

# Readability and test-retest reliability of a psychometric instrument designed to assess HIV/AIDS attitudes, beliefs, behaviours and sources of HIV prevention information of young adults

Joseph Balogun<sup>a</sup>, Titilayo Abiona<sup>a</sup>, Mainza Lukobo-Durrell<sup>a</sup>, Adedeji Adefuye<sup>a</sup>, Seyi Amosun<sup>b</sup>, Jose Frantz<sup>c</sup> and Yavuz Yakut<sup>d</sup>

<sup>a</sup>College of Health Sciences, Chicago State University, USA

<sup>b</sup>School of Health and Rehabilitation Sciences, Faculty of Health Sciences, University of Cape Town, South Africa

<sup>c</sup>Department of Physiotherapy, University of the Western Cape, South Africa

<sup>d</sup>Faculty of Health Sciences, Hacettepe University, Ankara, Turkey

## Abstract

**Objective:** This comparative study evaluated the readability and test-retest reliability of a questionnaire designed to assess the attitudes, beliefs behaviours and sources of information about HIV/AIDS among young adults recruited from universities in the United States of America (USA), Turkey and South Africa.

**Design/Setting:** The instrument was administered on two occasions, within a two week interval, to 219 university students in the USA (n = 66), Turkey (n = 53) and South Africa (n = 100).

**Method:** The psychometric instrument developed has five major subscales: demographic, HIV/AIDS attitudes and beliefs, HIV risk sexual behaviour, alcohol and drug use, and HIV sources of information.

**Results:** 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 overall test-retest reliability coefficients for the items on the demographic subscale were generally high (0.893–0.997). Similarly, high test-retest reliability was obtained for the HIV risk sexual behaviour (0.738–0.996) and the alcohol and drug use (0.562–1.000) subscales. Much lower test-retest 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.

**Conclusion:** We found no discernible difference in the reliability data among the respondents from the three countries. The instrument should be of interest to clinicians and researchers investigating the HIV risk behaviours of young adults and older age groups with an eighth grade reading level. The availability of this instrument may enhance HIV population and intervention studies internationally.

## Keywords

evaluation, HIV/AIDS, psychometric instrument, university students, young adults

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## Corresponding author:

Joseph Balogun, Office of the Dean, College of Health Sciences, Chicago State University, Chicago, IL, 60628, USA.

Email: jbalogun@csu.edu

## Introduction

Globally, HIV disproportionately affects young adults. In 2007, 5.4 million of the 1.7 billion persons between the ages of 15 and 24 years worldwide were estimated to be living with HIV<sup>1,2</sup>. In the same year, 45 per cent of all new HIV infections worldwide occurred in persons under the age of 25<sup>3</sup>. Young adults remain at the centre of the HIV/AIDS epidemic in terms of vulnerability, impact and potential for change<sup>1</sup>. Social, political, cultural, biological and economic factors increase young adults' vulnerability to HIV infection. Typically, because they have a feeling of invincibility, they are more likely to take risks.

University students in many countries around the world are typically young and take more risks. Young adults (15–24 years) are at higher risk of acquiring HIV infection compared to infants (under 1 year), youth (1–14 years), middle adults (25–44 years), older adults (45–64 years) and retirement age (65+ years) groups<sup>4</sup>, and they tend to have poor perceptions about their risk of contracting HIV<sup>5–7</sup>. Hence, it is necessary to study the attitudes, beliefs and HIV risk behaviours of young adults in different countries where the HIV epidemic rates differ.

In many countries around the world, HIV prevention education is generally communicated through advertisements on the radio, television, on billboards and in print media. The type of message communicated, used by the media, and the level of intensity of the prevention education, varies from country to country. Cross-cultural comparison of young adults' HIV/AIDS attitudes, beliefs and sources of information about the disease can provide opportunities for sharing exchanges on intervention approaches or may suggest the universality or otherwise of specific HIV risk behaviours.

Several studies exist in the literature on the HIV/AIDS attitudes, beliefs and HIV risk sexual behaviours of young adults in different countries around the world – the USA<sup>7–11</sup>, South Africa<sup>12–14</sup>, Turkey<sup>15–17</sup>, India<sup>18</sup>, China<sup>6,19</sup>, Kuwait<sup>20</sup> and Jamaica<sup>21</sup>. However, comparative studies are scarce. The psychometric properties of the questionnaire used in the previous studies were not reported. The paucity of comparative data on the HIV risk behaviours of young adults from different parts of the world may be attributed to the lack of a culturally appropriate and reliable psychometric instrument.

With increasing globalization and the resultant blurring of the distinctions between youth culture in different countries, a comparative study of young adults in developed and developing countries may provide additional insights into future patterns of HIV transmission, disease rates, and interventional needs. Currently, there is limited HIV prevention intervention research among young adults from developing countries due to a lack of culturally appropriate psychometric instruments.

Human behaviour involves a complex socio-cultural component. Comparative studies have the potential to deepen our understanding of sexually-related health outcomes, including varying HIV epidemiological pictures in different settings. To better understand the HIV risk behaviours of youth adults from different parts of the world, a reliable and valid instrument is needed. This study had two primary objectives: (1) to develop a psychometric instrument to assess the HIV/AIDS attitudes and beliefs, alcohol and drug use, HIV sexual risk behaviours and sources of HIV prevention information of young adults; and (2) to investigate the instrument's readability and test-retest reliability among young adults in the USA, Turkey and South Africa. We postulated that the instrument developed will show 'high' stability when re-administered within two weeks.

## Methods and materials

### *Development of the research questionnaire*

Our research questionnaire was adapted from various survey instruments that have been tested and used to evaluate university students' HIV/AIDS attitudes, beliefs and behaviour surveys. We

selected several items from the AIDS Attitude Scale<sup>22</sup>, the Assessing AIDS-related Beliefs Survey<sup>23</sup>, the National College Students Health Risk Behaviour Survey<sup>24</sup>, and the National Health Interview Survey of AIDS Knowledge and Attitudes.

The resulting psychometric instrument contained one open-ended (age) item and several closed-ended items divided into five major sections. Section one of the questionnaire sought socio-demographic information. Section two covered the use of drugs and alcohol, while section three covered HIV risk sexual behaviours. The items contained in sections one to three of the survey had varying options (ranging from 2 to 7) provided. Section four covered attitudes and beliefs toward individuals infected with HIV through statements with semantic differential scale ranging on a continuum from (1) 'strongly agree' to (2) 'strongly disagree'. Section five of the survey consisted of 'Yes' or 'No' type questions, which elicited information on the sources of HIV/AIDS transmission and prevention.

