9	10.6	33.6	53.8

*SA, strongly agree; A, agree; N, neutral; D, disagree; SD, strongly disagree.

was low. This was not statistically significant (ANOVA Test, $p = 0.202$). The attitude scores of the students did not correlate with the knowledge scores (Pearson correlation: 0.182 and 0.074 for male and female students, respectively, $p < 0.001$).

Practice: Students identified "school" (81.5%) and "television" (75.4%) as main sources of information about HIV/AIDS, followed by "newspapers and magazines" (55.4%), "internet" (46.0%), "doctors or nurses" (45.2%), and "friends" (25.3%). In addition, 1,179 (10%) of them had sexual experiences and the mean age of their first sexual intercourse was 17.14 (SD±1.45) (Figure 2). The sexual orientations of the participants were 93.3% heterosexual, 0.5% homosexual, 1.1% bisexual and 3.8% not decided yet. In addition, the proportions of the students who had sexual experiences in the heterosexual, bisexual and homosexual students were 9.9% (1081/10929), 32.1% (42/131) and 37.1% (23/62), respectively ($p < 0.001$). In terms of the mean age and range of the first sexual experiences for heterosexual, bisexual and homosexual students, they were 17.2 ± 1.4 (12-28), 16.9 ± 2.2 (11-22) and 16.8 ± 0.9 (15-18), respectively. Among 1,179 students who had sexual experiences, only 30.9% used condoms consistently (Figure 3).



	≤13	14	15	16	17	18	19	20	≥21
female	5	8	21	55	109	111	30	8	0
male	4	21	58	129	251	179	44	32	12
total	9	29	79	184	360	290	74	40	12

Figure 2. The distribution of age of the first sexual intercourse among male and female new entrant university students in Taiwan.

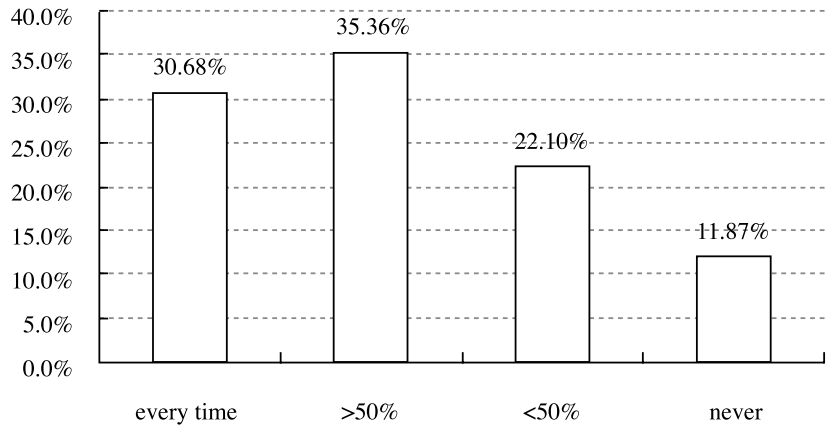


Figure 3. Distribution of condom usage patterns among new entrant university students who had sexual experiences.

In this study, 1,173 (9.9%) of participants admitted that they had alcohol drinking habit and 157 students (1.3%) were illicit drug users. The rates of students using illicit drug in the surveyed schools ranged from 0.3% to 3.4% with professional school had the highest rate. Furthermore, the differences of the rates were statistically significant (Pearson x^2 test = 63.210, $p < 0.001$). According to the survey, top three drugs used by the subjects were MDMA (63.7%), ketamine (56.7%), and psychedelic mushrooms (16.1%). Students obtained drugs

mainly from friends (58.6%), in pubs (45.2%), at school (21.6%) and in the home parties (21.6%). It is important to note that 10 students (0.08%) admitted that they were injection drug users.

