

## **RISK TAKING AND HIV/AIDS AMONG YOUNG PEOPLE IN CAMEROON: PREDICTION OF VULNERABILITY USING THE ADOLESCENT RISK-TAKING QUESTIONNAIRE**

---

SUSAN MOORE

*Swinburne University of Technology, Victoria, Australia*

ELEONORA GULLONE

*Monash University, Victoria, Australia*

CAROLE McARTHUR

*University of Missouri-Kansas City, MO, USA*

The aim of this study was to assess the reliability and validity of the Adolescent Risk-Taking Questionnaires (ARQ) (Gullone, Moore, Moss, & Boyd, 2000) with Cameroon adolescents, and to evaluate the measure as a screening device for those at risk of HIV/AIDS. Participants were 234 adolescents (79 boys, 155 girls) attending schools in Cameroon (mean age 13.6 years). The ARQ scale items, minus the thrill-seeking items (assessed as culturally inappropriate), formed conceptually meaningful factors. Risk behavior and risk belief

---

Professor Susan Moore, School of Social and Behavioural Sciences, Swinburne University of Technology, Hawthorn, Victoria, Australia; Associate Professor Eleonora Gullone, Department of Psychology, Monash University, Monash, Victoria, Australia; Professor Carole McArthur, Kansas City School of Dentistry, University of Missouri-Kansas City, MO, USA.

Thanks are due to our collaborators in Cameroon who administered the questionnaires and obtained the saliva samples, particularly Sanosi Werdzerem and Julius Takwa.

Appreciation is due to reviewers including: Marion Kostanski, PhD, Victoria University of Technology, PO Box 14428, Melbourne City MC, Victoria 8001, Australia. Email: <Marion.Kostanski@vu.edu.au>; and Torrance T. Stephens, PhD, Emory University, Department of Behavioral Sciences and Health Education, 1518 Clifton Road, Atlanta, GA 03022, USA. Email: <stephens@sph.emory.edu>

Keywords: Cameroon, HIV/AIDS, adolescence, risk taking, Adolescent Risk-taking Questionnaire. Please address correspondence and reprint requests to: Professor Susan Moore, School of Social and Behavioural Sciences (Mail 24), Swinburne University of Technology, PO Box 218, Hawthorn, Vic., Australia, 3122. Phone: + 61 3 9214 5694; Fax: + 61 3 9819 0574; Email: <smoore@swin.edu.au>; Associate Professor Eleonora Gullone, Department of Psychology, Monash University, Wellington Road, Monash, Vic., Australia, 3800. Phone: + 61 3 9905 5374; Fax: + 61 3 9905 3948; Email: <E.Gullone@med.monash.edu.au>; Professor Carole McArthur, Kansas City School of Dentistry, University of Missouri-Kansas City, 650 E. 25th St., Kansas City, MO 64108, USA. Phone 816/235-2175; Email: <mcarthurc@umkc.edu>.

subscales showed evidence of reliability and validity. The scale items successfully discriminated between HIV positive and HIV negative boys (but not girls). Further work is necessary on both the cultural sensitivity of the scales and issues of social desirability.

HIV/AIDS is a serious health problem in Cameroon. The estimated number of adults and children living with HIV/AIDS at the end of 2001 was 920,000 in a country with a population of approximately 15 million (UNAIDS/WHO, 2002). In 2001 alone, it was estimated that 53,000 people died of AIDS in Cameroon, and 210,000 children had been orphaned by the disease at the end of that year (UNAIDS/WHO, 2002). The high prevalence rate reported among young people (15 to 29 years of age) is associated with early sexual intercourse (median age at first intercourse is 16 years for boys and 17 years for girls), educational factors and poverty (Dallal et al., 2003). Importantly, reported condom use with nonregular partners is extremely low (6.6%), and rates of casual sex quite high, with 29% of males admitting to nonregular sexual partnerships over a 12-month period (JAAIDS, 2003). The seriousness of the situation is complicated by denial as to the existence of the disease in many areas, enormous stigma associated with infection and limited resources to deal with the social consequences of the disease, which is rapidly destroying the infrastructure of society (Dallal et al., 2003).

