**Sexuality-related attitudes significantly modulate demographic variation in sexual health literacy in Tasmanian university students**

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# Abstract

Background:

We have previously shown significant demographic variation in two instruments of sexual health literacy (SHL) in university-level students in Tasmania, Australia.

Aims:

To evaluate the impact of adjusting for sexuality-related attitudes on demographic variation in SHL.

Methods:

Iterated principal-factor analysis was used to evaluate latent variable grouping of responses to 21 attitudinal questions regarding sexuality and sexual behaviour. Linear regression was used to evaluate distribution and determinants of attitudinal patterns and thence the relationship of these patterns to SHL.

Results:

Three patterns – conservative, anti-persons living with HIV, and sexually responsible – were identified as explaining variation in sexual attitudes, the former two being associated with significantly lower SHL and the latter associated with significantly higher SHL. Adjustment for these patterns significantly attenuated much of the differences in SHL by birthplace/ethnicity and religion, including among South/Southeast Asian and Protestant, Islamic and Hindu students. However, some differences in SHL persisted, suggesting they are partly or fully independent of the attitudinal questions.

Conclusions:

As hypothesised, differences in attitude and framing significantly explained much of the demographic differences in SHL found previously. These results suggest that sexual education and orientation efforts need bear cultural framing in mind to enhance uptake by students.

# Introduction

Sexual health literacy (SHL), the knowledge of healthy practices regarding sexual activity, and the ability to understand and evaluate the risks and impacts of those activities(1), is a critical skillset for the health and wellbeing of individuals, their partners and the community at large. However, research has demonstrated that capacity of and approach to discussion of sexual health is not only a function of academic exposure to sexual and reproductive health in education, but also attitudes toward these topics(2, 3). Indeed, while knowledge is certainly a key component, perspective or belief structures may also form an important component of SHL. That is, while an individual may possess an academic understanding of the biology underlying optimal sexual health, the perception of this information is modulated by the beliefs and attitudes of the individual, thus significantly impacting how any knowledge is applied in the user’s own life(4).

While SHL is relevant throughout the lifecourse, it is particularly important in young adults in their first years of post-childhood independence. Accordingly, studies in this population in university students have been undertaken in a number of studies abroad and in Australia(5-9). Even still, the number of studies of SHL in university students in Australia have been relatively limited, with only two since 1999, in Western Australia(5) and Sydney(6), and our own study in Tasmania(10). An unexpected finding in our study was that, while demographic differences in SHL were found, particularly by overseas-born status as found previously, these differences were almost entirely robust to adjustment for age, sex, birthplace, sexual education and sexual experience. Culture and religion may explain variation in SHL, but are not enough in themselves to inform eventual remedial education interventions, where these are deemed desirable. Given this, we sought to investigate the role of sexuality-related attitudes in SHL and whether demographic differences in SHL might be explicated by attitudes, given the potent role of culture, religion and attitude in sexual health(11-13).

Further to this we made use of a set of 21 questions regarding sexuality-related attitudes by participants. Such a panel of sexuality-related attitude questions is useful in its being able to be distilled into a smaller set of attitudinal patterns, which can then be utilised as predictive covariates of other parameters, in this case sexual health literacy. This mitigates some of the variability that would be present in responses to individual questions, as well as allowing a more succinct and presentable evaluation of the attitude type underlying responses to the questions, rather than the questions themselves.

# Aims

We undertook to evaluate the distribution and determinants of sexual health literacy in a university population in Tasmania. We found that, while SHL scores were generally at sufficient levels, there were appreciable deficits in some demographic subgroups which persisted even after adjusting for sexual education and sexual experience. We here sought to undertake statistical analysis of responses to the set of attitudinal questions to determine: 1) the relationship of demographic and behavioural covariates with attitudinal factors; 2) the relationship of attitudinal factors with SHL score; and 3) the impact of adjusting for attitudinal factors on the relationship of demographic and behavioural covariates with SHL.

# Methods

## Study design and instruments

The Researching University Students’ Sexual Literacy Study (RUSSL) was an online anonymous questionnaire-based study of 1,786 then-current University of Tasmania students studying in Tasmania conducted in Spring 2013. Full details have been discussed previously(10). Briefly, sexual literacy was measured using the sexual health knowledge component of the Australian Research Centre in Sex, Health and Society (ARCSHS) Secondary Students and Sexual Health Survey(14) (ARC/LaTrobe), and sexual health knowledge component of the University of Missouri Sexual Health Survey(15) (SHS/Missouri). Both instruments contained a number of questions about basic reproductive biology and sexually transmitted infectious agents and their associated symptoms, while the SHS/Missouri instrument also queried the utility of various risk-reduction methods against sexually transmissible infection and unplanned pregnancy.

## Main outcome measures

Behavioural/attitudinal questions on sexual issues were derived from a sample of questions about attitudes and beliefs regarding sexuality and sexual behaviour from the *Handbook of Sexuality-Related Measures*(16). The original questionnaires from which these were derived included attitudinal components of the Eastman-Mueller Sexual Health Survey(15), the HIV/AIDS Knowledge and Attitudes Scale for Teachers(17), the Revised Attitudes Towards Sexuality Inventory(18), and the AIDS Attitude Scale(19). The whole of these questionnaires’ attitude/belief sections were combined and then pared to yield a core list of 21 questions thought to give a general profile of attitudes and beliefs concerning sexuality and sexual behaviour. The resultant list of 21 questions was realised as a balance between diversity of topics queried and questionnaire length, aiming to realise a measure of sexuality-related attitudes without being too onerous as to negatively impact participation and adherence.

Information regarding participant sex, age, relationship status, sexual history, sexual orientation, ethnicity, place of birth, religious affiliation, and area of main study were also collected. These were used in subsequent analysis of the effects of demographic factors on attitude.

## Statistical Methods

### Iterated Principal Factor analysis and score generation

The Kaiser-Meyer-Olkin measure of sampling adequacy was found to be 0.812 and the Bartlett test of sphericity was significant (p<0.001), supportive of factor analysis.

Iterated principal factor (IPF) analysis with oblique promax rotation was utilised to evaluate the latent variable organisation of the attitudinal questions(20). This exploratory factor analysis method distils the underlying variability in responses to a selection of parameters to a smaller number of latent constructs which can then be used to infer patterns and which are more easily interpreted than the total parent group of parameters. This method was used as it was the most appropriate for this subject matter, e.g. human behaviour rather than biological/physical systems, particularly the variability of communalities, which the procedure calculates in an iterative fashion. From this analysis, the optimal number of factors was retained as determined by loading plots and parallel analyses, these factors then given descriptive labels appropriate to the distribution of attitudinal question responses within each factor.

Participant scores for each of the three identified factors were predicted using the method suggested by Bartlett(21), whereby a weighted sum of individual responses to each attitudinal question are each multiplied by its loading for each factor (see Table 1), thus resulting in a factor score for each of the three factors for each participant with data on attitudinal questions.

### Predictors of SHL scores

As described previously(10), predictors of SHL scores were assessed by linear regression. Due to heteroskedasticity of the SHL score variables, these were transformed, but with all coefficients back-transformed at the mean of model covariates and presented on the scale of the original SHL score variable

All analyses were performed using STATA/SE 12.1 for Windows (College Station, TX).

