

Perception of risk of HIV and sexual risk behaviours among students in the United States, Turkey and South Africa

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Abstract

The aim of this study was to examine HIV sexual risk behaviours and perception of HIV risk among 1 095 students from the United States of America (US), Turkey and South Africa. Randomly selected students who were enrolled in general education courses completed a structured questionnaire. Results revealed statistically significant differences in specific HIV-related sexual behaviours among students from the three countries and among male and female students in each country. A higher percentage of US and South African students engage in HIV risky sexual behaviours compared with their Turkish counterparts, and a higher percentage of female students in the US and South Africa engage in HIV sexual risk behaviours compared with their male colleagues. A higher proportion of Turkish male students engaged in sexual risk behaviours compared with their female counterparts. The perception of HIV risk was low among US and Turkish students, and high among South African students. There was no agreement between engaging in risky sexual behaviour and self-perception of HIV risk among South African female students, while agreement was poor for US male and female students, Turkish male and female students, and South African male students. The observed optimistic bias needs to be considered in the design and implementation of HIV prevention programmes for these populations.

Keywords: Sexual risk behaviour, perception of risk, students.

Résumé

Le but de cette étude était d'examiner les comportements sexuels à risque liés au VIH et la perception du risque du VIH chez 1 095 étudiants originaire des États-Unis d'Amérique (USA), de la Turquie et d'Afrique du Sud. Choisis au hasard, ces étudiants inscrits à des cours d'enseignement général ont rempli un questionnaire structuré. Les résultats ont révélé des différences statistiquement significatives concernant les comportements sexuels liés au VIH entre les étudiants des trois pays et entre les étudiants masculins et féminins dans chaque pays. Un pourcentage plus élevé d'étudiants américains et sud-africains ont des comportements sexuels à risque liés au VIH par rapport à leurs homologues turcs, et un pourcentage plus élevé d'étudiantes aux États-Unis et en Afrique du Sud adoptent des comportements sexuels à risque par rapport à leurs collègues hommes. Une proportion plus élevée d'étudiants turcs masculins ont des comportements sexuels à risque par rapport à leurs homologues de sexe féminin. La perception du risque VIH était faible chez les étudiants américains et turcs, et élevée chez les étudiants sud-africains. Chez les étudiantes d'Afrique du Sud, il n'y avait aucune concordance entre l'adoption d'un comportement sexuel à risque et la perception individuelle d'un risque lié au VIH. Ce lien était faible pour les étudiants américains de sexe masculin et féminin, pour les étudiantes et étudiants turcs, et pour les étudiants sud-africains de sexe masculin. Le biais optimiste observé a besoin d'être pris en considération dans la conception et la mise en œuvre des programmes de prévention du VIH pour ces populations.

Mots clés: Comportement sexuel à risque, perceptions du risque, étudiants.

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Introduction

Human immunodeficiency virus (HIV) infection and acquired immune deficiency syndrome (AIDS) remains a global health problem of unprecedented dimensions. Since its recognition 27 years ago, HIV/AIDS has already caused an estimated 25 million deaths worldwide. Globally, the HIV epidemic has stabilised, although with unacceptably high levels of new HIV infections and AIDS deaths (UNAIDS, 2008). The annual number of new HIV infections declined from 3.0 million in 2001 to 2.7 million in 2007. Overall, 2.0 million people died due to AIDS in 2007, compared with 1.7 million in 2001. While the percentage of people living with HIV has stabilised worldwide since 2000, the overall number of people living with HIV has steadily increased as new infections occur each year. HIV treatments currently extend life, so new HIV infections still outnumber AIDS deaths. Southern Africa continues to bear a disproportionate share of the global burden of HIV. In 2007, 35% of HIV infections and 38% of AIDS deaths worldwide occurred in that subregion. Altogether, 67% of all people living with HIV are from sub-Saharan Africa (UNAIDS, 2008).

Young people aged 15 - 24 years account for an estimated 45% of new HIV infection worldwide (UNAIDS, 2008). Most HIV infections among young people occur through sexual intercourse (NIH, 2006). In the United States of America (US) with a population of about 300 million, an estimated 1.03 million individuals were living with HIV/AIDS at the end of 2006 (Centers for Disease Control and Prevention (CDC), 2008). Young adults of African-American descent in the US are disproportionately affected by the HIV/AIDS epidemic. Although African Americans constitute 13% of the US population, they accounted for 55% of all HIV infections among young adults ages 13 - 24 (CDC, 2008). The HIV data from South Africa, with an estimated population of 48.6 million people, suggest that the HIV epidemic might be stabilising, but there is no evidence yet of major changes in HIV-related behaviour (UNAIDS, 2008). In South Africa about 9% of people aged 15 - 24 years are infected with HIV.