Eaton, Flisher, and Aaro (2003), in summarizing research on unsafe sexual behavior in South Africa, have noted that Sub-Saharan Africa has the world's highest HIV infection rates. They associated these high rates with extreme poverty – which is in turn linked to high levels of adolescent sexual activity – early sexual debut, less knowledge about HIV/AIDS, greater commodification of sex, and higher degrees of physical abuse and sexual coercion within relationships, including more rape. They cited a South African study of high school pupils in which adolescents with lower socioeconomic status experienced eight times as much physical abuse and four times as much attempted and actual rape within relationships as did adolescents with high socioeconomic status (Wood & Jewkes, 1997). In this study, around half the young people surveyed attributed rape or sexual harassment to love of one's partner, that is, sexual domination was justified as a sign of love and passion. Eaton et al. also have argued, quoting several studies, that within poorer African communities sexual relationships tend to be coercive and male dominated, with limited or nonexistent possibilities for young women to negotiate about faithfulness, condom use, or even when and whether to have sex (Wood & Jewkes, 1997; Wood, Maforah, & Jewkes, 1998).

Other significant factors assessed as contributing to the AIDS in Africa crisis include unrealistic perceptions of risk (Blecher, Steinberg, Pick, Hennick, & Durcan, 1995), perceived disadvantages of protective measures (particularly

condom use) outweighing perceived advantages (e.g., Wood, Maforah, & Jewkes, 1998), lack of knowledge of – or incorrect beliefs about – transmission and protection (Smith, de Visser, Akande, Rosenthal, & Moore, 1998), and lack of access to condoms (MacPhail & Campbell, 2000).

Given all these factors and the high (and increasing) rate of HIV/AIDS infection among young people in Cameroon, there is a pressing need to find ways to identify those most at risk. The stigma attached to the disease severely limits the effectiveness of direct interventions focussed on prevention, such as education about the practicing of “safe sex”. The stigma also limits the effectiveness of direct questioning in order to establish risk patterns, and about sexual and other bodyfluid sharing practices. It is well established in western cultures that risk-taking behavior among adolescents includes a group of activities which cluster together and tend to involve binge drinking, smoking and participating in dangerous activities as well as sexual behaviors such as early sexual debut and unsafe sex practices (Donovan, Jessor, & Costa, 1988). If such clustering of risk activities also occurs among Cameroon youth, then general risk-taking measures may be effective in screening young people at higher risk of HIV/AIDS. A noninvasive, easily administered and short questionnaire which could be used as a screening device (even with a relatively high error rate) would be useful from the point of view of directing scarce resources toward a more at-risk population.

In this study we sought to examine the efficacy of the Adolescent Risk-Taking Questionnaire (ARQ) as a screening device for high risk taking, among an adolescent population of school attenders, with a view to examining (and improving) the reliability and validity of the measure with this population, and exploring the links between general risk-taking tendencies and sexual risk taking. The ARQ includes a direct question about unprotected sexual activity, but it is likely to be less confronting than a questionnaire focusing on sexual behavior, because the item is set within the context of a group of risk behaviors that range in social desirability/undesirability.

The Adolescent Risk-Taking Questionnaire (ARQ; Gullone, Moore, Moss, & Boyd, 2000; Gullone, Paul, & Moore, 2000; Moore & Gullone, 1996) assesses the extent of risk-taking behavior and beliefs/perceptions about the riskiness of these behaviors among adolescents and young people. Much previous research on adolescent risk taking has been limited by typically studying only one type of risk behavior (such as smoking) and/or only one or two personality characteristics (such as sensation seeking). The ARQ was designed to overcome this limitation through attempting to represent the underlying structure of adolescent risk rather than specific risks *per se*. The measure includes four subscales (in each of the “Risk Behaviors” and “Risk Perception” scales) established through factor analyses. These are Thrill-seeking risk, Rebellious risk, Reckless risk and

Antisocial risk. This range of categories was derived from extensive sampling of young people's views as to what constitutes risky behavior, and was also informed by theoretical conceptions of the nature of risk (Moore & Gullone, 1996).