To establish the content and face validity of the instrument, students and faculty members from the College of Health Sciences at Chicago State University reviewed the questionnaire for clarity. Based on their input several items of the initial draft of the questionnaire were restructured to improve comprehension. The English version of the questionnaire was translated into Turkish and back into English to ensure validity.

### *Study design*

The study protocol utilized in this study was approved by the Institutional Review Boards at the participating universities. Student volunteers were recruited from major public universities in the USA, Turkey and South Africa. A test-retest research protocol was employed and the questionnaire was administered on two occasions to selected university students in the three countries. While the universities were chosen mainly for convenience, the countries were selected based on differences in HIV prevalence rates as well as cultural, religious and ethnic differences. The participants in the purposive design study were selected by convenience sampling. All the participants who were present on the first day of data collection were invited to return for the second testing. Our study is a correlation study designed to evaluate the stability of the psychometric tool that we developed and no 'cause and effect' conclusion is anticipated.

### *Procedure*

The English version of the survey instrument was used in the USA and South Africa and the translated Turkish version was used in Turkey. The purpose, significance, benefits and potential risks of the study were explained to the volunteers. Participation in the study was voluntary and non-participation would have no social or academic consequences. Students who volunteered to participate were then asked to complete a paper and pencil survey after providing verbal consent. Participants were instructed to answer the questions as honestly and as accurately as possible. In addition, they were informed that there were no right or wrong answers. A time limit was not imposed for the completion of the questionnaire, but most participants completed the questionnaire in less than 30 minutes.

On the second occasion, similar standardized testing conditions and instructions were maintained. Testing was done by the same research staff members. The interval between the sessions was two weeks. Upon completion of both sessions, study participants received a book voucher or phone card for their time. Participants' concerns were addressed before and after completing the survey and those who required further services such as HIV testing were referred to the appropriate personnel.

### *Statistical analysis*

For statistical analysis, the five possible responses on the attitude and belief questions were collapsed into three options: 'Strongly Agree/Agree', 'Neither Agree nor Disagree' or 'Disagree/Strongly Disagree'. Intra-class correlation (ICC) coefficient, 95 per cent confidence intervals were computed for each item on the demographic, attitude and belief, alcohol and drug use, HIV risk sexual behaviour, and sources of information about HIV/AIDS subscales. In addition, test-retest reliability ( $k$ ) was computed as percentage agreement or as kappa coefficients for binary ('Yes' or 'No') responses, and weighted kappa for responses with more than two choices. We used the guidelines proposed by Landis and Koch<sup>25</sup> to interpret the test-retests reliability data.

## **Results**

### *Sample characteristics*

The study participants (USA 66, Turkey 53, and South Africa 100) range in age from 18–49 years (Mean = 24.1, SD = 5.8); 73.7 per cent were young adults (15–24 years), the remaining 26.3 per cent were older than 24 years. Fifty-two participants, 24 per cent of the total, were middle adults (25–44 years) and five participants, 2.3 per cent of the total, were older adults (45–64 years). Fifty-eight per cent of the respondents were junior students, 12 per cent sophomores, 16 per cent seniors, 4 per cent graduate students, and 7 per cent undisclosed. The overwhelming majority (77 per cent) of the respondents were women, 88 per cent were never married, 58 per cent were junior students, 51.6 per cent lived in off-campus housing or apartments and 93.6 per cent were full-time students. The study participants from the USA were older ( $p < .05$ ) than their peers from Turkey and South Africa.

### *Readability of the questionnaire*

The instrument readability was assessed with Microsoft Word 2007. The evaluation revealed that the Flesch-Kincaid score (literacy difficulty level of the questionnaire) was 8.4, indicating that respondents would need an eighth grade reading level to understand the survey. The Flesch Reading Ease score for the questionnaire was 36.6 (minimum score = 0, maximum obtainable score = 100, higher scores indicate the text is easier to read).

### *Demographic subscale*

The demographic information reliability coefficients for the three groups were greater than 0.80 (Table 1).

The overall Kappa or weighted Kappa coefficients for the demographic subscale range from 'almost perfect' (0.893,  $p < .001$ ) to 'almost perfect' (0.997,  $p < .001$ ).

### *Attitudes and beliefs about HIV/AIDS subscale*

The percentage agreement, Kappa or weighted Kappa ( $k$ ) coefficients for the 38 HIV/AIDS attitudes and beliefs items are presented in Table 2.

For the three groups, their re-test percentage agreement for the individual items was very high; it ranged from 71.2–96.9 per cent. No discernible difference in the percentage agreement, Kappa

**Table 1.** Test-retest reliability for the demographic subscale

Questions	USA			Turkey			South Africa			Overall		
	ICC 95% CI†	Kappa or weighted Kappa Coefficient*	Kappa or weighted Kappa 95% CI†	ICC 95% CI†	Kappa or weighted Kappa Coefficient*	Kappa or weighted Kappa 95% CI†	ICC 95% CI†	Kappa or weighted Kappa Coefficient*	Kappa or weighted Kappa 95% CI†	ICC 95% CI†	Kappa or weighted Kappa Coefficient*	
Q1. How old are you?	0.997** 0.995–0.998 <sup>a</sup>	0.999**	0.986 0.976–0.992 <sup>a</sup>	0.986 0.976–0.992 <sup>a</sup>	0.993**	0.974 0.962–0.982 <sup>a</sup>	0.995 0.993–0.996 <sup>a</sup>	0.987**	0.997**	0.995 0.993–0.996 <sup>a</sup>	0.997**	
Q2. What is your sex?	0.860 0.781–0.912 <sup>a</sup>	0.923	1.00 (–)	1.00 (–)	1.00	0.922 0.886–0.947 <sup>a</sup>	0.934 0.915–0.949 <sup>a</sup>	0.959	0.966	0.934 0.915–0.949 <sup>a</sup>	0.966	
Q3. What is your class standing?	0.898 0.838–0.936 <sup>a</sup>	0.947	1.00 (–)	1.00 (–)	1.00	0.872 0.815–0.912 <sup>a</sup>	0.950 0.935–0.961	0.931	0.974	0.950 0.935–0.961	0.974	
Q4. What is your current year in college?	0.763 0.640–0.847 <sup>a</sup>	0.866	0.973 0.954–0.984 <sup>a</sup>	0.973 0.954–0.984 <sup>a</sup>	0.958	0.938 0.938–0.971 <sup>a</sup>	0.917 0.893–0.936 <sup>a</sup>	0.978	0.957	0.917 0.893–0.936 <sup>a</sup>	0.957	
Q5. Are you a full-time student?	0.818 0.720–0.884 <sup>a</sup>	0.899	0.881 0.803–0.929 <sup>a</sup>	0.881 0.803–0.929 <sup>a</sup>	0.937	1.00 (–)	0.816 0.767–0.856 <sup>a</sup>	1.00	0.898	0.816 0.767–0.856 <sup>a</sup>	0.898	
Q6. How do you describe yourself?	0.940 0.904–0.963 <sup>a</sup>	0.969	0.88 0.814–0.934 <sup>a</sup>	0.88 0.814–0.934 <sup>a</sup>	0.942	0.978 0.967–0.985 <sup>a</sup>	0.931 0.911–0.947 <sup>a</sup>	0.989	0.965	0.931 0.911–0.947 <sup>a</sup>	0.965	