# Results

Of the 1,786 participants, 1,234 responded to the attitudinal questions. The distribution of the sample used in attitudinal analyses presented here was nearly identical to the parent sample (Supplemental Table 1), which was previously shown to be representative of the student population from whence this data is derived(10).

### Distribution and components of IPF model patterns

By making use of screeplots and parallel analysis, a 3-factor model was realised. A 4-factor model might have been generated but this fourth factor was solely a function of the question “I worry about possible casual contact with a person with AIDS”, which only loaded on this factor and was the only question to load on that factor. Excluding this question realised a 3-factor model with no such orphans. Accordingly, analyses presented hereafter are restricted to the 20 questions contributing to the 3-factor model. After oblique promax rotation of estimates, the post-rotation loadings were calculated (Table 1): a conservative pattern explaining 53.1% of the post-rotation variance; an anti-persons living with HIV (anti-PLWHIV) pattern explaining 38.0% of the post-rotation variance; and a sexually responsible pattern explaining 22.9% of the post-rotation variance.

As in Table 1, the conservative pattern loaded most positively on attitudes regarding sex being only for marriage or in long-term relationships and most negatively on the opposite attitude that sex is acceptable regardless of relationship duration. The anti-PLWHIV pattern loaded most positively on attitudes regarding HIV infection being a punishment or due to unnatural acts, and most negatively on whether persons deserve to have HIV/AIDS. The sexually responsible pattern loaded most positively on the importance of knowing sexual partners’ sexual history and negatively on failing to disclose STI or other sexual irresponsibility.

Looking at the distribution of the individual-level scores, while the means of all parameters were 0, the conservative and anti-PLWHIV patterns skewed negative, while the sexually responsible pattern skewed positive.

## Determinants of IPF pattern scores

As in Table 2, the three attitudinal patterns showed expected relationships with demographic and behavioural patterns. Results are shown adjusted for age, sex, birthplace and age at sexual debut. Females had much higher scores on the conservative and sexually responsible, and lower scores on the anti-PLWHIV pattern, all of these fully robust to adjustment for age, birthplace, sexual education and sexual experience. Older age was associated with lower conservative and sexually responsible, robust to adjustment, but did not associate with the anti-PLWHIV pattern. Homosexual-identifying students had significantly lower conservative and anti-PLWHIV scores, robust to adjustment. A near-significant negative association between homosexual identification and sexually responsible score was abrogated on adjustment. Bisexual-identifying students followed similar patterns to that seen for homosexual students, though adjustment did not as greatly attenuate the negative relationship with sexually responsible pattern.

Of particular interest are the associations of birthplace, ethnicity and religion, given their previously demonstrated potent association with sexual health literacy(10). Compared to students from Australia and New Zealand, students from Asia had higher conservative and anti-PLWHIV scores, the former driven by students from southeast and south Asia, the latter driven by students from East Asia, and all quite robust to adjustment. Analogous results were seen for ethnicity. All non-agnostic/atheist religions were associated with higher conservative scores, persisting on adjustment. At the same time, Protestant, Christian other and Hindu students had significantly higher anti-PLWHIV scores than agnostic/atheist-identifying students, though the Hindu association was abrogated on adjustment for birthplace. Finally, Catholic and Protestant had significantly higher sexually responsible pattern scores, though both were attenuated on adjustment.

Students in medical disciplines had higher conservative scores than students in non-science/medical disciplines, though this difference did not persist after adjustment. There was no difference in the sexually responsible pattern by medical study. Sexual education was associated with lower anti-PLWHIV scores, largely robust to adjustment, though again no difference was seen in the sexually responsible pattern. At the same time, poorer communication about sex in the childhood household was associated with higher conservative and anti-PLWHIV scores and lower sexually responsible scores, the latter mostly robust to adjustment.

Earlier age of sexual debut was associated in a dose-dependent fashion with lower conservative score; weaker and less consistent inverse associations were also seen for anti-PLWHIV and sexually responsible scores. Finally, persons of greater confidence in their not being at risk for STI exposure had higher scores in both the conservative and sexually responsible patterns, both dose-dependent and quite robust to adjustment.

## Attitudinal and SHL scores

Evaluating quartile categorical renditions of the total scores for each of the three patterns found the conservative and sexually responsible patterns to be robustly and independently associated with both instruments (Table 3). The conservative pattern score was associated with lower scores on both SHL instruments, though more dose-dependent in the SHS/Missouri instrument. Adjustment for age, sex, birthplace, and sexual education and experience attenuated the association with ARC/LaTrobe score somewhat but did not materially impact the association with the SHS/Missouri score. The sexually responsible pattern score was associate with significantly higher scores on both instruments, being again very neatly dose-dependent with the SHS/Missouri than ARC/LaTrobe. The anti-PLWHIV score was also significantly negatively associated with both SHS/Missouri scores, potently so with the SHS/Missouri.

Mutual adjustment for each pattern score found much of the above-mentioned associations to persist for SHS/Missouri, indicating that associations were independent of one another. However, the anti-PLWHIV association with ARC/LaTrobe was reduced by nearly half on adjustment for the other patterns, suggesting much of the variation in this outcome by anti-PLWHIV score covaried with the other pattern scores.

## Predictors of SHL, adjusted for attitudes

Table 4 shows the results for demographic and behavioural predictors of SHL. These results are generally in line with those shown previously(10), despite this analysis being restricted to the subsample of persons with attitudinal data. Most relevant for the present paper, however, are the results adjusted for the attitudinal pattern scores. While some associations with SHL are not materially impacted by adjustment for pattern scores like sex, age, study area, and sexual education, several key demographic covariates which had previously been robustly associated with SHL were impacted by adjustment for attitudinal pattern score.

Students from Asia, particularly East, South and Southeast Asia, had significantly lower scores, even after controlling for age, sex, and sexual education and experience. Adjusting for attitudinal pattern score, however, the lower ARC/LaTrobe and SHS/Missouri scores by Southeast Asian students were greatly attenuated and became nonsignificant. For SHS/Missouri, the lower scores of students from East and South Asia were reduced appreciably, though they remained statistically significant. Similarly, students of East and South Asian racial/ethnic affiliations had significantly lower SHS/Missouri scores, but adjustment for attitudinal scores attenuated the magnitude of these. More encouraging is the finding that the lower SHS/Missouri scores seen for several religious affiliations were strongly attenuated and made nonsignificant on adjustment for attitudinal scores.

# Conclusions

The results of this study provide clear evidence that attitudinal or belief structures play a role in the sexual knowledge and health literacy among university students. The initial analysis, designed to reduce 20 attitudinal questions into a smaller number of latent domains, produced three stable domains of sexual attitudes: conservative, anti-PLWHIV and sexually responsible. Many of the demographic and behavioural covariates examined were associated in expected fashions with scores on the three patterns found, and likewise these pattern scores associated with sexual health literacy scores as expected. That controlling for sexual attitude pattern scores greatly attenuated or wholly abrogated some of the demographic differences in SHL found previously(10) is encouraging. However, some of these differences were not completely removed, suggesting that our measure of attitudinal profile was incomplete.