Thrill-seeking risks refer to behaviors that are challenging but (relatively) socially acceptable, for example, engaging in dangerous sports. Reckless behaviors include those that, although thrill seeking for the most part, have a higher chance of negative social or health-related outcomes than is usually considered acceptable in the adult population. Examples include drinking and driving, or having unprotected sex. Rebellious behaviors include those that are often experimental rites of passage for young people as they move towards adulthood. Their potential outcomes may be quite negative but not to the extent likely for reckless behaviors. Examples include drinking alcohol and staying out late. Finally, antisocial behaviors are those socially frowned upon for adults and adolescents alike and not usually considered rites of passage. Cheating is one example.

The ARQ has several important qualities as a measure. It captures the notion that risk taking serves more than one purpose. The thrill-seeking scale in the ARQ encompasses some positive or managed risks, while the other three subscales encompass negative risks of different kinds. In addition, there is a developmental component implicit in the measure, as captured in the "rebellious risk" subscale which includes behaviors related to adolescent-to-adult transition behavior. The measure also demonstrates excellent reliability (both internal consistency and test-retest (Gullone, Moore et al., 2000); and validity (Gullone, Paul et al., 2000). Behavior and Perception scales of the ARQ showed expected relationships with age and gender in an Australian sample, with older adolescents and boys typically reporting lower levels of risk perception and higher levels of risk behavior than did younger adolescents and girls. In addition, more risky behaviors are shown to be consistently associated with lower perception of risk.

Finally, because the ARQ is based on input from adolescents, it has the potential to be sensitive to young people's current concerns. But this very strength may be a weakness if the measure is used in different cultural contexts or across a significant time span, as young people's concerns and perceived risks can vary. Core items like smoking, speeding and having unprotected sex are likely to be considered risky by young people and adults alike for some time to come within western cultures at least, but other items such as sniffing gas or glue may have a more temporal flavor as fashions in self-destructive activities change. Similarly, some risks are likely to be culturally specific, with many of the challenging sports that make up the thrill-seeking scale not available for adolescents except in relatively affluent societies.

The aims of this paper were to describe strengths and weaknesses of the ARQ when used with Cameroon adolescents, and to evaluate the measure as a screening device for those most at risk of HIV/AIDS. The ARQ was originally developed and validated on a large socioeconomically and culturally representative group of secondary school children aged between 11 and 18 years from Melbourne, Australia, so its psychometric properties for the Cameroon sample were yet to be tested. The young people from Cameroon who took part in the study were part of a larger study charting physiological concomitants of HIV/AIDS.

## METHOD

### PARTICIPANTS

Students were recruited following ethics approval in the US and collaboration with an Islamic mixed-gender school system ( $n = 200$ ) and a Catholic girls' ( $n = 53$ ) school in Cameroon. Although 253 children were tested, only children 11 years and older were included in the analyses because of concerns about the reliability and validity of self-report measures among younger children. For these 234 children (79 boys, 155 girls), the mean age of the male sample was 13.2 years ( $SD = 1.5$  years) and the mean age of the female sample was 13.9 years ( $SD = 2.2$  years). The age range was 11 to 19 years.

The sample is not representative of the age group as the secondary school enrolment rate for children in Cameroon is approximately 32% for boys and 22% for girls according to UNESCO figures (UNAIDS/WHO, 2002). These children are likely to reflect a relatively affluent, better educated, and possibly (because of their links with religious schools) a more conservative, minority.

### MEASURES

**HIV status:** Cameroon students were requested to provide a saliva sample via a straw into a numbered Cooke microcentrifuge tube. Tubes were carried on ice at 4 degrees C and stored at -20 degrees C for 3 weeks and then transported to the US for analysis. Cortisol levels were determined by a cortisol enzyme immunoassay (Diagnostic Systems Laboratories, Inc. Webster, TX) and HIV status was determined by the Oraquick Rapid Salivary HIV1/2 Antibody test (Orasure Technologies Inc.), with positive test repeated on the spot. HIV serology was again repeated in the US.