(Continued)

**Table 1.** Continued

Questions	USA		Turkey		South Africa		Overall	
	ICC 95% CI†	Kappa or weighted Kappa Coefficient**	ICC 95% CI†	Kappa or weighted Kappa Coefficient**	ICC 95% CI†	Kappa or weighted Kappa Coefficient**	ICC 95% CI†	Kappa or weighted Kappa Coefficient**
Q7. What is your marital status?	0.976 0.962–0.985 <sup>a</sup>	0.988	1.00(–)	1.00	0.986 0.980–0.991 <sup>a</sup>	0.993	0.982 0.977–0.986 <sup>a</sup>	0.991
Q8. Where do you currently live?	0.792 0.682–0.867 <sup>a</sup>	0.888	0.893 0.823–0.937 <sup>a</sup>	0.944	0.826 0.752–0.879 <sup>a</sup>	0.904	0.840 0.796–0.875 <sup>a</sup>	0.913
Q9. Are you a member of a social fraternity or sorority?	1.00(–)	1.00	0.900 0.833–0.941 <sup>a</sup>	0.948	0.671 0.547–0.766 <sup>a</sup>	0.802	0.808 0.756–0.849 <sup>a</sup>	0.893

<sup>a</sup> $p < .001$ ; <sup>b</sup> $p < .01$ ; <sup>c</sup> $p < .05$ ; <sup>d</sup>Test-retest reliability ( $k$ ) was computed as percentage agreement and as kappa coefficients for binary ('Yes' or 'No') items and weighted kappa for items with more than two choices; <sup>e</sup>Pearson product moment correlation coefficient for ratio (age) data; †CI = Confidence interval.

**Table 2.** Test-retest reliability for the attitudes and beliefs about HIV/AIDS subscale

Questions	USA		Turkey		South Africa		Overall	
	Agreement (%)	Kappa or weighted Kappa Coefficient**	Agreement (%)	Kappa or weighted Kappa Coefficient**	Agreement (%)	Kappa or weighted Kappa Coefficient**	Agreement (%)	Kappa or weighted Kappa Coefficient**
Q83. Limiting the spread of AIDs is more important than trying to protect the rights of people with AIDs	74.2	0.29 <sup>b</sup>	86.1	0.47 <sup>a</sup>	84.3	0.59 <sup>a</sup>	80.1	0.58 <sup>a</sup>
Q84. Support groups for people with HIV infection would be very helpful to them	96.9	0.32 <sup>a</sup>	90.4	0.52 <sup>a</sup>	89.0	0.76 <sup>a</sup>	91.5	0.80 <sup>a</sup>
Q85. I would consider marrying someone with HIV infection	86.9	0.54 <sup>a</sup>	88.7	0.56 <sup>a</sup>	88.3	0.74 <sup>a</sup>	90.1	0.77 <sup>a</sup>
Q86. I would quit my job before I would work with someone who has AIDs	83.1	0.19 <sup>c</sup>	81.7	0.38 <sup>a</sup>	88.6	0.75 <sup>a</sup>	83.4	0.63 <sup>a</sup>
Q87. People should not be afraid of catching HIV from casual contact like hugging or shaking hands	81.8	0.23 <sup>c</sup>	84.3	0.48 <sup>a</sup>	88.3	0.73 <sup>a</sup>	88.8	0.72 <sup>a</sup>
Q88. I would like to feel at ease around people with AIDs	86.4	0.30 <sup>b</sup>	84.6	0.38 <sup>a</sup>	86.3	0.67 <sup>a</sup>	83.9	0.61 <sup>a</sup>
Q89. People who receive positive results from the HIV blood test should not be allowed to get married	84.9	0.50 <sup>a</sup>	85.6	0.48 <sup>a</sup>	83.0	0.61 <sup>a</sup>	81.9	0.61 <sup>a</sup>
Q90. I would prefer not to be around homosexuals for fear of catching AIDs	93.2	0.63 <sup>a</sup>	84.0	0.49 <sup>a</sup>	82.3	0.61 <sup>a</sup>	85.7	0.70 <sup>a</sup>
Q91. Being around someone with AIDs would not put my health in danger	73.5	0.19 <sup>a</sup>	83.2	0.42 <sup>a</sup>	85.5	0.52 <sup>a</sup>	78.9	0.45 <sup>a</sup>
Q92. I would consider asking a person who has been to prison to get an HIV test before dating them	81.9	0.28 <sup>a</sup>	85.6	0.49 <sup>a</sup>	87.0	0.69 <sup>a</sup>	84.8	0.68 <sup>a</sup>
Q93. people with AIDs should not avoid being around other people	83.7	0.44 <sup>a</sup>	86.5	0.42 <sup>a</sup>	83.5	0.48 <sup>a</sup>	80.3	0.44 <sup>a</sup>
Q94. people should avoid going to the dentist because they might catch HIV from dental instruments	82.6	0.29 <sup>a</sup>	81.9	0.38 <sup>a</sup>	86.0	0.64 <sup>a</sup>	79.7	0.52 <sup>a</sup>
Q95. A person who has been to jail or prison has a greater chance of being infected with HIV	83.3	0.48 <sup>a</sup>	87.3	0.38 <sup>a</sup>	84.0	0.43 <sup>a</sup>	81.8	0.53 <sup>a</sup>
Q96. The thought of being around someone with AIDs does not bother me	83.7	0.37 <sup>a</sup>	93.0	0.72 <sup>a</sup>	79.0	0.51 <sup>a</sup>	80.3	0.57 <sup>a</sup>