That attitudinal affiliations were so strongly associated with SHL is a novel finding. It is intuitive that attitude can shape one’s framing of efficacy of various sexual health interventions like barrier and pharmaceutical contraception. Accordingly, a number of studies have investigated the role of religion, culture and attitude and their relevance in everything from perceptions about STI(12, 22), attitude and cultural influences of barrier usage and other risk-reduction strategies(3, 23, 24), to the impact of culture and belief on sexual health-related medical practice(11, 13, 25, 26). Even still, the magnitude of attitudinal pattern associations with SHL and their robustness to adjustment was surprising. Persons with negative attitudes about persons with HIV had significantly lower SHL by both instruments but even more strongly so for the academic ARC/LaTrobe instrument score. To what extent one could be identified as causal of the other cannot be discerned from this study. However, the most immediate interpretation is that both poor SHL and a negative attitude to persons with HIV are derived from the same general lack of sexual education and experience, leading to a poorer understanding of the nature of STI and HIV in particular, and also to a more negative, fear-based attitudinal profile concerning persons with HIV. These findings are broadly consistent with previous within university populations (27), but also broader populations such as sex workers (28), and such positive attitude towards condom use has been shown to be a predictor of subsequent sexual behaviour (29). These results also fit in with the diversity of studies showing the critical role of attitude and culture in influencing everything from risk reduction strategies, HIV and other STI testing, and patient-provider interaction on matters regarding sexual health.

Looking at demographic covariates’ associations with attitudinal groupings, some were as expected. For instance, females had greater scores on the sexually responsible pattern and lower scores on the coercive pattern, and religious affiliation was associated with greater conservative pattern scores. Some others were in line with our previous findings regarding SHL score, including greater conservative and anti-PLWHIV scores for persons from some regions of Asia or corresponding ethnic/racial affiliations. Results showing the lack of consistent association of sexual education or medical area of discipline with attitudinal scores perhaps should not surprise – if we are to presume that such attitudes are engrained earlier in life or as a function of culture, they may persist despite education.

In evaluating the relationship of attitudinal scores with SHL scores, two attitude patterns – conservative and sexually responsible – stood out in the robustness and independence of their association with both instrument scores, the former negatively and the latter positively. While the sexually responsible pattern did not greatly vary by level of most of the demographic and behavioural covariates examined, save sex, the conservative pattern had much higher scores among the religious and overseas-born students found to have deficiencies in SHL. That, after controlling for other pattern scores, the anti-PLWHIV pattern score was associated with significantly lower SHL scores by both instruments is germane, particularly as the anti-PLWHIV score did not significantly predict either SHL score prior to adjustment. What this suggests is that, among persons who are average in terms of their conservative and sexually responsible attitudes, anti-PLWHIV attitudes are associated with lower SHL.

Of greatest relevance to our study rationale, attitudinal scores explained some of the previously demonstrated(10) deficits in SHL score between demographic subgroups. These differences persisted after adjustment for confounders like age, sex, sexual education and sexual experience. We hypothesised that much of the remaining differences in SHL would be a function of framing and beliefs, and that controlling for this would reduce differences by demographic covariates. Some demographic differences were well-explained by these adjustments: a lower ARC/LaTrobe score among East Asian students was entirely reversed on adjustment; a similar result for ARC/LaTrobe was found for Protestant students and the difference by Islamic affiliation was eliminated. Others like Asian birthplace and racial/ethnic affiliation and SHS/Missouri were greatly attenuated on adjustment, though not abrogated. Others like Buddhist religious affiliation and ARC/LaTrobe were virtually unaffected by adjustment for attitude scores.

Rather than being an intrinsic quality of these demographic groups, the “unexplained” deficits in SHL score are more likely a function of limitations in our attitudinal instrument. Given the logistic strictures of the study and the desire to keep its length to one not hindering participation, we retained a series of questions on attitudes, seeking to get a general cross-section of key issues in sexual health, particularly timing of sex, persons with HIV and sexual etiquette. It was never meant to be a fully representative picture of beliefs or framing on matters of sexuality and sexual health, but we had hoped for a good sample of belief. That we found it to be an effective adjustment for some parameters supports this, but its insufficiency in some subgroups – particularly those from Asia and largely Buddhist/Hindu nations – suggests that attitudes particular to these groups were not adequately surveyed. A follow-on study in this population should thus endeavour to develop a more comprehensive culturally inclusive instrument.

This study derives much strength from its sample size, the largely random and thus more representative nature of participation, and the ability to control for a range of relevant covariates. Its weakness is the aforementioned inadequacy of attitudinal questions for subpopulations whose attitudes were evidently not fully measured by our panel of questions. Also, a complete and validated questionnaire for attitudes would have greater external validity, rather than the subset of questions used here.

This study has demonstrated a significant association of different sexual health-related attitudes with sexual health literacy and found these attitudes to vary significantly by demographic characteristics. The question arising from this work is therefore, what is to be done? While the study’s cross-sectional design precludes definitive pronouncements of areas for intervention, the findings generally substantiate the idea that generic education programs about divisive or sensitive issues like sexuality and sexual morality is not likely to realise equal results in diverse populations. That is, it is not sufficient merely to present sexual health information to all individuals in the same fashion in the hope they integrate it into practice accordingly. Rather, it is appropriate to attempt to engage persons culturally, socially and attitudinally, as reflected in the stages of change model of behaviour modification (30-32). The precise modes by which such personalised education is to be realised is outside the scope of this study but could be determined by in-depth qualitative studies of health education interventions in diverse populations.

# Author contributions

Project was conceived by RT and SSJ. Initial project development by RT, SSJ, CC, NS, KR and LB, with support from LO. Instrument development by SSJ with support from other investigators. Recruitment managed by SSJ. Analysis by SSJ, with support from MQ. Manuscript generation by SSJ. All authors reviewed manuscript and approve it for submission.