Turkey, with a population of 74.9 million people, is a developing country with conservative but rapidly changing social, cultural and moral norms (Gökengin *et al.*, 2003). Less than 0.2% of the adult (15 - 49 years) population in Turkey has HIV/AIDS. While this prevalence rate might be considered low, the number of people living with HIV/AIDS has continued to increase (Duyan, Agalar & Sayek, 2001; Urgan & Yaman, 2003). According to the Turkish Ministry of Health, 76% of HIV infections are among sexually active individuals between the ages of 15 and 49 years. It is also believed that HIV/AIDS prevalence data in Turkey may not reflect the true dimension of the problem because most people with sexually transmitted diseases do not generally attend health centres (Duyan, Agalar & Sayek, 2001). The country has witnessed increased access to sexual materials and increased sexual activity among young people. The impact of religion on attitudes and behaviour of young adults has decreased in the last decade (Bulut & Güvenli, 2001; Özcebe, 2002).

Globally, university students are in the age range with the highest rates of new HIV infections. The college environment with its attendant relative lack of parental supervision offers great opportunity for young people, who are bridging from adolescence to adulthood, to test the limits of their newfound freedom through sexual experimentation (Duncan *et al.*, 2002). Such experimentation

frequently involves engagement in risky sexual activities such as multiple partnerships, inconsistent use of condoms (Lewis & Malow, 1997; Nakornkhet, Crowe, Torabi, & Ding, 1998; Prince & Bernard, 1998), and having sex under the influence of alcohol or drugs (Nakornkhet, Crowe, Torabi, & Ding, 1998). The outbreaks of HIV infection seen on several North Carolina campuses in the US between 2001 and 2003 reflect the risk of HIV infection among university students (Hightow *et al.*, 2005).

A nationwide survey (Youth Risk Behaviour Surveillance) of HIV risk factors among university students in the US revealed that about a third (34.5%) had sexual intercourse with six or more sex partners during their lifetime (CDC, 2006). Unfortunately, those who reported having multiple sexual partners were the least likely to have used condoms consistently. Among the sexually active university students in the nationwide survey, only 29.6% reported that either they or their partner used a condom during their last sexual intercourse, and 27.9% reported that either they or their partner use a condom all the time. Gökengin and colleagues in 2003 reported that 31.5% of sexually experienced students in a Turkish university reported having sex with different partners at irregular intervals and 38.8% never used a condom. Studies in South Africa and other sub-Saharan Africa countries have similarly found a high level of HIV-risk behaviours among university students (Katjavivi & Otaala, 2003).

Perception of risk is a key component of both the health belief model (Janz & Becker, 1984) and the theory of reasoned action (Ajzen & Fishbein, 1980). Both frameworks have been widely used in the planning of HIV prevention interventions. An important aspect of perceived threat is whether the perception of threat creates worry (Ijadunola, Abiona, Odu & Ijadunola, 2007). This may be a strong motivating factor for behavioural change, particularly if the individual perceives control over the risk behaviour (Witte, Berkowitz, & Cameron, 1998). The tendency to systematically underestimate personal risk, termed optimistic bias (Eiser, 1986), and treating HIV infection as a distant possibility (Macintyre, Rutenberg, Brown, & Karim, 2004) have been reported among college students.

While a number of studies on the HIV-related sexual behaviours of students enrolled in US (Prince & Bernard 1998; Opt & Loffredo 2004; Opt & Loffredo, 2007), South African (Macintyre, Rutenberg, Brown, & Karim, 2004; Tenkorang, Rajulton, & Maticka-Tyndale, 2008; Maharaj & Cleland, 2008) and Turkish (Özcebe, 2002; Urgan, & Yaman, 2003; Gökengin *et al.*, 2003) universities/colleges have been published, transnational comparative studies are scarce.

The objectives of this study were to assess and compare HIV risk behaviours and perception of the risk of HIV infection among university students in US, South Africa and Turkey. The three countries were selected because of their cultural, religious and ethnic differences. South Africa like the US, is ethnically diverse with whites, blacks, Asians and other races. On the other hand, Turkey is predominantly white, but other races exist. South Africa has the largest HIV epidemic in the world (5.7 million cases) and current data indicate no reduction in HIV risk behaviours in that country (UNAIDS, 2008). South Africa and the US are predominantly Christian nations. Turkey is an Islamic nation with strongly held cultural, religious and moral values, which according to recent reports

might be weakening. We hypothesised that the risk behaviours would be different in the three countries and that risk perceptions would be uniformly poor. These hypotheses are premised on the feeling of invincibility in the psychological developmental process of young people universally (Christine & Viner, 2005).