(Continued)

Table 2. Continued

Questions	USA		Turkey		South Africa		Overall	
	Agreement (%)	Kappa or weighted Kappa Coefficient**	Agreement (%)	Kappa or weighted Kappa Coefficient**	Agreement (%)	Kappa or weighted Kappa Coefficient**	Agreement (%)	Kappa or weighted Kappa Coefficient**
Q97. People with HIV infection should not be prohibited from working in public places	79.6	0.36 <sup>a</sup>	89.0	0.53 <sup>a</sup>	80.3	0.51 <sup>a</sup>	77.8	0.48 <sup>a</sup>
Q98. I would not want to be in the same room with someone who I knew had AIDS	88.3	0.38 <sup>a</sup>	85.1	0.46 <sup>a</sup>	83.8	0.59 <sup>a</sup>	82.6	0.61 <sup>a</sup>
Q99. People who give HIV to others should face criminal charges	81.3	0.47 <sup>a</sup>	81.9	0.44 <sup>a</sup>	86.8	0.60 <sup>a</sup>	82.6	0.64 <sup>a</sup>
Q100. People should not be afraid to donate blood because of AIDS	84.8	0.51 <sup>a</sup>	80.9	0.51 <sup>a</sup>	87.3	0.66 <sup>a</sup>	83.5	0.65 <sup>a</sup>
Q101. A list of people who have HIV infection should be available to anyone	83.9	0.53 <sup>a</sup>	83.3	0.32 <sup>a</sup>	81.3	0.57 <sup>a</sup>	78.7	0.53 <sup>a</sup>
Q102. I would date a person with AIDS	84.2	0.51 <sup>a</sup>	86.5	0.52 <sup>a</sup>	79.8	0.53 <sup>a</sup>	83.3	0.64 <sup>a</sup>
Q103. No one deserves to have a disease like HIV infection	79.6	0.31 <sup>a</sup>	86.0	0.51 <sup>a</sup>	84.0	0.62 <sup>a</sup>	82.1	0.62 <sup>a</sup>
Q104. It would not bother me to attend class with someone who has AIDS	74.6	0.22 <sup>a</sup>	82.7	0.39 <sup>a</sup>	83.3	0.54 <sup>a</sup>	77.0	0.41 <sup>a</sup>
Q105. An employer should have the right to fire an employee with HIV infection regardless of the type of work she/he does	87.3	0.54 <sup>a</sup>	85.2	0.45 <sup>a</sup>	86.3	0.60 <sup>a</sup>	86.0	0.58 <sup>a</sup>
Q106. I would allow my children to play with the children of someone known to have AIDS	80.8	0.36 <sup>a</sup>	85.3	0.47 <sup>a</sup>	85.3	0.61 <sup>a</sup>	82.6	0.60 <sup>a</sup>
Q107. People get AIDS by performing unnatural sex acts	71.2	0.28 <sup>a</sup>	88.0	0.55 <sup>a</sup>	81.8	0.49 <sup>a</sup>	73.2	0.42 <sup>a</sup>
Q108. People with HIV should not be looked down upon by others	77.7	0.21 <sup>a</sup>	87.5	0.52 <sup>a</sup>	86.3	0.56 <sup>a</sup>	82.6	0.43 <sup>a</sup>
Q109. I could tell by looking at someone if she/he had AIDS	83.9	0.44 <sup>a</sup>	85.6	0.59 <sup>a</sup>	85.0	0.66 <sup>a</sup>	86.8	0.70 <sup>a</sup>
Q110. Health care workers should not refuse to care for people with HIV infection regardless of their personal feelings about the disease.	81.2	0.28 <sup>a</sup>	85.8	0.40 <sup>a</sup>	85.8	0.32 <sup>a</sup>	85.4	0.32 <sup>a</sup>
Q111. Children who have AIDS should not be prohibited from going to schools or day care centers	78.5	0.38 <sup>a</sup>	84.3	0.32 <sup>a</sup>	87.3	0.68 <sup>a</sup>	79.9	0.55 <sup>a</sup>



**Table 2.** Continued

Questions	USA		Turkey		South Africa		Overall	
	Agreement (%)	Kappa or weighted Kappa Coefficient**	Agreement (%)	Kappa or weighted Kappa Coefficient**	Agreement (%)	Kappa or weighted Kappa Coefficient**	Agreement (%)	Kappa or weighted Kappa Coefficient**
Q112. HIV blood test results should be confidential to avoid discrimination against people with positive results	81.2	0.29 <sup>a</sup>	88.5	0.53 <sup>a</sup>	85.3	0.46 <sup>a</sup>	82.9	0.47 <sup>a</sup>
Q113. HIV infection is a punishment of immoral behavior	84.2	0.56 <sup>a</sup>	87.8	0.59 <sup>a</sup>	84.0	0.56 <sup>a</sup>	81.8	0.54 <sup>a</sup>
Q114. I would not be afraid to take care of a family member with AIDS	85.6	0.49 <sup>a</sup>	88.5	0.56 <sup>a</sup>	87.8	0.58 <sup>a</sup>	85.9	0.60 <sup>a</sup>
Q115. If I discovered that my roommate had AIDS, I would move out	78.1	0.34 <sup>a</sup>	91.4	0.67 <sup>a</sup>	88.0	0.68 <sup>a</sup>	84.6	0.68 <sup>a</sup>
Q116. Churches should take a strong stand against drug abuse and homosexuality to prevent spread of AIDS	76.2	0.31 <sup>a</sup>	88.9	0.57 <sup>a</sup>	91.0	0.79 <sup>a</sup>	85.5	0.70 <sup>a</sup>
Q117. I could comfortably discuss AIDS with others	91.8	0.62 <sup>a</sup>	89.2	0.55 <sup>a</sup>	84.5	0.62 <sup>a</sup>	85.5	0.65 <sup>a</sup>
Q118. People with AIDS are not worth getting to know	87.1	0.28 <sup>a</sup>	84.6	0.39 <sup>a</sup>	86.0	0.69 <sup>a</sup>	85.2	0.62 <sup>a</sup>
Q119. Parents who transmit HIV to their children should be prosecuted as child abusers	85.6	0.50 <sup>a</sup>	86.3	0.52 <sup>a</sup>	89.3	0.74 <sup>a</sup>	88.3	0.75 <sup>a</sup>
Q120. People would not be so afraid of AIDS if they knew more about the disease	84.8	0.24 <sup>a</sup>	86.3	0.53 <sup>a</sup>	89.5	0.46 <sup>a</sup>	87.6	0.41 <sup>a</sup>
Q121. I would not avoid a friend if she/he had AIDS	89.1	0.43 <sup>a</sup>	88.2	0.54 <sup>a</sup>	87.0	0.62 <sup>a</sup>	91.2	0.63 <sup>a</sup>