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Table 1. Characteristics of three factors derived from IPF and loadings of attitudinal questions to them.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Factor 1 | Factor 2 | Factor 3 |
|  | Conservative | Anti-PLWHIV | Sexually responsible |
| Eigenvalue | 3.310 | 1.700 | 0.738 |
| Proportion variance (unrotated) | 0.576 | 0.295 | 0.128 |
| Post-rotation |  |  |  |
| Variance explained | 3.047 | 2.183 | 1.314 |
| Proportion variance (rotated) | 0.531 | 0.380 | 0.229 |
| Individual-level scores |  |  |  |
| Mean | 0 | 0 | 0 |
| Range | -1.30, 3.44 | -0.67, 8.46 | -3.10, 1.72 |
| Median | -0.23 | -0.23 | 0.08 |
| Interquartile range | -0.71, 0.48 | -0.39, 0.05 | -0.53, 0.58 |
|  | Loading values for each factor | | |
| It is important for me to know a partner's sexual history | 0.183 | 0.139 | **0.611** |
| Oral sex is not 'as big a deal' as penetrative (vaginal/anal) intercourse | -0.017 | 0.035 | **-0.206** |
| A partner's sexual history would influence my decision to engage in sexual activity with him/her | 0.135 | 0.107 | **0.414** |
| People who carry protection (condoms, dams, diaphragms) are perceived as being sexually responsible | **-0.299** | 0.061 | **0.200** |
| It is ok to have sex if a partner gives consent to have sex while under the influence of alcohol or drugs | **-0.334** | 0.105 | **-0.292** |
| I would consider not telling my partner about a past history of a sexually transmitted disease in order to engage in sex | -0.119 | 0.117 | **-0.398** |
| People who carry protection (condoms, dams, diaphragms) are perceived as being sexually promiscuous | **0.353** | -0.034 | **-0.243** |
| The primary goal of sexual intercourse should be to have children | **0.573** | 0.117 | -0.003 |
| Sex should be reserved for a long-term relationship | **0.798** | -0.019 | 0.169 |
| People should wait until they are married to have sex | **0.840** | -0.020 | -0.029 |
| If I have been in a relationship for a while, it is expected that I have sex with that partner | **-0.173** | 0.107 | -0.095 |
| Sexual intercourse is acceptable no matter how long two people have known each other | **-0.598** | 0.079 | -0.199 |
| I worry about possible casual contact with a person with AIDS |  |  |  |
| Activities that spread HIV, such as some forms of sexual behaviour, should be illegal | **0.311** | **0.339** | 0.009 |
| I feel uncomfortable when coming in contact with gay men because of the risk that they might have HIV | 0.024 | **0.535** | -0.002 |
| Persons with HIV/AIDS are responsible for getting their illness | 0.023 | **0.498** | -0.070 |
| People get HIV by performing unnatural sex acts | 0.043 | **0.588** | 0.025 |
| No one deserves to have a disease like HIV/AIDS | **-0.177** | **-0.186** | 0.096 |
| I could tell by looking at someone if they had HIV | 0.150 | **0.341** | -0.093 |
| HIV infection is a punishment for immoral behaviour | -0.105 | **0.667** | 0.140 |
| I have no sympathy for people who get HIV | -0.156 | **0.507** | 0.141 |
| Note: the greyed-out line for the attitudinal question, “I worry about possible casual contact with a person with AIDS”, is coloured to denote its not being included in calculation of the factors and analyse resultant therefrom.  Note: parameters can load strongly on more than one pattern, either both in the same direction or in opposite directions of appreciable magnitude. Values in boldface denote those most strongly positively or negatively loading on one or two of the three patterns. | | | |