Methods

Sample

Participants for this cross-sectional study were recruited from two major public universities in South Africa, and one each from US and Turkey. The sample included 2 006 student volunteers from various academic disciplines in the four universities. The breakdown was US 390 (19.4%), Turkey 521 (26.0%) and South Africa 1 095 (54.6%). More students from South Africa participated in the study because two universities indicated interest in the study and were therefore accommodated. At each of the universities courses were randomly selected from university-wide required/general education courses, and the instructors of the selected classes were contacted. The student volunteers who participated in the study were those enrolled in the classes taught by the instructors who provided consent for the survey to be administered in their classes. Following the instructors' consent, information about the study and data collection date was provided to the students.

The mean age of the study participants was 23.0 (+7.1) years for US, 21.7 (+2.1) years for Turkey, and 21.2 (+2.6) years for South Africa. The majority of the students (US 87.6%, Turkey 88.7% and South Africa 97.2%) attended school full-time. About half (US 46.3%, South Africa 48.5%) of the students in the US and South African universities had been in school for more than 2 years, while 73.5% of the students in the Turkish university had been in school for more than 2 years. The majority (US 76.4%, Turkey 44.2%, and South Africa 64.4%) of students in the sample lived off-campus.

Research questionnaire

The investigators adapted survey instruments (Carey & Schroeder, 2002; Shrum, Turner, & Bruce, 1989; CDC, 1995; National Center for Health Statistics, 1992) that have been tested and used to conduct college-based surveys of HIV/AIDS knowledge, attitudes, beliefs and behaviour surveys. Authors selected relevant items from the instruments. The questionnaire sought demographic information, HIV knowledge and attitude, HIV-related risk behaviour and perception of risk. In this manuscript, only the data relating to sexual risk behaviours and perception HIV risk are presented.

We evaluated the readability and test re-test reliability of the questionnaire used for this study by administering the instrument on two occasions, within a 2-week interval, to 219 university students in the USA ($N=66$), Turkey ($N=53$) and South Africa ($N=100$). The instrument's readability evaluation revealed a Flesch-Kincaid score (literacy difficulty level of the questionnaire) of 8.4, indicating that respondents would need an eighth grade reading level to understand the survey. The test re-test reliability coefficients were generally high for the demographic information (0.893 - 0.997), HIV risk sexual behaviour (0.738 - 0.996) and the alcohol and drug use (0.562 - 1.000) subscales. Much lower test re-test reliability was obtained for the HIV/AIDS attitudes and beliefs (0.32 - 0.80), and sources of information about HIV/AIDS (0.370 - 0.892) subscales. We found no

discernible difference in the reliability data among the respondents from the three countries.

Measures

We defined HIV-risky sexual behaviours as multiple numbers of sexual partners and inconsistent or non-use of condoms, and sexual experience as past or current participation in sexual intercourse. Consistency of condom use was assessed by the question: 'During the past 30 days, how often did you or your partner use a condom?' Always was scored 0, any other answer was scored 1 (risky sex). To assess consistency of condom use among sexually experienced individuals who did not have sex within the 30 days prior to the study, the answer from another question, i.e. 'The last time you had sexual intercourse, did you or your partner use a condom?' was used.

Self-perception of HIV risk was assessed by the question 'What are the chances that you might catch HIV? Would you say there is no chance, a moderate chance or a good chance?' For the analysis, 'moderate or good chance' was scored as 1, and no chance or don't know were scored as 0. In our analysis, low perception is defined as 'no chance' and high perception as 'moderate/good chance'.

Procedure

Approval to carry out the study was obtained from the Institutional Review Board (IRB) in the participating universities. Following instructors' consent, information about the study and data collection date was provided to students. On the scheduled data collection dates, a recruitment script which explained the purpose, significance, benefits and potential risks of the study was read to the students. An informed consent script was then read to students who were willing to participate. The script emphasised the anonymity and voluntary nature of the survey. The student volunteers completed a paper and pencil survey.

Data analysis

In our analysis of the data, we excluded married students because the variables 'inconsistent condom use' and 'non-condom use last sex' may not apply to married students. Research has demonstrated differences in sexual behaviour and risk perception between males and females (Macintyre, Rutenberg, Brown, & Karim, 2004; Akwara, Madise, & Hinde, 2003; Varga, 2003; Harrison, Xaba, & Kunene, 2001). Since research has demonstrated gender differences, analysis was conducted separately for each gender. Five (1 US and 4 Turkish) students who did not indicate a gender were excluded, leaving a total of 1 919 students on which the analysis was done.