<sup>a</sup>p < .001; <sup>b</sup>p < .01; <sup>c</sup>p < .05. \*\*Kappa coefficients are reported for binary ('Yes' or 'No') items; <sup>a</sup>Test-retest reliability (k) was computed as percentage agreement and as kappa coefficients for binary ('Yes' or 'No') items and weighted kappa for items with more than two choices.

or weighted Kappa ( $k$ ) coefficients data for the attitudes and beliefs subscale exists among the students from the three countries. Their overall percentage agreement data range from 73.2–91.5 per cent; Kappa or weighted Kappa coefficient data range from ‘fair’ (0.32,  $p < .05$ ) to ‘almost perfect’ (0.80,  $p < 0.001$ ).

### *Alcohol and drug use subscale*

The test-retest reliability coefficients for the alcohol and drug use items on the questionnaire are presented in Table 3.

The overwhelming majority (99 per cent) of the items on the alcohol and drug use subscale showed ‘substantial’ (0.6–0.8) to ‘perfect’ (1.00) reliability. Only one item (‘How old were you when you tried marijuana for the first time?’) from the Turkish students had a ‘moderate’ (0.325,  $p < 0.01$ ) test-retest coefficient. No noticeable differences in the ICC, Kappa or weighted Kappa ( $k$ ) coefficients data for the alcohol and drug use subscale exist among the students from the three countries. The overall Kappa or weighted Kappa coefficient data range from ‘moderate’ (0.562,  $p < .05$ ) to ‘perfect’ (1.000,  $p < 0.001$ ).

### *HIV risk sexual behaviour subscale*

The test-retest reliability data for the HIV risk sexual behaviour subscale is presented in Table 4.

All the items on the HIV risk sexual behaviour subscale for the three cohorts of students showed test reliability coefficients greater than 0.60. No discernable differences in the ICC, Kappa or weighted Kappa ( $k$ ) coefficients data for the HIV risk sexual behaviour subscale exist among the students from the three countries. Their overall Kappa or weighted Kappa coefficient data range from ‘substantial’ (0.738,  $p < .001$ ) to ‘almost perfect’ (0.966,  $p < 0.001$ ).

### *Sources of information about HIV/AIDS subscale*

The test-retest reliability data for the sources of information about HIV/AIDS subscale is presented in Table 5.

Among the USA students, one of the items (‘Received information about AIDS from a health department?’) showed ‘poor’ (0.126,  $p > .05$ ) reliability. For the HIV sources of information subscale, no noticeable difference in the ICC, Kappa or weighted Kappa ( $k$ ) coefficients data exists among the students from the three countries. The overall reliability coefficient data range from ‘moderate’ (0.370,  $p < .05$ ) to ‘almost perfect’ (0.892,  $p < 0.001$ ).

## **Discussion**

This study sets out to evaluate the readability and stability of a psychometric instrument designed to assess the HIV/AIDS attitudes, beliefs, behaviours and sources of HIV information of university students in countries where the HIV epidemic rates differ. This evaluative study is significant because it represents the first attempt to determine the psychometric properties of an instrument designed to assess the HIV risk behaviours of young adults in different countries. The HIV epidemic is considered to be low level in the USA and Turkey, whereas it is hyper endemic in South Africa. In addition to disparities in prevalence rate, other selection criteria such as culture, religion and ethnicity were also considered. Both South Africa and the USA are ethnically diverse and are

**Table 3.** Test-retest reliability for the alcohol and drug use subscale

Questions	Response Options		USA		Turkey		South Africa		Overall			
	ICC	95% CI†	Kappa or weighted Kappa Coefficient*	ICC	95% CI†	Kappa or weighted Kappa Coefficient*	ICC	95% CI†	Kappa or weighted Kappa Coefficient*	ICC	95% CI†	
Q10. How old were you when you had your first drink of alcohol other than a few sips?			0.815 0.715–0.882 <sup>a</sup>	0.896	0.945	0.906–0.968 <sup>a</sup>	0.973	0.963	0.945–0.975 <sup>a</sup>	0.982	0.925	0.904–0.942 <sup>a</sup>
	I have never drink alcohol	12–16 years old										
		17–20 years old										
		21 years and above										
Q11. During the past 30 days, on how many days did you have at least one drink of alcohol?			0.543 0.349–0.692 <sup>a</sup>	0.703	0.572	0.361–0.728 <sup>a</sup>	0.726	0.963	0.945–0.975 <sup>a</sup>	0.977	0.863	0.825–0.893 <sup>a</sup>
	0 days	1–5 days										
		6–9 days										
		10 days and above										
Q12. During the past 30 days, on how many days did you have 5 or more drinks of alcohol in a row, that is, within a couple of hours?			0.453 0.239–0.625 <sup>a</sup>	0.618	0.465	0.226–0.651 <sup>a</sup>	0.632	0.896	0.849–0.928 <sup>a</sup>	0.945	0.810	0.759–0.851
	0 times	1–5 days										
		6 days and above										
Q13. During your life, how many times have you used marijuana?			0.879 0.810–0.924 <sup>a</sup>	0.936	0.662	0.481–0.790 <sup>a</sup>	0.797	0.989	0.984–0.993 <sup>a</sup>	0.994	0.942	0.925–0.955 <sup>a</sup>
	0 times	1–19 times										
		20 times and above										
Q14. How old were you when you tried marijuana for the first time?			0.918 0.870–0.949 <sup>a</sup>	0.957	0.325	0.064–0.545 <sup>a</sup>	0.490	0.975	0.963–0.983 <sup>a</sup>	0.987	0.934	0.915–0.949 <sup>a</sup>
	Never tried marijuana	12–18 years										
		19 years and above										
Q15. Did you use marijuana in the past 30 days?			0.638 0.470–0.761 <sup>a</sup>	0.779	–	–	–	0.912	0.873–0.940 <sup>a</sup>	0.954	0.828	0.781–0.865 <sup>a</sup>
	No	Yes										
Q16. Have you ever used any form of cocaine, including powder, crack, or freebase?			1.00(–)	1.00	–	–	–	1.00(–)	1.000–1.000	1.00	1.000	1.000–1.000
	No	Yes										
Q17. How old were you when you tried any form of cocaine, including powder, crack, or freebase, for the first time?			1.00(–)	1.00	–	–	–	1.00(–)	1.000–1.000	1.00	1.000	1.000–1.000
	Never tried	12 years or younger										
		13–18 years										
		More than 18 years										