**Risk Behaviors and Perceptions:** Student behaviors and perceptions regarding risk were measured using their responses to the ARQ (Gullone, Moore et al., 2000). The 22-item questionnaire involves the rating of each item twice, first in relation to judgment of riskiness (on a 5-point Likert scale: 0 = *not at all risky*, 1 = *not very risky*, 2 = *risky*, 3 = *very risky*, and 4 = *extremely risky*) and a second

time in relation to frequency of participation in the behavior (also on a 5-point scale: 0 = *never done*, 1 = *hardly ever done*, 2 = *done sometimes*, 3 = *done often*, to 4 = *done very often*). Total risk-perception and behavior scores are calculated by adding ratings on all items with a high score indicating a stronger overall perception of riskiness, and more risky behavior, respectively. Each form of the scale (i.e., perception, behavior) can be divided into four subscales (thrill seeking, rebellious risk, reckless risk, antisocial risk, as described previously).

Students also provided their age and sex on the questionnaires, which were numbered for tracking purposes. Young people were asked to write down other behaviors they perceived as “risky” after they had completed the risk questionnaires. This step was taken to allow for subsequent improvement of the ARQ, by adapting its cultural relevance to a Cameroon sample.

## PROCEDURE

Volunteer students were given the questionnaire by their teachers, to complete during class time. Research assistants conducted the salivary tests, also during school time. Salivary test results and questionnaires were matched through a numbering system, to maintain confidentiality of data. Feedback from the test administrators, including teachers and research assistants, was collected, with the specific aim of assessing students’ understanding of the items and their cultural relevance.

## RESULTS

### PRELIMINARY ANALYSES

In this study a 15-item version of the ARQ scales was used, omitting the seven “thrill-seeking” items (e.g., roller blading; snow skiing) which, on the basis of feedback from survey administrators in Cameroon, were considered culturally inappropriate for that sample. The new scales had good internal consistency for the Cameroon sample (Risk behaviors:  $\alpha = 0.82$ ; Risk perceptions:  $\alpha = 0.83$ ).

There were between 1 and 6 percent missing data on the ARQ items, and only 140 cases on which data were present for all 30 items. This resulted in fewer than 234 participants in many of the subsequent analyses. Mean substitution was not considered appropriate because it would be likely to overestimate risk behavior and perception.

### FACTOR ANALYSIS OF THE CAMEROON RISK DATA

Principal components factor analysis with varimax rotation of the two scales (total of 30 items) produced eight factors with eigenvalues over 1.0, however several of these factors were small and not conceptually meaningful. A “best” solution of three factors was chosen on the basis of the scree plot and conceptual

meaningfulness. The three factors were a risk beliefs/perception factor which was almost entirely "pure" (comprising 14 of the 15 beliefs/perception items) and two risk behavior scales, one assessing "reckless" risks and the other "anti-social" risks, which paralleled similar factors from the Australian sample on which the questionnaire was originally developed (Gullone, Moore et al, 2000; Gullone & Moore, 2000). The factors explained 39% of the variance (Factor 1: Risk Perception, 19.1%; Factor 2: Reckless Risk, 12.9%; Factor 3: Antisocial Risk, 7.1%). Because (a) the two behavior scales were positively correlated ( $r = 0.34$ ,  $p < 0.001$ ), (b) the behavior item which loaded on the Risk Perception factor also loaded highly on one of the Risk Behavior factors, and (c) the total of the behavior items formed a reliable scale (see above), the behavior items were combined for further analysis. Similarly, the perception items were retained as a scale for further analysis, given the factor structure and the reliability of the scale.