Data were analysed with SPSS software version 16 for Windows. We conducted univariate, bivariate and multivariate analysis. Multivariate analysis was conducted through the use of binary logistic regression as our outcome variables (engagement or non-engagement in high-risk sexual behaviour and low- or high-risk perception) were binary in nature. The model was built on from knowledge of factors that may potentially be associated with risky sexual behaviour from extant literature as well as the result of our bivariate analysis, in line with the recommendations of Harrell and colleagues (1996). Alpha level of less than 0.05 was regarded as being statistically significant for the associations.

Table 1. Selected demographic characteristics of the sample

| | Females | | | | Males | | | |
|------------------------------|--------------------------|-------------------|-------------------------|--------------------|--------------------------|-------------------|-------------------------|--------------------|
| | United States (N=251) | Turkey (N=324) | South Africa (N=685) | p-value | United States (N=112) | Turkey (N=177) | South Africa (N=370) | p-value |
| Age in years Mean (+ SD) | 23.1 (7.3) | 23.0 (3.9) | 21.8 (2.8) | 0.009 ^a | 22.8 (5.3) | 22.4 (2.5) | 21.8 (2.7) | 0.037 ^b |
| Race/ethnicity (%) | | | | | | | 5 | |
| White | 4.0 | 65.5 | 41.9 | | 10.8 | 63.5 | 3.0 | |
| Black | 84.5 | 0.6 | 14.9 | <0.001 | 72.1 | 1.2 | 16.2 | <0.001 |
| Hispanic/Latino* | 7.6 | 1.9 | 19.9 | | 9.0 | 2.9 | 18.4 | |
| Asian/Pacific Islander | 0.4 | 20.8 | 22.2 | | 0.9 | 15.9 | 11.1 | |
| Other | 3.6 | 11.2 | 1.2 | | 7.2 | 16.5 | 1.4 | |
| Number of years enrolled (%) | | | | | | | | |
| 2 or less | 54.6 | 25.0 | 51.1 | <0.001 | 47.3 | 27.7 | 52.2 | <0.001 |
| > 2 | 43.6 | 75.0 | 48.9 | | 52.7 | 72.3 | 47.8 | |
| Attendance (%) | | | | | | | | |
| Full-time | 87.6 | 90.4 | 97.2 | <0.001 | 88.4 | 85.2 | 97.3 | <0.001 |
| Part-time | 12.4 | 9.6 | 2.8 | | 11.6 | 14.8 | 2.7 | |
| Residence (%) | | | | | | | | |
| On campus | 19.9 | 48.9 | 32.3 | <0.001 | 31.3 | 35.0 | 41.9 | 0.075 |
| Off campus | 80.1 | 51.1 | 67.7 | | 68.8 | 65.0 | 58.1 | |
| Religion (%) | | | | | | | | |
| Christian | | 0.0 | 33.8 | <0.001 | | 2.2 | 33.3 | <0.001 |
| Muslim | | 57.1 | 4.3 | | | 82.0 | 4.8 | |
| Atheist | | 10.7 | 24.4 | | | 11.2 | 19.8 | |
| Other | | 32.1 | 37.5 | | | 4.5 | 42.1 | |

^a F=4.77^b F=3.33

* Coloured race in South Africa refers to individuals of mixed race who possess some sub-Saharan African ancestry, but not enough to be considered black under the law of South Africa.

To determine the level of agreement between sexual risk behaviour and HIV risk perception, we calculated the kappa statistic — a measure that corrects for chance agreement. Interpretation of the kappa statistic was based on the work of Byrt (1997), which classifies value of -1.0 to 0.0 as 'no agreement' and specifies the following cut-offs for various levels of agreement: 0.2 = poor, 0.4 = slight, 0.6 = fair, 0.8 = good, 0.92 = very good and values beyond 0.92 (to the maximum of 1) as 'excellent' agreement.

Results

Sample demographic characteristics

The demographic characteristics of the study participants are presented in Table 1. As expected, there were significant differences in the racial/ethnic composition of the participants from the three countries. Females constituted 65.7% of the sample; the breakdown by country was US 69.1%, Turkey 64.7% and South Africa 64.9%. Among female students the mean age was 23.1 (+7.3) years for US, 20.3 (+3.9) years for Turkey, and 21.8 (+2.8) years for South Africa. For the male students, the mean age was 22.8 (+5.3) years for US, 22.4 (+2.5) years for Turkey, and 21.8 (+2.7) years for South Africa. Statistically significant differences were observed among female students ($p=0.009$) and male students ($p=0.037$) from the three countries. A significantly higher proportion of Turkish students had been in school for more than 2 years compared to their US and South African counterparts ($p<0.001$).