(Continued)

**Table 3.** Continued

Questions	Response Options		USA		Tur-key		South Africa		Overall	
	ICC 95% CI†	Kappa or weighted Kappa Coefficient*	ICC 95% CI†	Kappa or weighted Kappa Coefficient*	ICC 95% CI†	Kappa or weighted Kappa Coefficient*	ICC 95% CI†	Kappa or weighted Kappa Coefficient*	ICC 95% CI†	Kappa or weighted Kappa Coefficient*
Q18. Did you use any form of cocaine, including powder, crack, or freebase in the past 30 days?	1.00(-)	1.00	-	-	1.00(-)	1.00	1.00(-)	1.00	0.855 0.815-0.887 <sup>a</sup>	0.922
Q19. Have you used the crack or freebase forms of cocaine?	-	-	-	-	0.919 0.881-0.944 <sup>a</sup>	0.958	1.00(-)	0.958	0.856 0.812-0.885 <sup>a</sup>	0.920
Q20. Have you ever sniffed glue, or breathed the contents of aerosol spray cans, or inhaled any paints or sprays to get high?	0.663 0.504-0.779 <sup>a</sup>	0.798	-	-	1.00(-)	1.00	1.00(-)	1.00	0.961 0.949-0.970 <sup>a</sup>	0.980
Q21. Have you ever taken steroid pills or shots without a doctor's prescription?	-	-	-	-	1.00(-)	1.00	1.00(-)	1.00	0.799 0.745-0.842 <sup>a</sup>	0.888
Q22. Have you used any other type of illegal drug, such as LSD, PCP, ecstasy, mushrooms, speed, ice, or heroin?	1.00(-)	1.00	1.00(-)	1.00	1.00(-)	1.00	1.00(-)	1.00	1.000 1.000-1.000	1.000
Q23. Did you use any other type of illegal drug, such as LSD, PCP, ecstasy, mushrooms, speed, ice, or heroin in the past 30 days?	1.00(-)	1.00	-	-	0.422 0.248-0.571 <sup>a</sup>	0.610	0.422 0.248-0.571 <sup>a</sup>	0.610	0.388 0.270-0.495 <sup>a</sup>	0.562
Q24. Did you use any illegal drug in combination with drinking alcohol in the past 30 days?	0.737 0.605-0.830 <sup>a</sup>	0.847	-	-	0.904 0.860-0.935 <sup>a</sup>	0.950	0.904 0.860-0.935 <sup>a</sup>	0.950	0.896 0.866-0.919 <sup>a</sup>	0.945
Q25. Have you used a needle to inject any illegal drug into your body?	-	-	-	-	1.00(-)	1.00	1.00(-)	1.00	1.000 1.000-1.000	1.000

<sup>a</sup>p < .001; <sup>b</sup>p < .01; <sup>c</sup>p < .05; <sup>†</sup>Test-retest reliability (k) was computed as percentage agreement and as kappa coefficients for binary ('Yes' or 'No') items and weighted kappa for items with more than two choices; <sup>‡</sup>CI = Confidence interval.

**Table 4.** Test-retest reliability for the HIV risk sexual behaviour subscale

Questions	Response Options	USA		Turkey		South Africa		Overall	
		ICC 95% CI†	Kappa or weighted Kappa Coefficient**	ICC 95% CI†	Kappa or weighted Kappa Coefficient**	ICC 95% CI†	Kappa or weighted Kappa Coefficient**	ICC 95% CI†	Kappa or weighted Kappa Coefficient**
Q26. How old were you when you had sexual intercourse for the first time?	I have never had sexual intercourse 12–14 years old 15–18 years old 19 and above	0.537 0.342–0.688 <sup>a</sup>	0.695	0.976 0.959–0.986 <sup>a</sup>	0.988	0.983 0.974–0.988 <sup>a</sup>	0.991	0.923 0.901–0.940 <sup>a</sup>	0.960
Q27. During your life, with how many females have you had sexual intercourse?	I have never had sexual intercourse with a female 1 female 2–4 females 5 female and more	0.439 0.224–0.614 <sup>a</sup>	0.605	0.994 0.990–0.997 <sup>a</sup>	0.997	0.992 0.988–0.994 <sup>a</sup>	0.996	0.934 0.915–0.949 <sup>a</sup>	0.966
Q28. During the past 3 months, with how many females have you had sexual intercourse?	I have never had sexual intercourse with a female 1 female 2–4 females 5 female and above	0.804 0.699–0.875 <sup>a</sup>	0.896	0.810 0.692–0.885 <sup>a</sup>	0.895	0.773 0.680–0.841 <sup>a</sup>	0.875	0.794 0.739–0.838 <sup>a</sup>	0.889
Q29. During your life, with how many males have you had sexual intercourse?	I have never had sexual intercourse with a male 1 male 2–4 males 5 male and more	0.893 0.832–0.933 <sup>a</sup>	0.944	0.811 0.695–0.886 <sup>a</sup>	0.896	0.951 0.928–0.967 <sup>a</sup>	0.975	0.945 0.929–0.957 <sup>a</sup>	0.972
Q30. During the past 3 months, with how many males have you had sexual intercourse?	I have never had sexual intercourse with a male 1 male 2–4 males 5 males and more	0.747 0.618–0.837 <sup>a</sup>	0.855	0.811 0.695–0.886 <sup>a</sup>	0.896	0.882 0.830–0.919 <sup>a</sup>	0.937	0.846 0.803–0.879 <sup>a</sup>	0.916

