ATTITUDES TOWARDS AND PRACTICE OF SEXUALITY AMONG UNIVERSITY STUDENTS IN LEBANON

P. SALAMEH*†[1], R. ZEENNY†, J. SALAMÉ‡, M. WAKED§, B. BARBOUR¶, N. ZEIDAN ¶ AND I. BALDI#

Clinical & Epidemiological Research Laboratory, Faculty of Pharmacy, Lebanese University, Hadath, Lebanon, †Pharmacy Practice Department, School of Pharmacy, Lebanese American University, Byblos, Lebanon, ‡Charité–Universitätsmedizin, Berlin, Germany, §Pulmonology Department, Saint Georges Hospital & Faculty of Medicine, Balamand University, Beirut, Lebanon, ¶Midwifery Department, Faculty of Public Health, Lebanese University, Fanar, Lebanon and #Laboratoire Santé Travail Environnement, Université Bordeaux Segalen, Bordeaux, France

Summary. Sexuality is still a taboo in Middle Eastern countries, and Lebanon is no exception. This study's objective was to evaluate attitudes towards sexuality and its practice among university students in Lebanon and assess their respective correlates. The cross-sectional study was carried out among students selected from seventeen universities across Lebanon. The participants received a self-administered standardized questionnaire that assessed their attitudes towards sexuality. It included questions on socio-demographic factors, risk-taking, risky behaviours and sexuality-related questions. Among 3384 students, 2700 (79.8%) answered the questions on sexuality. Around 15% had engaged in sexual activity, while 20% were regularly sexually active. Among males, 34.8% had never had sexual activity, 29.9% had tried it and 35.3% were regularly sexually active. Among females the results were respectively 85.1%, 5.3% and 9.6% ($p < 0.001$). Only 36% regularly used condoms during their relationships. A liberal attitude towards sex, male sex, motives for risky behaviours, current cigarette smoking and problematic alcohol consumption were associated with sexual activity. Realizing that risky behaviours are dangerous, health concerns related to sexual relationships and a liberal attitude towards sex were associated with regular condom use. However, being bothered by condoms and female sex were inversely associated with condom use. Finally, participants who had motives for, and those who felt excited about risky behaviours, and those reporting current cigarette and waterpipe smoking and problematic alcohol consumption ($\beta = 0.600$; $p = 0.002$) embraced a more liberal attitude towards sex. Conversely, females ($\beta = -7.58$; $p < 0.001$) and individuals who considered risky behaviours as dangerous reported

[1] Corresponding author. Email: pascale.salameh@lau.edu.lb

an unfavourable attitude towards sexuality. A substantial proportion of Lebanese university students have regular sexual activity, but a low percentage use condoms for protection. Interventions are required among males in particular in view of these attitude and behavioural changes towards sexuality.

Introduction

In developing countries, the sexual behaviours of young people are largely influenced by religion, parental attitudes and lifestyles (Kabiru & Orpinas, 2009), and contraceptive use is often inadequate (Hiltabiddle, 1996), increasing risk of unwanted pregnancies and sexually transmitted diseases (Carvalho *et al.*, 2008; Rahamefy *et al.*, 2008; Vivancos *et al.*, 2008). The latter are a worldwide public health problem, with AIDS and hepatitis B being serious diseases with a high burden (World Health Organization, 2013). In Lebanon, sexually transmitted diseases are commonly reported, particularly among patients visiting community pharmacies, but the issue has not been studied. Moreover, a low level of HIV prevalence has been documented in the whole region, but this has probably been underestimated due to under-reporting for social, religious and political reasons (Rosenthal *et al.*, 2011; Alkaiyat *et al*., 2014).

Young people do not always have the information they need to take responsibility for their sexual health, delay sexual activity or practise safe sex (Lally *et al.*, 2014). They perceive risk differently from older adults (Quadrel *et al.*, 1993), and are generally more influenced by their peers and the media (Primack *et al.*, 2007; Salamé *et al.*, 2013). They adopt certain risky behaviours, in particular risky sexual activity, in parallel with modern urban lifestyles, and more frequently at a young age (UNAIDS, 2011; Ismael & Sabir Zangana, 2012).