Sexual experience and sexually-related risk behaviours

Female sexual behavioural pattern

A significantly lower proportion (10.5%) of Turkish students reported previous sexual experience compared with US students (84.5%) and South African students (47.9%) ($p<0.001$) (Table 2). Turkish students (OR=0.22, CI=0.13 - 0.35) and South African students (OR=0.17, CI=0.12 - 0.25) were less likely than US students to report previous sexual experience. Among the sexually experienced, over a quarter (27.6%) of the US female students compared with 2.1% of South African students and none of the Turkish students had their first sexual experience before the age of 15 years ($p<0.001$). South African students (OR=0.06, CI=0.03 - 0.13) were less likely than US students to report sexual debut before the age of 15 years.

As shown in Table 2, statistically significant differences exist among female students from the three countries in terms of engaging in specific HIV-related sexual behaviours. About 83% of the US female students reported having multiple sexual partners in the previous 3 months compared with 58.6% of Turkish and 79.9% of South African students ($p=0.01$); Turkish (OR=0.30, CI=0.13 - 0.67) and South African (OR=0.83, CI=0.53 - 1.29) students were less likely than US to report having multiple sexual partners in the previous 3 months. Thirty-eight per cent of US, 77.4% of Turkish and 58.1% of South African female students reported that they or their partner did not

Table 2. Sexual behaviours and HIV risk self-perception among American, Turkish and South African university students

| Sexual behaviour | (%) ^a | Females | | | Males | | |
|--|------------------|---------------------|-----------------|------------------|---------------------|-----------------|--|
| | | Odds ratio (95% CI) | <i>p</i> -value | (%) ^a | Odds ratio (95% CI) | <i>p</i> -value | |
| Sexual experience | | | | | | | |
| United States | 84.5 | 1 | | 80.4 | 1 | | |
| Turkey | 10.5 | 0.22 (0.13-0.35) | <0.001 | 53.7 | 0.28 (0.16-0.49) | <0.001 | |
| South Africa | 47.9 | 0.17 (0.12-0.25) | | 73.8 | 0.69 (0.41-1.16) | | |
| Sexual debut before 15 years of age | | | | | | | |
| United States | 27.6 | 1 | | 31.1 | 1 | | |
| Turkey | 0.0 | 0.00 | <0.001 | 9.7 | 0.24 (0.11-0.54) | 0.008 | |
| South Africa | 2.1 | 0.06 (0.03-0.13) | | 10.6 | 0.26 (0.15-0.47) | | |
| Multiple sexual partners within past 3 months | | | | | | | |
| United States | 82.8 | 1 | | 80.7 | 1 | | |
| Turkey | 58.6 | 0.30 (0.13-0.67) | 0.010 | 59.1 | 0.35 (0.17-0.69) | <0.001 | |
| South Africa | 79.9 | 0.83 (0.53-1.29) | | 70.1 | 0.56 (0.31-1.03) | | |
| Condom use last sex | | | | | | | |
| United States | 38.2 | 1 | | 53.3 | 1 | | |
| Turkey | 77.4 | 6.38 (2.50-16.30) | <0.001 | 69.0 | 2.39 (1.26-4.53) | 0.007 | |
| South Africa | 58.1 | 2.23 (1.56-3.19) | | 65.9 | 1.90 (1.16-3.09) | | |
| Consistent condom use in last 30days | | | | | | | |
| United States | 81.7 | 1 | | 70.0 | 1 | | |
| Turkey | 71.0 | 2.31 (0.92-5.83) | 0.069 | 83.3 | 0.61 (0.29-1.31) | 0.035 | |
| South Africa | 73.5 | 1.86 (1.19-2.92) | | 69.6 | 1.45 (0.83-2.55) | | |
| Use of alcohol/drug at last sexual intercourse | | | | | | | |
| United States | 15.0 | 1 | | 8.9 | 1 | | |
| Turkey | 36.7 | 3.18 (1.38-7.32) | 0.001 | 35.2 | 5.85 (2.51-13.67) | <0.001 | |
| South Africa | 19.5 | 1.33 (0.83-2.13) | | 27.5 | 3.86 (1.78-8.37) | | |
| Risky sexual behaviour | | | | | | | |
| United States | 88.1 | 1 | | 85.6 | 1 | | |
| Turkey | 61.3 | 0.21 (0.09-0.49) | <0.001 | 68.8 | 0.37 (0.18-0.78) | 0.012 | |
| South Africa | 87.5 | 0.95 (0.56-1.61) | | 81.0 | 0.72 (0.37-1.39) | | |
| High self-perception of HIV risk | | | | | | | |
| United States | 40.0 | 1 | | 36.7 | 1 | | |
| Turkey | 25.8 | 0.52 (0.22-1.22) | <0.001 | 23.7 | 0.54 (0.28-1.02) | <0.001 | |
| South Africa | 54.3 | 1.78 (1.25-2.53) | | 52.0 | 1.87 (1.15-3.06) | | |