Comparison of the knowledge and attitude between students who had or have no sexual experiences. Regarding the knowledge levels, 98.8% (9383/9493) of students who had no sexual experiences had scores >80, which is significantly higher than that (83.2%, 981/1,179) of the students who have had sexual experiences. As shown in Table 1, the former group of students had significant higher rates of correct answers than the latter group on question numbers 1, 2, 4, 8, 14, 15, 17, 23 and 25, while the latter had significantly higher rates of correct answers on question number 13 and 16. In terms of the attitude, 31.0% (365/1179) of students who have had sexual experiences had scores >60 (the total score was 75) which is significantly higher than the percentage of students who had no sexual experiences (24.1%, 2,521/10,483). As shown in Table 3, the former group had significantly higher rates of positive attitude toward question numbers 6 and 13 than the latter group. On the other hand, the latter group had significantly higher rate of positive attitude to question number 10 than the former group.

Interactions between knowledge/ attitude and practices. As shown in Table 4, among four groups of students who had different frequencies of condom usage, the differences of their rates of correct answers to the following questions were statistically significant: knowledge question No. 23 and attitude questions No. 3, 9, 13 and 15. 4.4% (6/137) of students who never used condom when they had sex thought that condom can be used for several times, which was significantly higher than the other three groups of students. Furthermore, 53.3% of the same group had neutral or negative attitude about going to drug store to buy condoms. Finally, 29.9% of the students never used condoms when they had sex agreed or strong agreed that it is an insult to their sexual partners if they use condom.

DISCUSSION

The present study evaluated the knowledge, attitude, and practice of new entrant university students regarding HIV-1/AIDS in Taiwan. To avoid the peer influence, we collected the questionnaires during the student' s orientation days. We analyzed the distribution of the participants by city or county of their residence and found that they came from 6 cities and 23 counties including Kinmen islands Lienchiang county (data not shown). Therefore, the subjects of this study are well representative the high school graduates population who entered the university system.

In general, the knowledge level of the participants was relatively high with an average score of 86.7. This is consistent with other studies in Taiwan previously[5-8]. Chen et al. surveyed 1,125 Taiwanese between the ages of 20 and 39 and showed that they had a high score for knowledge on HIV-1/AIDS[5]. To rule out the possible effects of those students whose ages were too young or too mature, we deleted 202 questionnaires from students whose age data was unavailable, <16, or >25 and repeated the analysis. The results were similar to the findings presented in this article.

In this study, 36.7% of students failed to correctly define the acronym "Acquired Immunodeficiency Syndrome". This may be due to the students' poor English vocabulary. The results showed knowledge gaps regarding transmission routes of HIV-1 infection-23.5% of students believed that the HIV-1 can be transmitted through mosquito bites. This misconception has been mentioned in other

Table 3. Percentages of students having positive attitude among students with or without sexual experiences

Questions on different attitudes toward HIV-1/AIDS	Percentage of students having positive attitude		
	No sexual experience n=10,483	Had sexual experience n=1,179	p value*
There is no need for the average person to be concerned about AIDS.	72.1	72.8	0.628
The names of individuals with AIDS should be kept confidential in order to protect them against discrimination.	64.3	63.7	0.709
There is no need for a girl to learn how to wear a condom.	88.8	89.3	0.563
If I get AIDS I will avoid transmitting the disease.	88.4	86.4	0.044
More government funds should be spent on providing support services for people with AIDS.	86.4	86.3	0.911
I would avoid having contact with persons who have AIDS.	19.7	22.4	0.026
I would feel embarrassed if one of my family members had AIDS.	60.9	61.8	0.521
I would immediately go to visit a doctor if I get a Sexual Transmitted Infection.	92.5	93.2	0.352
It is important to exercise safety precautions in one's sex behavior in order to prevent AIDS.	95.5	94.4	0.083
Students with AIDS should be allowed to attend school with students who don't have AIDS.	70.7	66.0	0.001
I would rather have any cancer than AIDS.	23.0	24.7	0.205
If a condom is not available during sexual intercourse it should be wise to avoid penetration.	27.0	26.5	0.722
It is embarrassing (to me) to buy condoms.	37.4	64.1	0.000
I am afraid I might contract AIDS.	25.6	28.3	0.044
Using a condom seems like an insult to my partner.	87.4	85.8	0.100

*p value base on chi-square test

studies for a long period of time[9-12]. Female participants showed a slightly higher level of knowledge in comparison with male participants; this difference is small and insignificant. Most of the surveyed students (78.7%) believed that AIDS could be a threat for Taiwanese people. It points out that students consider AIDS as a serious issue and is consistent with the findings of Tavoosi's study in 2004[13]. However, they were slightly biased against infected individuals as some of them would be embarrassed if one of their family members contracted AIDS.