(Continued)

Table 4. Continued

Questions	Response Options	USA		Turkey		South Africa		Overall	
		ICC 95% CI†	Kappa or weighted Kappa Coefficient*	ICC 95% CI†	Kappa or weighted Kappa Coefficient*	ICC 95% CI†	Kappa or weighted Kappa Coefficient*	ICC 95% CI†	Kappa or weighted Kappa Coefficient*
Q31. During the past 30 days, how many times did you have sexual intercourse?	0 times 1–3 times 4 to 9 times 10 times and more	0.756 0.631–0.843 <sup>a</sup>	0.860	0.762 0.622–0.855 <sup>a</sup>	0.866	0.922 0.886–0.947 <sup>a</sup>	0.959	0.849 0.807–0.882 <sup>a</sup>	0.918
Q32. During the past 30 days, how often did you or your partner use a condom?	I have not had sexual intercourse during the past 30 days Inconsistent Consistent	0.733 0.598–0.828 <sup>a</sup>	0.849	0.850 0.751–0.912 <sup>a</sup>	0.917	0.876 0.821–0.914 <sup>a</sup>	0.933	0.842 0.798–0.877 <sup>a</sup>	0.914
Q33. The last time you had sexual intercourse, did you or your partner use a condom?	I have never had sexual intercourse Yes No	0.735 0.602–0.829 <sup>a</sup>	0.846	0.931 0.882–0.960 <sup>a</sup>	0.964	0.829 0.757–0.882 <sup>a</sup>	0.907	0.934 0.841–0.904 <sup>a</sup>	0.934
Q34. Did you drink alcohol or use drugs before you had sexual intercourse the last time?	I have never had sexual intercourse Yes No	0.756 0.630–0.843 <sup>a</sup>	0.859	0.929 0.880–0.959 <sup>a</sup>	0.964	0.807 0.722–0.867 <sup>a</sup>	0.894	0.892 0.861–0.917 <sup>a</sup>	0.943
Q35. Has any relative, friend or colleague of yours ever had HIV/AIDS?	Yes No	0.750 0.621–0.839 <sup>a</sup>	0.855	0.696 0.527–0.812 <sup>a</sup>	0.817	0.782 0.686–0.852 <sup>a</sup>	0.877	0.768 0.706–0.819 <sup>a</sup>	0.869
Q36. What are the chances that you might catch HIV? Would you say there is no chance, a moderate chance or a good chance?	No chance Moderate chance Good chance Don't know	0.554 0.363–0.701 <sup>a</sup>	0.709	0.533 0.305–0.703 <sup>a</sup>	0.696	0.832 0.761–0.884 <sup>a</sup>	0.909	0.585 0.491–0.666 <sup>a</sup>	0.738
Q37. What is the main reason why? (circle only one answer)	Abstinent/no sex Has only one partner Always uses condom	0.827 0.710–0.900 <sup>a</sup>	0.916	0.962 0.912–0.984 <sup>a</sup>	0.981	0.954 0.930–0.970	0.977	0.919 0.890–0.941 <sup>a</sup>	0.958

\* $p < .001$ ; <sup>b</sup> $p < .01$ ; <sup>c</sup> $p < .05$ ; <sup>d</sup>Test–retest reliability ( $k$ ) was computed as percentage agreement and as kappa coefficients for binary ('Yes' or 'No') items and weighted kappa for items with more than two choices; †CI = Confidence interval.

**Table 5. Test-retest reliability of the sources of information about HIV/AIDS subscale**

Questions	Response Options			USA			Turkey			South Africa			Overall		
		ICC	Kappa or weighted Kappa coefficient**	ICC	Kappa or weighted Kappa coefficient**	ICC	Kappa or weighted Kappa coefficient**	ICC	Kappa or weighted Kappa coefficient**	ICC	Kappa or weighted Kappa coefficient**	ICC	Kappa or weighted Kappa coefficient**	ICC	Kappa or weighted Kappa coefficient**
Q122. How much do you know about AIDS?	A lot Some A little Nothing	0.579 0.392-0.720 <sup>a</sup>	0.734	0.694 0.520-0.813 <sup>a</sup>	0.824	0.659 0.533-0.757 <sup>a</sup>	0.793	0.735 0.667-0.790 <sup>a</sup>	0.848						
Q123. Seen public service announcements about AIDS on television?	Yes No	0.653 0.488-0.772 <sup>a</sup>	0.787	0.565 0.351-0.723 <sup>a</sup>	0.720	0.521 0.362-0.650 <sup>a</sup>	0.690	0.644 0.559-0.715 <sup>a</sup>	0.785						
Q124. Seen public service announcements about AIDS on bus/streetcar/subway displays?	Yes No	0.203 -0.040-0.423 <sup>a</sup>	0.353	0.618 0.420-0.759 <sup>a</sup>	0.760	0.615 0.477-0.723 <sup>a</sup>	0.759	0.623 0.535-0.698	0.767						
Q125. Seen public service announcements about AIDS on airport public service posters?	Yes No	0.691 0.537-0.800 <sup>a</sup>	0.815	1.00(-)	1.00	0.599 0.458-0.711 <sup>a</sup>	0.751	0.718 0.647-0.777 <sup>a</sup>	0.836						
Q126. Seen Public service announcements about AIDS on street signs/billboards?	Yes No	0.602 0.422-0.737 <sup>a</sup>	0.748	0.838 0.736-0.903 <sup>a</sup>	0.910	0.507 0.347-0.639 <sup>a</sup>	0.670	0.746 0.680-0.799 <sup>a</sup>	0.854						
Q127. Heard public service announcements about AIDS on radio?	Yes No	0.575 0.388-0.717 <sup>a</sup>	0.726	0.443 0.197-0.636 <sup>a</sup>	0.611	0.541 0.386-0.666 <sup>a</sup>	0.699	0.627 0.539-0.702 <sup>a</sup>	0.770						
Q128. Received information about AIDS from church or religious organization?	Yes No	0.579 0.393-0.720 <sup>a</sup>	0.730	0.671 0.490-0.796 <sup>a</sup>	0.800	0.702 0.588-0.789 <sup>a</sup>	0.824	0.689 0.612-0.753 <sup>a</sup>	0.815						
Q129. Received information about AIDS from church or religious organization?	Yes No	0.816 0.715-0.883 <sup>a</sup>	0.898	0.488 0.254-0.668 <sup>a</sup>	0.649	0.762 0.666-0.833 <sup>a</sup>	0.871	0.802 0.750-0.845 <sup>a</sup>	0.892						