The rotated factor matrix showed the following structure and loadings: Factor 1, Risk Perception: perception of risk associated with - driving without a license (.70), speeding (.68), getting drunk (.67), staying out late (.64), drinking and driving (.59), teasing people (.58), underage drinking (.54), overeating (.52), unprotected sex (.49), cheating (.48), taking drugs (.47), sniffing gas or glue (.47), smoking (.46), stealing cars (.45). Factor 2, Reckless Risk: unprotected sex (.77), stealing cars (.77), drinking and driving (.73), taking drugs (.69), smoking (.68), sniffing gas/glue (.62), getting drunk (.55), speeding (.54), driving without a license (.43). Factor 3, Antisocial Risk: teasing people (.66), talking to strangers (.58), overeating (.54), staying out late (.51), cheating (.51), underage drinking (.49). Full details of this analysis are available from the first author.

#### **INTERCORRELATIONS BETWEEN RISK SCALES AND THEIR RELATIONSHIPS TO SEX AND AGE**

The correlation between risk behavior and risk perception was negative as expected ( $r = -0.23$ ,  $p < 0.01$ ), with similar patterns for girls and boys (boys  $r = -0.23$ ; girls:  $r = -0.24$ ). Thus a stronger belief that behaviors were risky was associated (relatively weakly) with less risky behavior for both sexes.

The total risk behavior and risk perception scores were each divided by the number of items (15) to allow clearer interpretation of the means. There were no significant gender differences on risk perception (boys:  $M = 2.79$ ; girls:  $M = 2.85$ ) nor risk behavior (boys:  $M = 0.82$ ; girls:  $M = 0.91$ ). Also, there were no significant relationships between age and either risk behavior or risk perception for the total Cameroon sample, or for boys and girls separately.

#### **RISK SCALES AND HIV STATUS**

Fifteen percent of 53 girls (12 to 20 years) in the Catholic girls' school and 10 percent of 181 youths (79 boys and 102 girls; 11 to 19 years) in the Islamic co-

educational school were HIV positive (Total HIV positive:  $N=26$ ; 11 boys, 15 girls). Two one-way ANOVAs (one for each sex) were calculated to determine whether there were any differences in risk perception and risk behavior by HIV status. For boys, risk behavior differences between HIV status groups were statistically significant, with HIV positive young men admitting to more risky behaviors than did HIV negative young men (Mean HIV+ 1.21; Mean HIV- 0.75;  $F(1,54) = 5.00$ ,  $p < 0.05$ ). In addition, there was an almost significant trend toward lower (less cautious) risk perception scores in the boys HIV positive group (Mean HIV+ 2.50; Mean HIV- 2.84;  $F(1,55) = 2.77$ ,  $p < 0.10$ ). For girls, there were no significant differences between the HIV status groups on either risk behavior or risk perception.

A more fine-grained analysis involved the consideration of the one item on the risk behavior scale most relevant to HIV status, that is, participation in unprotected sex. It was found that admitting to participation in unprotected sex was related to HIV positive status for boys (Chi-square (1) = 4.39,  $p < 0.05$ ), but not for girls. Either girls were not admitting to unprotected sex, or they did not realize what it is and/or whether they have experienced it, or they have become HIV positive in some other way. Ten out of 14 HIV positive girls (71%) said they had not had unprotected sex (one did not respond). Only three out of 11 HIV positive boys (27%) made this claim.

#### **THE ARQ AS A SCREENING TOOL FOR HIV RISK AMONG CAMEROON YOUTH**

Discriminant function analyses were carried out, separately for the sexes, to ascertain whether the 30 ARQ items (both risk perception and risk behavior 15-item scales) could be used to discriminate between HIV positive and HIV negative youth. Stepwise discriminant function analysis was used because of the relatively large amount of missing data on some items. The stepwise procedure allows for a maximization of cases which can be used in the analysis, while the regular procedure uses only the number of cases for which there are full data on every item.

For boys, the discriminant function successfully separated the HIV positive and negative groups (Wilks' Lambda = .360; Chi-square (6)=35.78,  $p < 0.0001$ ), correctly classifying 83.3% of cases (72.7% of the HIV positive boys and 85.5% of the HIV negative boys were correctly classified). Eight steps led to a function in which the significant discriminants (with their standardized canonical discriminant function coefficients) were the behaviors of cheating (0.65), drug taking (0.79), and overeating (-0.57), and the risk perceptions concerning getting drunk (-0.68), taking drugs (-0.92) and overeating (0.66). The behavior of drinking and driving was included in the first step of the discriminant procedure but excluded again at step 4. The group centroids were well separated (HIV+ = 3.09; HIV- = -0.55).