Public universities demonstrated better knowledge scores than private and technical schools. The latter reported the lowest scores. This may be due to the university entrance policy in Taiwan. Students with the highest entry examination scores go to public schools, those with middle scores go to private schools and students with the lowest scores are enrolled in technical schools. A positive linear association was found between a students' knowledge level and their father's education level. This is consistent with the findings of Savaser[13]. Similar correlation was found with their mother's education level. However, negative correlation occurred at the mother's highest education level. Further investigations are needed to understand this situation.

Table 4. Percentages of students chose correct answers or with positive attitude among new entrant university students having sexual experiences with different condom usage frequencies.(n= 1,154)

Frequency of condom usage	Every time (n=354)	>50% (n= 408)	<50% (n=255)	Never (n=137)	p value*
Knowledge questions:	% choosing correct answer				
Anal intercourse is high risk for transmitting the AIDS virus.	86.4	89.5	89.8	85.4	0.3457
Oral intercourse carries risk for AIDS virus transmission.	59.6	63.0	61.6	54.7	0.3631
A person can be exposed to the AIDS virus in one sexual contact.	97.5	98.1	97.3	94.9	0.2691
Condoms make intercourse completely safe.	78.8	78.2	78.4	81.8	0.8431
When people become sexually exclusive with one another, they no longer need to follow 'safe sex' guidelines.	94.4	94.9	20.2	89.1	0.0550
By reducing the number of different sexual partners and using condoms, you are effectively protected from AIDS.	96.1	96.3	94.9	94.9	0.7757
The chances of contracting AIDS can be significantly reduced by using a condom.	95.2	96.6	94.9	91.2	0.0958
One condom may be used several times.	99.7	98.3	97.3	95.6	0.0120
Attitude questions:	% with positive attitude				
There is no need for a girl to learn how to wear a condom.	91.5	92.2	88.6	78.1	<0.0001
It is important to exercise safety precautions in one's sex behavior in order to prevent AIDS.	96.3	92.1	95.7	96.1	<0.0001
If a condom is not available during sexual intercourse it should be wise to avoid penetration.	24.0	24.5	29.4	31.4	0.1920
It is embarrassing (to me) to buy condoms.	66.4	68.4	65.5	46.7	<0.0001
Using a condom seems like an insult to my partner.	91.0	88.5	83.5	70.1	<0.0001

* p value base on chi-square test

In addition, this study found that nearly thirty-one percent of students who had sexual experiences used condoms every time, showing an apparent increase in rate of condom use within the past few years. In 1994, Yang and Yen conducted a study among two-year college night school students (n=671) which has shown 24.2% of students (n=165) who had sexual experience used condoms every time [14]. Chen et al., (2003) reported that 29.3% of fourth-year university students who had sexual experiences (n=251) used condoms consistently [15].

In this study, the participants indicated that HIV/AIDS information was mostly disseminated through schools (81.5%) and television (75.4%). Other studies found that the needs of sex education or HIV education were unmet among students in school [6,7,16,17]. Therefore, school is an important environment to disseminate AIDS education and prevention programs. Although new entrant university students in Taiwan overall had a relatively positive attitude towards HIV/AIDS, 42.9% of them would avoid having contact with persons who have AIDS. This may express a kind of fear that Taiwanese students have of the AIDS disease. This was found to be true in the study of Gray[18] in India, and Nwokocha[19] in Nigeria. This may be due to lack of proper HIV/AIDS education. Due to its seriousness, it is

imperative that this issue is addressed. Overall, attitude was not correlated to knowledge level (Pearson Correlation: 0.14), which means that better knowledge doesn't necessary lead to a positive attitude.