^a Per cent of sexually experienced students in each country reporting the behaviours.

use a condom during last sex ($p<0.001$); Turkish (OR=6.38, CI=2.50 - 16.30) and South African (OR=2.23, CI=1.56 - 3.19) students were more likely than US students to report that they or their partner used a condom last sex. Fifteen per cent of US, 36.7% of Turkish, and 19.5% of South African female students reported that they used alcohol or illegal drugs the last time they had sex ($p=0.001$); Turkish (OR=3.18, CI=1.38 - 7.32) and South African (OR=1.33, CI=0.83 - 2.13) students were more likely than US students to report alcohol or drug use last sex.

Male sexual behavioural pattern

Among the males, 80.4% of the US students compared with 53.7% of Turkish and 73.8% of South African students reported previous sexual experience ($p<0.001$). Turkish (OR=0.28, CI=0.16 - 0.49) and South African (OR=0.69, CI=0.41 - 1.16) male students were also less likely than US students to report previous sexual experience. A

third (31.1%) of US, 9.7% of Turkish and 10.6% of South African students had their sexual debut before the age of 15 years ($p=0.008$) (Table 2). Turkish (OR=0.24, CI=0.11 - 0.54) and South African (OR=0.26, CI=0.15 - 0.47) students were less likely than US students to report sexual debut before the age of 15 years. As Table 2 further shows, 80.7% of US, 59.1% of Turkish and 70.1% of South African students reported having multiple sexual partners in the 3 months prior to the study ($p<0.001$). Turkish (OR=0.35, CI=0.17 - 0.69) and South African (OR=0.26, CI=0.15 - 0.47) students were less likely than US students to report having multiple sexual partners in the previous 3 months.

Significant differences were also observed in other HIV sexual risk behaviours. About half (53.3%) of US, 69.0% of Turkish, and 65.9% of South African male students reported not using a condom during last sex ($p=0.007$). Turkish (OR=2.39, CI=1.26 - 4.53) and South African

(OR=1.90, CI=1.16 - 3.09) students, like their female counterparts, were more likely than US students to report that they or their partners used a condom at last sex. While there were no significant differences in consistency of condom use among females ($p=0.069$), differences among male students were significant ($p=0.035$). Over two-thirds (70.0%) of US, 83.3% of Turkish, 69.6% of South African male students reported inconsistent condom use in the last month ($p=0.035$); while South African male students were more likely (OR=1.45, CI=0.83 - 2.55) to report consistent condom use than US students, Turkish male students were less likely (OR=0.61, CI=0.29 - 1.31). As with female students, the use of alcohol and illegal drugs in the context of sex was more prevalent among Turkish and South African students: 8.9% of US, 35.2% of Turkish, and 27.5% of South African male students reported using alcohol or illegal drugs during last sex ($p<0.001$). Turkish (OR=5.86, CI=2.51 - 13.67) and South African (OR=3.86, CI=1.78 - 8.37) students were more likely than US students to report alcohol or drug use during last sex.

HIV-related sexual behaviour among males and females

Overall, 88.1% of US female students, 61.3% of Turkish female students and 87.5% of female South African students met our defined criteria of engaging in risky sexual behaviour, i.e. 'defined criteria of engaging in risky sexual behaviour (multiple number of sexual partners and inconsistent or non-use of condoms.' Turkish (OR=0.21, CI=0.09 - 0.49) and South African (OR=0.95, CI=0.56 - 1.61) female students were less likely than US students to engage in risky sexual behaviour ($p<0.001$). A similar picture is seen among male students: 85.6% of US male students, 68.8% of Turkish male students and 81.03% of female South African students met our defined criteria of engaging in risky sexual behaviour ($p=0.012$). Turkish (OR=0.37, CI=0.18 - 0.78) and South African (OR=0.72, CI=0.37 - 1.39) male students were less likely than US students to engage in risky sexual behaviour. When male and female students

in each country were compared, we found no significant differences in engaging in HIV sexual risk behaviours among students in US ($p=0.54$) and Turkey ($p=0.44$), while South African male students were almost twice (OR=1.65) more likely than female students to engage in risky sexual behaviours ($p=0.027$).