For girls, the discriminating power of the scale was weak, although significant (Wilks' Lambda = .958; Chi-square (1) = 4.17,  $p < 0.05$ ). The HIV positive girls were successfully classified in 80.0% of cases but successful classification of the HIV negative girls occurred in only 44.6% of cases (a 48.0% success rate overall). Only one item, risk perception concerning "talking to strangers" was a significant discriminant, with a standardized canonical discriminant function coefficient of 1.0. The group centroids were not well separated (HIV+ = -0.62; HIV- = 0.07).

### **THE ARQ AS A SCREENING TOOL FOR RISK OF UNPROTECTED SEX AMONG CAMEROON YOUTH**

Another way of examining the screening power of the ARQ items was to assess whether they could significantly discriminate between those who admitted to unprotected sex and those who did not. This involved using one item of the ARQ (unprotected sex behavior) to form the groups to be discriminated (had unprotected sex; not had unprotected sex) and the other 14 behavior items, plus the corresponding 14 risk perception items, as the independent variables in the analyses (potential predictors of the groups). The item concerning risk perception of unprotected sex was removed, as the purpose of this analysis was to ascertain if risk status with respect to unprotected sex could be ascertained without directly asking about it.

The ARQ items significantly discriminated between those who admitted to unprotected sex and those who did not, for both boys (Wilks' Lambda = .523; Chi-square (3) = 25.64;  $p < 0.0001$ ) and girls (Wilks' Lambda = .488; Chi-square (6) = 63.85;  $p < 0.0001$ ). For boys, there was a successful prediction rate of 88.9% of those who claimed not to have had unprotected sex, and a 71.07% success rate for predicting those who admitted to having had unprotected sex, with an overall success rate of 80.60%. For girls the prediction rates were 87.1%, 70.2% and 81.06% respectively. The significant discriminants for boys (with their standardized canonical discriminant function coefficients) were underage drinking behavior (0.79), drug taking behavior (0.66) and perception of overeating as risky (0.51). The group centroids were -0.72 for the "have not had unprotected sex" group and 1.21 for the "have had unprotected sex" group. The significant discriminants for girls (with their standardized canonical discriminant function coefficients) were the four behaviors of smoking (0.46), taking drugs (0.68), getting drunk (0.42) and overeating (0.40) plus risk perception concerning sniffing gas or glue (-0.46) and overeating (0.44). The group centroids were -0.64 for the "have not had unprotected sex" group and 1.60 for the "have had unprotected sex" group.

### QUALITATIVE DATA

Young people in the Cameroon sample indicated behaviors they perceived as “risky” but which were not ARQ items. Responses mentioned by five or more adolescents in the sample of 252 (2% or more) included: stealing (25%), abortion (14%), murdering people or poisoning them (9%), suicide (8%), fighting with others (7%), jumping from high places (7%), swimming (6%), lying to people (4%), horse riding/playing with horses (4%), belonging to a sect/practicing witchcraft (3%), climbing (3%), disobeying elders (3%), mixing with the wrong people (3%), playing with fire or electricity (3%), abusing people (2%), playing too much (2%), flirting (2%), playing with dangerous objects (2%), playing with wild animals (2%).

### DISCUSSION

Evidence for reliability and validity of the ARQ scales with a Cameroon sample was obtained from this study, although there is need for caution. Concerns about the cultural meaning of some items were expressed and the scales adapted accordingly. However, a further refining of cultural suitability may be in order given the relatively high missing data counts on some items (suggesting difficulties with understanding of the item’s meaning, or social desirability constraints), and the range of additional risky activities suggested by adolescent respondents (for example stealing and abortion).