In this study, 1.7% (193/11,570) of the students identified themselves as homosexual or bisexual and 3.9% (448/11,570) were uncertain about their sexual orientation. The proportions of the students who had sexual experiences in the heterosexual, bisexual and homosexual students were 9.9% (1,081/10,929), 32.1% (42/131) and 37.1% (23/62), respectively ($p < 0.001$). In addition, 5.1% (23/448) of the students who were uncertain about their sexual orientation have already had sexual experiences. Therefore, the proportions of students who were homosexual or bisexuals may be under estimated. These subpopulations deserve special attention in the counseling programs of the universities.

Besides, the mean age of first sexual intercourse of the participant was 17.1± 1.5 years old. This is a relatively late sexual debut compared to other regions such as Latin America and Sub-Saharan Africa. For instance, Trajman et al.,[20] and Adu-Mireku et al.,[21] reported that the sexual debuts among students in Brazil and Ghana were 15 and 16 years old, respectively. Although the Taiwan's Ministry of Education (MOE) starts sex education among 5th and 6th grades' primary school students, most of them will not engage in sexual behavior until they graduate from high schools. Therefore, it is very important for the MOE to emphasize AIDS and STD prevention programs in high school and university.

It is important to note that a very small proportion of participants were illicit drug users (1.3%) and 13 of them admitted that they were heroin/morphine users. Since there has been a severe outbreak of HIV-1 infection among injection drug users in Taiwan since 2004[22], harm reduction program should be considered to be introduced to the high school and university students through different channels[23]. Besides, vigilance should be observed to keep them away from drug abuse since it may lead to unsafe sexual behavior.

In this study, no correlation was found between knowledge level and practice. Despite the high knowledge level, students who had sexual experiences were found to be inconsistent condom users. This is consistent with previous studies by Smith LA[24] in the USA; Babikian[11] in Armenia; and Atunes[25] in Brazil. However, when we compared the knowledge or attitude levels between subjects who had or had no sexual experiences, we found that in general, students who had no sexual experiences had higher knowledge and lower attitude score than those students who had sexual experiences (Tables 1 and 3). In addition, students who had sexual experiences tend to have more positive attitude to buy condoms at stores and will not feel embarrassing (Table 3, question No. 13). Further analysis on their condom usage frequency, we found that 53% of the students who never used condoms when they had sex felt it is embarrassing to buy condoms from stores while only 33.6% of the students who used condoms persistently felt embarrassed and the difference is statistically significant (Table 4). Therefore, some attitude questions correlate with the behaviors.

The limitation of this study is our results can only represent the high school graduate who entered university systems in Taiwan. Other studies needed to be implemented for students who chose not to continue their education or been rejected from the university system. Nevertheless, students should be instructed about all aspects of HIV/AIDS at school, which at present is the most frequent source of information.

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台灣地區大專新生愛滋病知識、態度及行為調查

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目標：台灣愛滋病病毒感染最近幾年明顯上升，此研究以尚未被同儕影響的大一新生為研究對象，調查其愛滋病相關的知識、態度與行為。**方法**：於2004年9月針對9所大學(包括公立、私立、醫學大學、職業學校)的11,847位新生進行問卷調查。**結果**：知識問題平均答對分數為86.8%。態度方面，42.2%受訪者會避免與愛滋病患接觸，13.6%受訪者會因家人感染愛滋病而感尷尬。在男女學生群中，知識及態度的相關性係數極低(皮爾森積差相關係數：男學生，0.182；女學生，0.074，$p<0.001$)。學校及電視是取得愛滋病相關資訊的主要途徑。受訪者的性取向為：93.3%異性戀，1.1%雙性戀，0.5%同性戀。第一次性行為平均年齡為17.1歲(標準差1.5歲)。在1,179 (10%)位性活躍的學生中，只有30.9%同學會在每次性行為時使用保險套，此外，9.9%學生有飲酒的行為，157 (1.3%)位曾使用過禁藥，其中10位曾使用過靜脈注射的非法藥物。禁藥的來源包括：朋友(58.6%)，酒吧(45.2%)及學校(21.6%)。**結論**：台灣高中畢業生對於愛滋病的相關知識及態度仍有不正確之處，建議加強高中生的愛滋教育。(台灣衛誌 2007；**26(4)**：324-337)

關鍵詞：愛滋病、知識、態度、行為、大專學生

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