Table 2. Demographic and other determinants of attitudinal grouping scores.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | n/N (%) | Conservative | Anti-PLWHIV | Sexually responsible |
| Sexa  Male  Female | 421/1207 (34.9)  786/1207 (65.1) | 0.89 (0.82, 0.95)  **+0.26 (0.17, 0.35)**  ***p<0.001*** | 0.53 (0.49, 0.57)  **-0.10 (-0.15, -0.06)**  ***p<0.001*** | 2.83 (2.75, 2.90)  **+0.53 (0.44, 0.62)**  ***p<0.001*** |
| Age  17 – 20  >20 – 25  >25 – 30  >30  *Trend:* | 238/1210 (19.7)  483/1210 (39.9)  165/1210 (13.6)  324/1210 (26.8) | 1.28 (1.17, 1.39)  **-0.22 (-0.35, -0.09)**  **-0.37 (-0.52, -0.21)**  **-0.31 (-0.45, -0.18)**  ***p<0.001*** | 0.48 (0.43, 0.53)  -0.03 (-0.08, 0.03)  -0.06 (-0.13, 0.01)  -0.01 (-0.08, 0.06)  *p=0.74* | 3.30 (3.21, 3.39)  **-0.12 (-0.23, -0.01)**  **-0.18 (-0.32, -0.03)**  **-0.19 (-0.31, -0.06)**  ***p=0.004*** |
| Region  Australia/NZ  Asia  Africa and Middle East  Europe  Americas  *Trend:* | 1042/1187 (87.8)  62/1187 (5.2)  12/1187 (1.0)  48/1187 (4.0)  23/1187 (1.9) | 1.03 (0.99, 1.08)  **+0.70 (0.41, 0.98)**  +0.54 (-0.04, 1.11)  -0.09 (-0.29, 0.12)  -0.20 (-0.45, 0.06)  b | 0.44 (0.42, 0.46)  **+0.48 (0.29, 0.67)**  +0.08 (-0.16, 0.31)  -0.03 (-0.13, 0.07)  -0.06 (-0.18, 0.06)  b | 3.17 (3.13, 3.21)  +0.04 (-0.15, 0.23)  +0.37 (-0.02, 0.76)  +0.20 (-0.00, 0.41)  -0.03 (-0.32, 0.26)  b |
| Sexual orientation  Heterosexual  Questioning  Bisexual  Homosexual  *Trend:* | 1026/1200 (85.5)  20/1200 (1.7)  105/1200 (8.8)  49/1200 (4.1) | 1.11 (1.06, 1.165)  -0.09 (-0.42, 0.24)  **-0.37 (-0.49, -0.25)**  **-0.32 (-0.50, -0.15)**  a | 0.48 (0.45, 0.50)  +0.10 (-0.10, 0.31)  **-0.14 (-0.19, -0.08)**  **-0.15 (-0.23, -0.08)**  a | 3.19 (3.15, 3.24)  +0.09 (-0.24, 0.41)  -0.14 (-0.29, 0.02)  -0.09 (-0.30, 0.12)  a |
| Race/ethnicity  White  African  Aus Aboriginal  East Asian  Hispanic  Pac Islander  South Asian  Mixed  *Trend:* | 1013/1188 (85.3)  6/1188 (0.5)  40/1188 (3.4)  27/1188 (2.3)  9/1188 (0.8)  3/1188 (0.3)  29/1188 (2.4)  61/1188 (5.1) | 1.03 (0.99, 1.08)  +0.47 (-0.61, 1.55)  -0.02 (-0.25, 0.21)  **+0.51 (0.08, 0.94)**  -0.07 (-0.59, 0.44)  +0.16 (-0.95, 1.27)  **+0.47 (0.03, 0.90)**  +0.07 (-0.14, 0.27)  b | 0.44 (0.42, 0.46)  +1.20 (-0.26, 2.66)  +0.11 (-0.03, 0.24)  **+0.32 (0.06, 0.57)**  -0.10 (-0.29, 0.09)  -0.16 (-0.45, 0.13)  **+0.29 (0.04, 0.55)**  +0.01 (-0.08, 0.10)  b | 3.17 (3.13, 3.22)  -0.19 (-1.02, 0.63)  -0.11 (-0.35, 0.12)  -0.09 (-0.41, 0.23)  +0.17 (-0.35, 0.68)  +0.80 (-0.08, 1.68)  -0.16 (-0.49, 0.17)  +0.07 (-0.12, 0.26)  b |
| Religion  Agnostic/atheist  None/Unaffiliated  Catholic  Protestant  Christian, other  Islam  Buddhist  Hindu  Other/Multiple  *Trend:* | 488/1178 (41.4)  347/1178 (29.5)  94/1178 (8.0)  159/1178 (13.5)  26/1178 (2.2)  6/1178 (0.5)  30/1178 (2.6)  5/1178 (0.4)  23/1178 (2.0) | 0.80 (0.75, 0.85)  **+0.25 (0.16, 0.33)**  **+0.45 (0.28, 0.61)**  **+0.98 (0.81, 1.15)**  **+1.12 (0.70, 1.53)**  **+1.34 (0.26, 2.42)**  **+0.52 (0.20, 0.83)**  **+1.46 (0.45, 2.47)**  **+0.45 (0.12, 0.78)**  b | 0.38 (0.35, 0.41)  **+0.10 (0.06, 0.15)**  **+0.16 (0.07, 0.24)**  **+0.23 (0.15, 0.31)**  +0.17 (-0.00, 0.34)  +0.26 (-0.22, 0.73)  +0.08 (-0.06, 0.22)  +0.66 (-0.04, 1.35)  -0.04 (-0.15, 0.08)  b | 3.14 (3.07, 3.20)  -0.01 (-0.11, 0.10)  +0.12 (-0.04, 0.28)  **+0.17 (0.04, 0.31)**  +0.09 (-0.20, 0.39)  +0.27 (-0.41, 0.95)  +0.10 (-0.19, 0.39)  +0.34 (-0.26, 0.95)  +0.04 (-0.28, 0.35)  b |
| Study area |  |  |  |  |
| Non-science/medical  Science/math  Allied health/Menzies  Nursing  Medicine  *Trend:* | 517/1199 (43.1)  306/1199 (25.5)  144/1199 (12.0)  100/1199 (8.3)  132/1199 (11.0) | 1.03 (0.96, 1.09)  -0.04 (-0.15,0 0.06)  +0.12 (-0.03, 0.27)  +0.15 (-0.02, 0.33)  +0.09 (-0.07, 0.24)  b | 0.44 (0.41, 0.47)  +0.00 (-0.05, 0.05)  +0.05 (-0.02, 0.12)  +0.08 (-0.00, 0.17)  +0.04 (-0.03, 0.12)  b | 3.18 (3.12, 3.24)  -0.05 (-0.15, 0.06)  +0.08 (-0.05, 0.21)  -0.01 (-0.17, 0.15)  +0.00 (-0.14, 0.14)  b |
| Sexual education |  |  |  |  |
| None  Missing basic  Basic only  Basic + advanced  Basic, advanced and extra  *Trend:* | 189/1234 (15.3)  101/1234 (8.2)  23/1234 (1.9)  221/1234 (17.9)  700/1234 (56.7) | 1.12 (1.00, 1.24)  -0.15 (-0.34, 0.04)  -0.25 (-0.54, 0.05)  -0.10 (-0.26, 0.06)  -0.05 (-0.19, 0.08)  *p=0.85* | 0.50 (0.44, 0.56)  +0.01 (-0.09, 0.12)  +0.02 (-0.16, 0.20)  -0.07 (-0.15, 0.00)  -0.05 (-0.12, 0.02)  ***p=0.041*** | 3.20 (3.09, 3.31)  **-0.22 (-0.40, -0.03)**  -0.32 (-0.65, 0.01)  +0.01 (-0.14, 0.15)  +0.00 (-0.12, 0.13)  *p=0.25* |
| Family sexual discussion |  |  |  |  |
| Free and open  Only questions  Implicit only  Taboo  *Trend:* | 268/1188 (22.6)  264/1188 (22.2)  437/1188 (36.8)  219/1188 (18.4) | 1.01 (0.93, 1.10)  +0.02 (-0.11, 0.14)  +0.04 (-0.07, 0.15)  +0.12 (-0.02, 0.27)  *p=0.11* | 0.44 (0.40, 0.49)  +0.01 (-0.05, 0.07)  +0.00 (-0.05, 0.06)  +0.05 (-0.02, 0.12)  *p=0.28* | 3.26 (3.18, 3.35)  -0.12 (-0.24, 0.01)  -0.06 (-0.17, 0.05)  **-0.16 (-0.29, -0.03)**  *p=0.063* |
| Age first sex |  |  |  |  |
| Never had sex  18-40yo  17yo  16yo  10-15yo  *Trend:* | 108/1164 (9.3)  181/1164 (15.6)  289/1164 (24.8)  199/1164 (17.1)  387/1164 (33.3) | 1.87 (1.65, 2.08)  **-0.46 (-0.71, -0.20)**  **-0.79 (-1.03, -0.56)**  **-0.94 (-1.18, -0.71)**  **-1.02 (-1.25, -0.80)**  ***p<0.001*** | 0.57 (0.49, 0.66)  **-0.10 (-0.21, -0.00)**  **-0.10 (-0.20, -0.01)**  **-0.15 (-0.25, -0.05)**  **-0.13 (-0.23, -0.04)**  ***p=0.004*** | 3.33 (3.19, 3.46)  +0.03 (-0.14, 0.20)  -0.11 (-0.27, 0.05)  **-0.19 (-0.36, -0.02)**  **-0.29 (-0.44, -0.14)**  ***p<0.001*** |
| Perceived STI risk |  |  |  |  |
| Never  V Unlikely  Unlikely  Likely  V Likely  *Trend:* | 150/1226 (12.2)  582/1226 (47.5)  414/1226 (33.8)  73/1226 (6.0)  7/1226 (0.6) | 1.48 (1.33, 1.63)  **-0.38 (-0.55, -0.22)**  **-0.55 (-0.72, -0.39)**  **-0.67 (-0.88, -0.46)**  **-0.78 (-1.23, -0.33)**  ***p<0.001*** | 0.52 (0.45, 0.59)  -0.07 (-0.15, 0.00)  -0.08 (-0.15, 0.00)  -0.03 (-0.14, 0.09)  -0.16 (-0.39, 0.07)  *p=0.28* | 3.46 (3.36, 3.57)  **-0.18 (-0.30, -0.06)**  **-0.43 (-0.56, -0.30)**  **-0.85 (-1.06, -0.64)**  **-0.72 (-1.31, -0.14)**  ***p<0.001*** |

|  |
| --- |
| Results presented as geometric mean (95% CI) attitudinal pattern loading at reference, with coefficients (95% CI) relative to reference for subsequent levels. Analysis by linear regression.  Analyses adjusted for age, sex, birthplace, sexual education, and age at sexual debut.  Figured in bold denote statistical significance (p<0.05). Figures in italic are p-values.  a. 3 persons reporting their sex as “Other” omitted from analysis due to insufficient numbers.  b. A test for trend for this variable is not presented as there is not an expectation of a linear relationship in this categorical variable. |