The adapted ARQ risk measures, with the thrill-seeking items removed to produce 15-item versions of the scales, showed good internal reliability with the Cameroon sample of school-based adolescents. A conceptually meaningful factor structure resulted when the items from the two adapted ARQ scales were factor analyzed. A clear risk perception scale emerged, as did two risk behavior scales that were comparable in content to the factors from Australian adolescent data (Gullone et al., 2000; Gullone & Moore, 2000). The Cameroon “reckless behavior” and “antisocial behavior” factors comprised items similar to the same named factors in the Australian study, however there was no separate “rebellious risk” factor in the Cameroon data - items labeled rebellious risk in the Australian factor solution were spread across the two Cameroon Behavioral factors. This would not seem to be a major threat to validity, given that there were existing conceptual difficulties in separating rebelliousness from both reckless and antisocial risk. Indeed the Cameroon factor structure could be interpreted as more meaningful than the Australian one. The correlation between Behavioral subscales produced from the Cameroon factors also emphasized difficulties in separating out types of risk from a set of negative risk-taking behaviors, and for this reason, total risk behavior and risk perception scores are recommended, rather than subscale scores based on the factors.

Construct validity evidence was sought in the Cameroon sample through comparison with Australian findings of scale relationships to each other, age, and gender. Similar patterns in each country were found for the expected negative correlations between risk behavior and risk perception, reflecting the notion that young people who assess behaviors as less risky are more likely to engage in those behaviors than are their more cautiously perceiving counterparts. However, the Australian data showed that boys engaged in more risk behavior (and perceived less risk) than did girls, and that age and risk were related, with older Australian youths taking more risks and perceiving these behaviors as less risky (Gullone, Paul, et al., 2000). These patterns were not reflected among Cameroon youth, possibly because the discriminating power of the scales was weaker with this sample. However, it is equally possible that the Australian patterns do not reflect the way of life in Cameroon. So the lack of gender and age differences in risk perception and risk behavior in a Cameroon adolescent sample using the ARQ needs further investigation before it can be accepted as a validity problem for the ARQ.

The validity of the ARQ risk scales was further tested by comparing groups of Cameroon youth on the basis of their HIV status. The expectation that the HIV positive young people would score higher on risky behaviors and perceive them to be less risky was supported for males but not for females, perhaps reflecting limited validity. Alternatively, the lack of support for our expectation with the female adolescents may be more a reflection of social desirability responding or cultural factors than of limited validity of the ARQ. The fact that the majority of female adolescents who were HIV positive reported that they never engaged in unprotected sex indicates that self-report may not be the most appropriate method for obtaining accurate information about levels of engagement in such behaviors in a Cameroon sample of female adolescents.

Despite the above consideration, the adapted ARQ scales did prove useful as a screening tool for risk engagement. Specifically, boys who admitted to cheating and drug taking and who judged drinking and drug taking to be less risky than their peers did (and also, somewhat puzzlingly, did not overeat and assessed overeating as relatively risky) could be fairly accurately placed in the HIV positive category by the discriminant function equation. For girls, this prediction power was very weak, however, girls who admitted to unprotected sex could be reasonably accurately identified. These were the girls who also admitted to smoking, drug taking, getting drunk and overeating, and who perceived sniffing gas or glue to be of low risk while overeating was perceived to be highly risky. Boys who had unprotected sex were identified as those who were also likely to drink, take drugs, and perceive overeating as risky. While a few of these markers of HIV status or unprotected sex are somewhat puzzling and would need to be replicated for confidence to be placed in them, the overall pattern of greater

nonsexual risk taking among those who are currently HIV positive or at risk of becoming so is supported by these data. This supports past research indicating that risk-taking behavior is likely to be predicted by stable individual differences such as personality traits (Gullone & Moore, 2000).