(Continued)

Table 5. Continued

Questions	Response Options	USA		Turkey		South Africa		Overall	
		ICC95% CI†	Kappa or weighted Kappa coefficient**	ICC 95% CI†	Kappa or weighted Kappa coefficient**	ICC 95% CI†	Kappa or weighted Kappa coefficient**	ICC 95% CI†	Kappa or weighted Kappa coefficient**
Q130. Received information about AIDS from your workplace?	Yes No Not currently working	0.601 0.421–0.736 <sup>a</sup>	0.750	0.387 0.120–0.602 <sup>c</sup>	0.549	0.839 0.769–0.888 <sup>a</sup>	0.912	0.743 0.676–0.798 <sup>a</sup>	0.852
Q131. Received information about AIDS from a health department?	Yes No	0.063 –0.182–0.302	0.126	0.444 0.201–0.636 <sup>a</sup>	0.612	0.627 0.492–0.732 <sup>a</sup>	0.768	0.227 0.097–0.349 <sup>a</sup>	0.370
Q132. Received information about AIDS from a community organization?	Yes No	0.566 0.373–0.712 <sup>a</sup>	0.718	–0.010 –0.276–0.258		0.722 0.613–0.804 <sup>a</sup>	0.837	0.703 0.629–0.765 <sup>a</sup>	0.825
Q133. Received information about AIDS from a family member?	Yes No	0.784 0.668–0.862 <sup>a</sup>	0.884	0.734 0.581–0.837 <sup>a</sup>	0.844	0.779 0.689–0.846 <sup>a</sup>	0.875	0.777 0.718–0.825 <sup>a</sup>	0.874
Q134. Received information about AIDS from a friend or acquaintance?	Yes No	0.570 0.380–0.714 <sup>a</sup>	0.722	0.854 0.760–0.913 <sup>a</sup>	0.920	0.700 0.585–0.788 <sup>a</sup>	0.822	0.728 0.659–0.785 <sup>a</sup>	0.842
Q135. Received information about AIDS from an AIDS hotline?	Yes No	0.450 0.232–0.625 <sup>a</sup>	0.615			0.833 0.762–0.885	0.909	0.775 0.716–0.823 <sup>a</sup>	0.873
Q136. Have you received information about AIDS from magazine articles?	Yes No	0.474 0.261–0.643 <sup>b</sup>	0.638	0.743 0.594–0.843 <sup>a</sup>	0.855	0.653 0.525–0.752 <sup>a</sup>	0.788	0.623 0.535–0.698 <sup>a</sup>	0.768
Q137. Have you received information about AIDS from newspaper articles?	Yes No	0.706 0.559–0.810 <sup>a</sup>	0.825	0.658 0.475–0.787 <sup>a</sup>	0.811	0.756 0.658–0.829 <sup>a</sup>	0.861	0.727 0.657–0.784 <sup>a</sup>	0.843
Q138. Have you received information about AIDS from store displays/store distributed brochures?	Yes No	0.407 0.182–0.591 <sup>a</sup>	0.573	0.783 0.653–0.868 <sup>a</sup>	0.881	0.691 0.573–0.781 <sup>a</sup>	0.815	0.713 0.641–0.773 <sup>a</sup>	0.832

<sup>a</sup>p < .001; <sup>b</sup>p < .01; <sup>c</sup>p < .05; <sup>\*\*</sup>Test–retest reliability (k) was computed as percentage agreement and as kappa coefficients for binary ('Yes' or 'No') items and weighted kappa for items with more than two choices; †CI = Confidence interval.



both predominantly Christian nations. Turkey is ethnically a less-diverse Islamic nation with conservative moral ideals but is being influenced by western values.

Our findings reveal that the questionnaire requires an eighth grade reading level to comprehend. The overall test-retest reliability coefficients for the items on the demographic subscale were generally high (0.893–0.997). Similarly, high test-retest reliability was obtained for the HIV risk sexual behaviour (0.738–0.996) and the alcohol and drug use (0.562–1.000) subscales. Much lower test-retest reliability was obtained for the attitudes and beliefs (0.32–0.80), and sources of information about HIV/AIDS (0.370–0.892) subscales.

For the three groups of students, the HIV risk behaviour instrument is generally stable when re-administered within two weeks. The level of agreement that we observed on retest compared favourably or better with the reliability coefficients reported in other HIV-specific research questionnaires<sup>26,27</sup> with the same two-week retest interval. The high retest reliability obtained in our study may be attributed, in part, to the recall bias phenomenon<sup>28</sup>. To address this limitation in future studies, the stability of the instrument should be evaluated over a longer period.

To enhance the external validity and applicability of the questionnaire, the psychometric properties of the instrument should be investigated by recruiting students from the other parts of the world. The evaluation of the instrument's sensitivity and validity is needed in future studies. The use of binary ('Yes' or 'No') responses in some of the questions did not provide the extent to which the respondents had engaged in such specific behaviours. Future refinements of the instrument should include a behavioural frequencies scale so that changes in behaviour can be accurately quantified.

Based on the findings in this study, the instrument should be of interest to clinicians and researchers investigating the HIV risk behaviours of young adults (15–24 years old). The instrument should find wider application among clinicians, counsellors and researchers interested in evaluating the HIV risk behaviours of adolescents and young adults in the three countries. About 74 per cent of the study participants were young adults less than 25 years old, 24 per cent were middle adults (25–44 years) and 2.3 per cent were older adults (45–64 years). This observation suggests that the instrument could be used in older age groups for individuals with eighth grade reading level. The availability of this instrument may enhance HIV prevention studies internationally. The psychometric tool will find useful application in studies designed to compare HIV risk behaviours between sub groups within the population, or between countries. The instrument can also be used in intervention studies designed to study the effectiveness of behaviour modification therapies or lifestyle changes on HIV risk behaviours.

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