Table 3. Relationship of factor variables to sexual health literacy scores.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | n/N (%) | ARC/LaTrobe |  |  | SHS/Missouri |  |  |
|  |  | Univariable | Adjusted | Mutually adjusted | Univariable | Adjusted | Mutually adjusted |
| Factor 1: Conservative | |  |  |  |  |  |  |
| -1.30, -0.71  >-0.71, -0.23  >-0.23, 0.48  >0.48, 3.44  *Trend:* | 309/1234 (25.0)  308/1234 (25.0)  309/1234 (25.0)  308/1234 (25.0) | 85.41 (84.18, 86.64)  **-2.56 (-4.35, -0.77)**  -1.62 (-3.39, 0.15)  **-5.64 (-7.50, -3.77)**  ***p<0.001*** | 85.17 (83.89, 86.44)  **-2.59 (-4.41, -0.77)**  -1.26 (-3.07, 0.55)  **-4.30 (-6.34, -2.26)**  ***p=0.001*** | 85.24 (83.84, 86.63)  **-2.80 (-4.66, -0.93)**  -1.26 (-3.19, 0.68)  **-4.39 (-6.80, -1.98)**  ***p=0.006*** | 83.03 (81.89, 84.17)  **-1.90 (-3.54, -0.26)**  **-2.72 (-4.37, -1.07)**  **-5.61 (-7.32, -3.90)**  ***p<0.001*** | 83.12 (81.95, 84.28)  **-2.10 (-3.74, -0.46)**  **-2.72 (-4.38, -1.05)**  **-5.46 (-7.32, -3.60)**  ***p<0.001*** | 82.65 (81.40, 83.90)  **-2.12 (-3.77, -0.46)**  **-1.94 (-3.68, -0.19)**  **-4.26 (-6.40, -2.12)**  ***p<0.001*** |
| Factor 2: Anti-PLWHIV | |  |  |  |  |  |  |
| -0.67, -0.39  >-0.39, -0.23  >-0.23, 0.05  >0.05, 8.46  *Trend:* | 309/1234 (25.0)  308/1234 (25.0)  309/1234 (25.0)  308/1234 (25.0) | 85.10 (83.86, 86.34)  -1.27 (-3.05, 0.51)  -1.76 (-3.54, 0.03)  **-5.63 (-7.51, -3.75)**  ***p<0.001*** | 84.23 (82.95, 85.51)  -0.26 (-2.06, 1.55)  -0.58 (-2.39, 1.24)  **-3.66 (-5.60, -1.72)**  ***p<0.001*** | 83.45 (82.04, 84.86)  +0.28 (-1.59, 2.13)  +0.46 (-1.50, 2.42)  -1.98 (-4.23, 0.26)  *p=0.14* | 84.78 (83.71, 85.85)  **-2.97 (-4.52, -1.41)**  **-5.33 (-6.92, -3.73)**  **-9.22 (-10.89, -7.55)**  ***p<0.001*** | 84.23 (83.14, 85.32)  **-2.51 (-4.08, -0.93)**  **-4.81 (-6.42, -3.19)**  **-7.62 (-9.33, -5.90)**  ***p<0.001*** | 83.27 (82.07, 84.47)  **-1.85 (-3.46, -0.24)**  **-3.51 (-5.24, -1.78)**  **-5.52 (-7.49, -3.54)**  ***p<0.001*** |
| Factor 3: Sexually responsible | |  |  |  |  |  |  |
| -3.10, -0.53  >-0.53, 0.08  >0.08, 0.58  >0.58, 1.72  *Trend:* | 309/1234 (25.0)  308/1234 (25.0)  309/1234 (25.0)  308/1234 (25.0) | 81.87 (80.52, 83.22)  +1.11 (-0.77, 3.00)  +1.12 (-0.76, 3.00)  **+2.36 (0.51, 4.22)**  ***p=0.017*** | 82.30 (80.88, 83.73)  +0.96 (-0.97, 2.89)  +0.76 (-1.18, 2.71)  +1.81 (-0.20, 3.81)  *p=0.11* | 81.99 (80.48, 83.50)  +1.20 (-0.76, 3.15)  +1.25 (-0.79, 3.29)  **+2.29 (0.07, 4.52)**  *p=0.056* | 78.62 (77.38, 79.87)  +0.66 (-1.09, 2.41)  **+2.41 (0.69, 4.13)**  **+4.50 (2.80, 6.19)**  ***p<0.001*** | 79.35 (78.04, 80.66)  -0.05 (-1.85, 1.74)  **+1.77 (0.00, 3.54)**  **+3.28 (1.46, 5.10)**  ***p<0.001*** | 79.40 (78.06, 80.73)  -0.01 (-1.76, 1.76)  **+1.89 (0.10, 3.69)**  **+2.95 (0.98, 4.91)**  ***p=0.001*** |
| Results presented as geometric mean (95% CI) attitudinal pattern loading at reference, with coefficients (95% CI) relative to reference for subsequent levels. Analysis by linear regression.  Adjusted analyses adjusted for age, sex, birthplace, sexual education and age of sexual debut. Mutually adjusted analyses include adjusted model covariates as well as factor loadings for conservative, anti-PLWHIV and sexually responsible attitudinal factors.  Figured in bold denote statistical significance (p<0.05). Figures in italic are p-values. | | | | | | | |