Overall, this study has provided initial support for the reliability and validity of an adapted version of the ARQ scales for use with young people in Cameroon. However, these findings are tempered by several possible limitations. First, as has been discussed previously, our measures of risk taking may need to be more culturally sensitive. Second, the use of HIV status as an index of risky behavior is somewhat flawed, as not all young people who engage in risky sexual practices become HIV positive, and indeed those who do become HIV positive may subsequently reduce their risk taking. Thus, longitudinal assessments of risk behavior and HIV status are desirable to trace an individual's history of risk taking and its outcomes. Other validating techniques could include use of data from a greater range of informants, such as peers and teachers, to be correlated with young people's assessments of their own risk taking. Third, the issue of social desirability of some of the items, particularly with the female Cameroon sample, needs to be addressed. It seems likely from our data that young women, at least, are underestimating the extent to which they have engaged in unprotected intercourse; the extent to which other risks have been underestimated is unknown and an important area for further study. A final issue relates to the size of the sample surveyed and their ages. The strength of the study's findings would have been improved with a larger sample, especially of males, and with a stronger representation of postpubertal adolescents included. Extension of the study to those young people who are not attending school (some 60% to 70% of the age range) would further increase generalizability. Despite these difficulties, the study has provided useful preliminary data on the risk-taking behaviors of Cameroon youth in comparison to Australian youth. Preliminary data have also been provided for the validity and reliability of the ARQ as a measure of risk beliefs and behaviors for Cameroon young people.

## REFERENCES

- Blecher, M. S., Steinberg, M., Pick, W., Hennick, M., & Durcan, N. (1995). AIDS - knowledge, attitudes and practices among STD clinic attenders in the Cape Peninsula. *South African Medical Journal*, **18**, 1281-1286.
- Dallal, N., Rathbone-McCuan, E., McArthur, C., Moore, S., Gullone, E., Werdzerem, S., & Kindzeka, M. (March, 2003). *Risk behavior, risk perception, HIV status and psychological indicators among young people in Cameroon*. 32nd Annual American Association of Dental Research. March 12-15th San Antonio, Texas, USA.
- Donovan, J., Jessor, R., & Costa, F. (1988). Syndrome of problem behavior in adolescence: A replication. *Journal of Consulting and Clinical Psychology*, **56**, 762-765.

- Eaton, L., Flisher, A. J., & Aaro, L. E. (2003). Unsafe sexual behaviour in South African youth. *Social Science and Medicine*, **56**, 149-165.
- Gullone, E., Moore, S., Moss, S., & Boyd, C. (2000). The adolescent risk-taking questionnaire (ARQ): Development and psychometric evaluation. *Journal of Adolescent Research*, **15**, 231-250.
- Gullone, E., Paul, J., & Moore, S. M. (2000). A validation study of the Adolescent Risk-Taking Questionnaire. *Behaviour Change*, **17**, 143-154.
- Journalists Against AIDS (JAAIDS) Nigeria. (2003). Cameroon.  
[http://www.nigeria-aids.org/pdf/AIDS\\_in\\_Cameroon.pdf](http://www.nigeria-aids.org/pdf/AIDS_in_Cameroon.pdf).
- MacPhail, C., & Campbell, C. (2000). "I think condoms are good, but AAI, I hate those things": Condom use among adolescents and young people in a Southern African township. *Social Science and Medicine*, **52**, 1613 - 1627.
- Moore, S., & Gullone, E. (1996). Predicting adolescent risk behaviour using a personalised cost-benefit analysis. *Journal of Youth and Adolescence*, **25**, 343-359.
- Smith, A. M. A., de Visser, R., Akande, A., Rosenthal, D., & Moore, S. (1998). Australian and South African university undergraduates' HIV-related knowledge, attitudes, and behaviours. *Archives of Sexual Behavior*, **27**, 279-294.
- UNAIDS/WHO (2002). Epidemiological facts sheets on HIV/AIDS and sexually transmitted infections. 2002 Update. Cameroon.  
[http://www.unaids.org/wac/2000/wad00/files/WAD\\_epidemic\\_report.htm](http://www.unaids.org/wac/2000/wad00/files/WAD_epidemic_report.htm)
- Wood, K., & Jewkes, R. (1997). Violence, rape and sexual coercion: Everyday love in a South African township. *Gender and Development*, **5**, 41-46.
- Wood, K., Maforah, F., & Jewkes, R. (1998). "He forced me to love him": Putting violence on adolescents' sexual health agendas. *Social Science and Medicine*, **47**, 233-242.