HIV risk perception and relationship to sexual behaviour

Self-perception of HIV risk is reported in Table 2. There were significant differences in perception among students in the three countries: 40.0% of US, 25.8% of Turkish, and 54.3% of South African female students reported that they considered themselves to have a moderate to good chance of being infected with HIV ($p<0.001$). South African female students were more likely (OR=1.78, CI=1.25 - 2.53) to report high perception of HIV risk than US students, while Turkish female students were less likely (OR=0.52, CI=0.22 - 1.22). The picture was the same among male students, with 36.7% of US, 23.7% of Turkish and 52.0% of South African students reported moderate to good perception of HIV risk ($p<0.001$). South African male students were more likely (OR=1.87, CI=1.15 - 3.06) to report high perception of HIV risk than US students, while Turkish female students were less likely (OR=0.54, CI=0.28 - 1.02). Overall, a lower proportion of male students in all three countries perceived themselves to have a moderate to good chance of HIV infection.

Table 3 shows the relationship between risky sexual behaviour and HIV risk self-perception. Agreement between risky behaviour and perception of risk was generally poor. As a group, US students showed the highest agreement level ($p=0.005$).

Discussion

Most HIV infections among young people occur through sexual intercourse. Current estimates indicate that between 5 000 and 6 000

Table 3. Comparison of sexual behaviours and HIV risk perceptions among study participants

| Country/gender | Sexual behaviour | HIV risk perception | | Kappa statistic | p-value |
|----------------|------------------|---------------------|----------|-----------------|---------|
| | | Low (%) | High (%) | | |
| US/male | Non-risky | 100 | 0 | 0.178 | 0.003 |
| | Risky | 57.1 | 42.9 | | |
| Turkey/male | Non-risky | 79.3 | 20.7 | 0.031 | 0.650 |
| | Risky | 75.0 | 25.0 | | |
| SA/male | Non-risky | 50.0 | 50.0 | 0.016 | 0.747 |
| | Risky | 47.5 | 52.5 | | |
| US/female | Non-risky | 72.0 | 28.0 | 0.050 | 0.192 |
| | Risky | 58.4 | 41.6 | | |
| Turkey/female | Non-risky | 83.3 | 16.7 | 0.128 | 0.355 |
| | Risky | 68.4 | 31.6 | | |
| SA/female | Non-risky | 43.9 | 56.1 | -0.010 | 0.802 |
| | Risky | 46.0 | 54.0 | | |
| US/total | Non-risky | 81.6 | 18.4 | 0.089 | 0.005 |
| | Risky | 58.2 | 41.8 | | |
| Turkey/total | Non-risky | 80.5 | 19.5 | 0.050 | 0.392 |
| | Risky | 73.8 | 26.2 | | |
| SA/total | Non-risky | 47.3 | 52.7 | 0.004 | 0.907 |
| | Risky | 46.7 | 53.3 | | |

US = United States; SA = South Africa.

young people globally are infected with HIV daily, mostly through unprotected sexual intercourse (UNAIDS, 2006). Therefore, understanding HIV-related risky sexual behaviours and perception of risk among young people is critical to designing interventions to stem the tide of new infection among the population. University students represent a particularly vulnerable group in terms of HIV-related sexual risk behaviour because of opportunities offered by the university environment that engender sexual risk taking.

In this study, which examined HIV-related sexual risk behaviours and perception of risk among university students in US, Turkey and South Africa, we sought to look for differences in patterns of sexual risk taking and possible similarity in risk perception. A significantly lower percentage of Turkish students were sexually experienced compared with their US and South African counterparts. There were also significant differences in age at sexual debut among the study participants. Early sexual debut has been associated with HIV-related risk factors like multiple partners, unprotected sex and alcohol use in the context of sexual intercourse (Klanger, Tyden, & Ruusuvaara, 1993; DeHovitz *et al.*, 1994). The highest proportion of sexually experienced participants who had their sexual debut before the age of 15 years was among US male students and lowest was among female Turkish students. In each of the three countries, a higher proportion of sexually experienced male students reported early sexual debut compared with female students. This finding may be indicative of exceptions to the generally held view that girls mature faster than boys and are therefore more likely to have earlier sexual debut compared with boys.

Having multiple sexual partners is a recognised risk for HIV infection. There were significant differences in the proportion of both male and female students from the three countries. The highest percentage of students reporting multiple partners was among US students, while Turkish students had the lowest. The rates of multiple partnerships are higher than in previous studies (CDC, 2006; Gökengin *et al.*, 2003). This observation may indicate previous underreporting by students. It may also be because our measure of multiple partnership combined heterosexual and same-sex partnerships to the extent that an individual who had one male and one sexual female partner in the previous 3 months is coded as engaging in multiple partnership. Most of the previous studies had looked at heterosexual and same-sex partnerships separately.