Table 4. Demographic determinants of SHL, adjusted for attitudes.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | ARC/LaTrobe | | SHS/Missouri | |
|  | n/N (%) | Adjusted | Further adjusted | Adjusted | Further adjusted |
| Sexa  Male  Female | 421/1207 (34.9)  786/1207 (65.1) | 81.47 (80.29, 82.64)  **+2.63 (1.21, 4.05)**  ***p<0.001*** | 81.71 (80.50, 82.92)  **+2.27 (0.76, 3.77)**  ***p=0.003*** | 78.12 (77.03, 79.21)  **+3.67 (2.44, 5.08)**  ***p<0.001*** | 78.72 (77.64, 79.81)  **+2.86 (1.51, 4.21)**  ***p<0.001*** |
| Age  17 – 20  >20 – 25  >25 – 30  >30  *Trend:* | 238/1210 (19.7)  483/1210 (39.9)  165/1210 (13.6)  324/1210 (26.8) | 79.21 (77.60, 80.83)  **+3.79 (1.89, 5.70)**  **+7.68 (5.35, 10.01)**  **+5.44 (3.35, 7.53)**  ***p<0.001*** | 79.44 (77.83, 81.04)  **+3.60 (1.70, 5.49)**  **+7.21 (4.88, 9.54)**  **+5.16 (3.07, 7.25)**  ***p<0.001*** | 77.57 (76.12, 79.02)  **+3.50 (1.78, 5.21)**  **+4.09 (1.90, 6.29)**  **+4.24 (2.33, 6.14)**  ***p<0.001*** | 77.83 (76.44, 79.23)  **+3.27 (1.61, 4.92)**  **+3.42 (1.28, 5.57)**  **+3.93 (2.08, 5.78)**  ***p<0.001*** |
| Region  Australia/NZ  Asia  Africa and Middle East  Europe  Americas  *Trend:* | 1042/1187 (87.8)  62/1187 (5.2)  12/1187 (1.0)  48/1187 (4.0)  23/1187 (1.9) | 83.48 (82.79, 84.18)  **-3.75 (-7.11, -0.38)**  +0.77 (-5.74, 7.28)  -0.04 (-3.46, 3.39)  -3.37 (-8.37, 1.63)  a | 83.41 (82.721, 84.11)  -1.84 (-5.15, 1.48)  +1.43 (-4.95, 7.82)  -0.58 (-4.03, 2.87)  -3.76 (-8.77, 1.26)  a | 81.01 (80.38, 81.65)  **-8.42 (-11.75, -5.08)**  -1.27 (-7.48, 4.94)  +0.78 (-2.31, 3.86)  +0.27 (-3.93, 4.47)  a | 80.92 (80.30, 81.54)  **-5.40 (-8.56, -2.24)**  -0.45 (-6.41, 5.51)  -0.08 (-3.13, 2.97)  -0.23 (-4.35, 3.89)  a |
| Sexual orientation  Heterosexual  Questioning  Bisexual  Homosexual  *Trend:* | 1026/1200 (85.5)  20/1200 (1.7)  105/1200 (8.8)  49/1200 (4.1) | 83.01 (82.29, 83.72)  -2.87 (-8.48, 2.74)  +1.06 (-1.30, 3.41)  **+4.85 (1.82, 7.88)**  a | 83.09 (82.38, 83.80)  -2.75 (-8.30, 2.80)  +0.43 (-1.95, 2.81)  **+4.25 (1.20, 7.30)**  a | 80.49 (79.83, 81.15)  -1.41 (-6.39, 3.57)  +1.64 (-0.52, 3.80)  +0.70 (-2.37, 3.78)  a | 80.60 (79.96, 81.24)  -1.05 (-5.82, 3.72)  +0.77 (-1.36, 2.90)  -0.30 (-3.33, 2.73)  a |
| Race/ethnicity  White  African  Aus Aboriginal  East Asian  Hispanic  Pac Islander  South Asian  Mixed  *Trend:* | 1013/1188 (85.3)  6/1188 (0.5)  40/1188 (3.4)  27/1188 (2.3)  9/1188 (0.80)  3/1188 (0.3)  29/1188 (2.4)  61/1188 (5.1) | 83.48 (82.76, 84.20)  -20.40 (-42.28, 1.49)  -1.08 (-4.80, 2.64)  +0.20 (-4.81, 5.21)  -7.01 (-16.96, 2.95)  +2.79 (-11.73, 17.30)  -2.90 (-8.41, 2.60)  -1.21 (-4.37, 1.96)  a | 83.40 (82.69, 84.12)  -16.58 (-36.18, 3.03)  -0.72 (-4.39, 2.95)  +1.55 (-3.32, 6.42)  -7.95 (-18.07, 2.18)  +1.74 (-13.03, 16.51)  -1.43 (-6.78, 3.93)  -1.04 (-4.17, 2.09)  a | 81.23 (80.57, 81.88)  -15.69 (-31.97, 0.59)  -1.70 (-5.11, 1.71)  **-10.29 (-15.95, -4.63)**  -3.52 (-11.72, 4.69)  +5.03 (-7.77, 17.83)  **-8.22 (-13.76, -2.68)**  -0.90 (-3.76, 1.95)  a | 81.11 (80.47, 81.74)  -10.34 (-24.45, 3.78)  -1.04 (-4.32, 2.24)  **-7.71 (-12.96, -2.46)**  -4.89 (-13.10, 3.32)  +3.09 (-9.82, 16.00)  **-5.55 (-10.71, -0.39)**  -0.71 (-3.48, 2.05)  a |
| Religion  Agnostic/atheist  None/Unaffiliated  Catholic  Protestant  Christian, other  Islam  Buddhist  Hindu  Other/Multiple  *Trend:* | 488/1178 (41.4)  347/1178 (29.5)  94/1178 (8.0)  159/1178 (13.5)  26/1178 (2.2)  6/1178 (0.5)  30/1178 (2.6)  5/1178 (0.4)  23/1178 (2.0) | 84.05 (83.03, 85.06)  -1.38 (-2.98, 0.23)  +1.91 (-0.52, 4.34)  -1.44 (-3.59, 0.70)  -2.64 (-7.53, 2.26)  -2.85 (-14.51, 8.81)  **-6.58 (-11.83, -1.33)**  -2.12 (-12.42, 8.18)  +0.93 (-3.88, 5.74)  a | 83.48 (82.42, 84.54)  -0.88 (-2.50, 0.74)  **+2.75 (0.30, 5.20)**  +0.38 (-1.94, 2.70)  -0.17 (-5.01, 4.67)  -0.38 (-11.51, 10.75)  **-5.52 (-10.71, -0.34)**  +0.73 (-9.10, 10.56)  +1.77 (-3.01, 6.54)  a | 82.57 (81.66, 83.48)  **-2.42 (-3.87, -0.96)**  **-3.12 (-5.51, -0.73)**  **-3.98 (-5.98, -1.98)**  **-6.20 (-10.89, -1.52)**  -7.47 (-18.89, 3.95)  **-5.38 (-9.88, -0.89)**  -8.84 (-19.41, 1.73)  -1.32 (-5.86, 3.21)  a | 81.90 (80.96, 82.84)  **-1.78 (-3.22, -0.34)**  -2.08 (-4.44, 0.28)  -1.89 (-4.01, 0.24)  -3.23 (-7.76, 1.30)  -4.38 (-15.02, 6.27)  -4.18 (-8.54, 0.19)  -4.65 (-14.35, 5.06)  -0.43 (-4.86, 4.00)  a |
| Study area |  |  |  |  |  |
| Non-science/medical  Science/math  Allied health/Menzies  Nursing  Medicine  *Trend:* | 517/1199 (43.1)  306/1199 (25.5)  144/1199 (12.0)  100/1199 (8.3)  132/1199 (11.0) | 80.71 (79.71, 81.71)  +0.43 (-1.25, 2.12)  **+5.46 (3.52, 7.39)**  **+7.01 (4.84, 9.18)**  **+10.59 (8.72, 12.46)**  a | 80.64 (79.66, 81.63)  +0.35 (-1.32, 2.01)  **+5.61 (3.70, 7.51)**  **+7.45 (5.32, 9.57)**  **+10.77 (8.93, 12.61)**  a | 79.81 (78.88, 80.74)  +0.08 (-1.49, 1.66)  **+2.36 (0.44, 4.28)**  +0.36 (-1.95, 2.67)  **+4.29 (2.32, 6.27)**  a | 79.72 (78.83, 80.62)  +0.02 (-1.51, 1.54)  **+2.50 (0.65, 4.35)**  +1.07 (-1.14, 3.27)  **+4.54 (2.64, 6.44)**  s |
| Sexual education |  |  |  |  |  |
| None  Missing basic  Basic only  Basic + advanced  Basic, advanced and extra  *Trend:* | 189/1234 (15.3)  101/1234 (8.2)  23/1234 (1.9)  221/1234 (17.9)  700/1234 (56.7) | 82.05 (80.23, 83.88)  -0.56 (-3.66, 2.55)  -0.08 (-5.35, 5.20)  +0.86 (-1.54, -3.25)  +1.77 (-0.29, 3.83)  ***p=0.032*** | 82.25 (80.45, 84.05)  -0.53 (-3.60, 2.53)  -0.29 (-5.52, 4.94)  +0.55 (-1.82, 2.92)  +1.54 (-0.50, 3.57)  *p=0.058* | 79.51 (77.85, 81.18)  -0.83 (-3.68, 2.03)  +2.41 (-2.21, 7.03)  +1.34 (-0.85, 3.52)  +1.54 (-0.35, 3.44)  ***p=0.036*** | 79.83 (78.23, 81.43)  -0.68 (-3.42, 2.05)  +2.27 (-2.18, 6.72)  +0.84 (-1.27, 2.95)  +1.14 (-0.68, 2.96)  *p=0.11* |
| Family sexual discussion |  |  |  |  |  |
| Free and open  Only questions  Implicit only  Taboo  *Trend:* | 268/1188 (22.6)  264/1188 (22.2)  437/1188 (36.8)  219/1188 (18.4) | 85.16 (83.83, 86.48)  -1.87 (-3.81, 0.08)  -1.63 (-3.35, 0.08)  **-4.21 (-6.36, -2.05)**  ***p=0.001*** | 85.03 (83.71, 86.35)  -1.78 (-3.71, 0.16)  -1.56 (-3.27, 0.14)  **-3.75 (-5.89, -1.61)**  ***p=0.002*** | 81.97 (80.72, 83.22)  -0.98 (-2.79, 0.83)  -0.87 (-2.47, 0.73)  **-3.09 (-5.08, -1.11)**  ***p=0.008*** | 81.77 (80.56, 82.98)  -0.81 (-2.56, 0.95)  -0.80 (-2.35, 0.76)  **-2.32 (-4.23, -0.40)**  ***p=0.034*** |
| Age first sex |  |  |  |  |  |
| Never had sex  18-40yo  17yo  16yo  10-15yo  *Trend:* | 108/1164 (9.3)  181/1164 (15.6)  289/1164 (24.8)  199/1164 (17.1)  387/1164 (33.3) | 79.75 (77.34, 82.16)  +1.79 (-1.25, 4.83)  **+3.68 (0.93, 6.25)**  **+3.41 (0.52, 6.30)**  **+4.89 (2.23, 7.54)**  ***p<0.001*** | 81.25 (78.82, 83.68)  +0.73 (-2.24, 3.70)  +2.05 (-0.72, 4.82)  +1.57 (-1.38, 4.52)  **+3.07 (0.33, 5.82)**  ***p=0.011*** | 76.05 (73.82, 78.28)  **+5.28 (2.53, 8.03)**  **+4.45 (1.91, 6.99)**  **+4.57 (1.90, 7.24)**  **+5.45 (2.99, 7.91)**  ***p=0.002*** | 78.09 (75.92, 80.27)  **+3.76 (1.14, 6.38)**  +2.22 (-0.27, 4.70)  +2.05 (-0.60, 4.69)  **+3.04 (0.57, 5.51)**  *p=0.23* |
| Perceived STI risk |  |  |  |  |  |
| Never  V Unlikely  Unlikely  Likely  V Likely  *Trend:* | 150/1226 (12.2)  582/1226 (47.5)  414/1226 (33.8)  73/1226 (6.0)  7/1226 (0.6) | 82.45 (80.52, 84.38)  +0.34 (-1.81, 2.49)  +1.59 (-0.65, 3.84)  +1.50 (-1.81, 4.81)  +4.93 (-3.47, 13.33)  *p=0.055* | 82.98 (81.03, 84.93)  -0.32 (-2.47, 1.84)  +0.97 (-1.33, 3.27)  +1.40 (-1.99, 4.78)  +4.49 (-3.86, 12.83)  *p=0.090* | 80.08 (78.31, 81.84)  +0.78 (-1.19, 2.75)  +0.77 (-1.30, 2.84)  -0.29 (-3.41, 2.82)  +2.26 (-5.96, 10.48)  *p=0.86* | 80.94 (79.21, 82.67)  -0.31 (-2.22, 1.61)  -0.23 (-2.29, 1.83)  -0.41 (-3.50, 2.68)  +1.51 (-6.45, 9.46)  *p=0.96* |
| Results presented as geometric mean (95% CI) attitudinal pattern loading at reference, with coefficients (95% CI) relative to reference for subsequent levels. Analysis by linear regression.  Adjusted analyses adjusted for age, sex, birthplace, sexual education and age of sexual debut. Further adjusted analyses include adjusted model covariates as well as factor loadings for conservative, anti-PLWHIV and sexually responsible attitudinal factors.  Figured in bold denote statistical significance (p<0.05). Figures in italic are p-values.  a. 3 persons reporting their sex as “Other” omitted from analysis due to insufficient numbers.  b. A test for trend for this variable is not presented as there is not an expectation of a linear relationship in this categorical variable. | | | | | | |

Supplemental Table 1. Demographic Information from the Researching University Students' Sexual Literacy (RUSSL) Study Sample

|  |  |  |
| --- | --- | --- |
|  | Total sample  N=1,786 | Sample with  data from attitudinal questions  N=1,234 |
|  | n/N (%) | |
| Sexa |  |  |
| Male  Female | 628/1693 (37.1)  1,065/1,693 (62.9) | 421/1,207 (34.9)  786/1,207 (65.1) |
| Age Category |  |  |
| 17 – 20  21 – 25  26 – 35  36+ | 348/1,703 (20.4)  695/1,703 (40.8)  222/1,703 (13.0)  438/1,703 (25.7) | 238/1,210 (19.7)  483/1,210 (39.9)  165/1,210 (13.6)  324/1,210 (26.8) |
| Relationship Status |  |  |
| Single  Dating  Committed relationship  Married/partnered  Separated/divorced  Widowed | 607/1,699 (35.7)  52/1,699 (3.1)  616/1,699 (36.3)  389/1,699 (22.9)  29/1,699 (1.7)  6/1,699 (0.4) | 405/1,207 (33.6)  37/1,207 (3.1)  452/1,207 (37.5)  284/1,207 (23.5)  25/1,207 (2.1)  4/1,207 (0.3) |
| Birthplace (By Region) |  |  |
| Australia/NZ/Oceania  Asia  Africa/Middle East  Europe  North/South America | 1,432/1,636 (87.5)  91/1,636 (5.6)  20/1,636 (1.2)  67/1,636 (4.1)  26/1,636 (1.6) | 1,042/1,187 (87.8)  62/1,187 (5.2)  12/1,187 (1.0)  48/1,187 (4.0)  23/1,187 (1.9) |
| Study Area |  |  |
| Arts and Music  Business and Management  Government and Sociology  History and Languages  Medicine  Nursing  Allied Health  Science and Mathematics  Nonspecific  Multiple | 122/1,672 (7.3)  138/1,672 (8.3)  258/1,672 (15.4)  113/1,672 (6.8)  158/1,672 (9.5)  132/1,672 (7.9)  187/1,672 (11.2)  373/1,672 (22.3)  9/1,672 (0.5)  182/1,672 (10.9) | 94/1,199 (7.8)  78/1,199 (6.5)  191/1,199 (15.9)  82/1,199 (6.8)  120/1,199 (10.0)  96/1,199 (8.0)  133/1,199 (11.1)  269/1,199 (22.4)  6/1,199 (0.5)  130/1,199 (10.8) |
| School year |  |  |
| Undergraduate  Postgraduate | 1,263/1,659 (76.1)  396/1,659 (23.9) | 905/1,1981 (76.0)  286/1,191 (24.0) |
| a. 3 persons reporting their sex as “Other” omitted from analysis due to insufficient numbers. | | |