There were also differences in condom use among students in the three countries. A higher proportion of male and female students from Turkey reported that they or their partner used a condom the last time they had sex. The lowest proportion was among US male and female students. While high last-sex condom use rate among Turkish students might indicate a permeation of HIV prevention messages among them, the high inconsistent condom use rate negates this. Among all groups, male South African students had the highest percentage reporting inconsistent condom use. There were also interesting gender differences in sexual behaviour among students in the three countries. Among US students there was a lower proportion of males reporting multiple sexual partners, higher proportion reporting that they or their partner used condom last sex, and a lower proportion reporting inconsistent condom use. Overall among US students a higher percentage of female students meet our defined criteria of engaging in risky sexual behaviour

compared with their male colleagues. However, the differences were not statistically significant. For Turkish students, a lower percentage of females reported multiple sexual partners, higher percentage reporting that they or their partner used a condom at last sex, and a lower percentage reported inconsistent condom use. A higher proportion of male Turkish student met our defined criteria for engaging in risky sexual behaviour than their female counterparts. The gender difference in engagement in risky sexual behaviours among Turkish students was also not statistically significant. Among South African students, males had a lower percentage reporting multiple sexual partners, a higher percentage reporting that they or their partner used a condom at last sex, and a lower percentage reporting inconsistent condom use. A statistically significant difference in engagement in risky sexual behaviours was observed among South African students, with a higher proportion of female students meeting our defined criteria for engaging in risk sexual behaviour compared with their male counterparts.

These gender differences may be indicative of gender roles in each of the three countries. In both US and South Africa women are exposed to sexual activity at young ages and have access to sexual materials, while in Turkey socio-cultural and moral norms limit exposure to sexual material and sexual activity for students, particularly female students, who are expected to keep the honour of their families. With the finding that a higher proportion of female students in US and South Africa engage in HIV sexual risk behaviour, it is no surprise that the highest rates of new infections in both countries are among women. Students in both countries largely stay off-campus and their sexual behaviour may mirror that of their communities.

We found a low perception of HIV risk among US and Turkish students. The percentages of South African male and female students perceiving themselves to be at risk for HIV infection are higher than their US and Turkish counterparts. There is no agreement between engaging in risky sexual behaviour and self-perception of HIV risk among South African female students, while agreement is poor for US male and female students, Turkish male and female students, and South African male students, as reflected in Kappa statistic values (Table 3). Therefore, not only do a higher proportion of South African female students have a high HIV risk profile, there is no agreement between their behaviour and their perception of HIV risk, a situation that connotes disaster. The tendency to systematically underestimate personal risk, termed optimistic bias, (Eiser, 1986) and to treat HIV infection as a distant possibility (Macintyre, Rutenberg, Brown, & Karim, 2004) reported among college students is very evident in our findings. This optimistic bias means the students might not have any motivation to adopt HIV preventive behaviour.

The use of technology has improved communication and information delivery on college campuses worldwide. Advantage can be taken of the medium that student television broadcasts, blogs, listserv and newspapers provide to disseminate HIV prevention messages. This will probably be more effective in the US because of wider access. The HIV prevention messages should highlight HIV/AIDS prevalence rates and the poor perception of risk among students worldwide, and emphasise the importance of condom use and minimising the number of sexual partners. In addition, free condoms can be provided in student service and health centres on the university

campuses in the US and South Africa. In Turkey, where this may be religiously and culturally acceptable, student social networks can be used for condom distribution.

This study has several limitations and caution must be exercised in generalising the result of this study. First, the inherent bias due to underreporting of behaviours as a result of the social desirability phenomenon cannot be ruled out in this study as a result of the use of self-administered questionnaires. Secondly, because the universities that participated in the study were locations of convenience and the students who participated were volunteers, their HIV risk behaviours and perception of HIV risk may not be representative of the student population in each country. Thirdly, because this was a survey, the contexts in which the HIV risk behaviours occurred could not be explored. It is therefore recommended that qualitative studies that examine the contextual factors involved in the engagement in HIV risk behaviours among students in all the three countries be carried out.

Conclusion

We found high levels of HIV high risk behaviours among students in the US, Turkey and South Africa. Although the HIV risk behaviour of Turkish students was lower than that for the US and South Africa, it may be indicative of the erosion of socio-cultural and moral norms. We found poor agreement between engaging in HIV high-risk sexual behaviour and perception of HIV risk among the students. It is plausible that the students might not be motivated to take measures or adopt behaviour to prevent them from being infected with HIV. Perceived threat is recognised as a strong motivating factor for behavioural change, particularly if the individual perceives control over the risk behaviour. Recognition of the poor perception of HIV risk among university students should be an important consideration in the planning and implementation of prevention programmes targeting this population in each of these countries.

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