Little is known about sexual behaviours among youth in Lebanon. In a previous study conducted among Lebanese university students in 2007, the majority of males (73.3%) and a few females (21.8%) declared previous sexual relations, and the majority of males had used condoms (86.1%), but females had generally not used any contraceptives (75.6%) (Barbour & Salameh, 2009). However, attitude towards sexuality and correlates of sexual behaviours were not evaluated in this study. This information would be useful to target interventions at specific subgroups leading to safer sexual behaviours, as demonstrated in other countries (Amazaki & Shimizu, 2008; Brakel, 2008). The ultimate goal is to decrease sexually transmitted diseases and improve reproductive health in Lebanon. In this study, the objective was to evaluate attitudes towards and practice of sexuality among university students in Lebanon and assess their respective correlates to allow for tailored interventions among Lebanese youth.

Methods

General study design

A cross-sectional study was carried out using a proportionate cluster sample of Lebanese students in public and private universities. From each university, a sample proportionate to its size was selected. Each group of students, chosen from one university, defined the cluster. A list of universities in Lebanon, provided by the Centre for Pedagogic Research, was used

to adjust the sample size (Center for Educational Research & Development, 2009). A sample size of at least 3000 individuals was the target to allow for adequate power for bivariate and multivariate analysis to be carried out, taking into account the proportionate cluster sampling method (factor design = 2), even if there is no previous information about the variable distribution in the population (assumed to be 50% per subgroup) (Center for Disease Control, 2012). Seventeen universities agreed to participate in the study: the Lebanese public university (40% of university students in Lebanon), and sixteen private universities, including the biggest in each of the Lebanese regions. Additional information about the sample description is available in a previous publication (Salameh *et al.*, 2012).

Data collection

Most of the university administrative offices in Lebanon that were approached did not allow a random sample of enrolled students to be drawn to participate in the study. They did not provide lists of students and permission was not granted to enter classrooms and search for students nominatively. Thus, the research group had to work with a non-random sample of students outside their classes. Students were approached on campus during break times between courses by a fieldworker, who equally targeted males and females. No specific quota was used during data collection. The only inclusion criterion was to be registered as a student in the targeted university, while the exclusion criterion was to be currently married.

The fieldworker explained the study objectives to the student, and after obtaining an oral consent, the student was handed the anonymous and self-administered questionnaire. Students were asked not to discuss the questions and answers of the questionnaire until after they had submitted it to the fieldworker.

On average, the questionnaire was completed by participants within approximately 20 minutes. At the end of the process, the completed questionnaires were placed in closed boxes and sent for data entry. During the data collection process, the anonymity of the students was guaranteed. Out of 4900 distributed questionnaires, 3384 (69.1%) were returned to the fieldworker.

Questionnaire and variables

The anonymous questionnaire was in Arabic and was composed of different sections: socio-demographic characteristics, a screening section for all risky behaviours and a thorough cigarette and waterpipe smoking history. Moreover, the Alcohol, Smoking and Substance Involvement (ASSIST) score for problematic use of toxic substances, defined by the World Health Organization as 'at risk of developing problems related to their substance use in the future' (World Health Organization, 2010), and the Risk Involvement & Perception Scale (RIPS) for risk involvement attitudes assessment (excitement, apprehension and motives) were used (Siegel *et al.*, 1994; Shapiro *et al.*, 1998; Mantzouranis & Zimmermann, 2010). The latter scale had already been validated among Lebanese university students by the team (Salameh *et al.*, 2014). In addition, the socioeconomic status of respondents was assessed using the declared household monthly income divided by the number of individuals per household as a surrogate measure. The obtained number was subsequently divided into quartiles, according to which individuals were classified as: very high, intermediate and low socioeconomic status.

Sexual practice was assessed using the following question: 'Have you ever had full sexual intercourse?', where possible answer options were: 'Yes, and I am still regularly sexually active'; 'Yes, I have tried it' and 'No, I have never had sex in my life.' No further questions were added about the nature of the intercourse (vaginal or anal), or about the number and sex of sexual partners: these questions were considered too audacious, and could subsequently jeopardize the answers of participants (see below). Condom use was assessed with the question: 'If you are sexually active, how often do you use condoms?' Possible answers were: 'Yes, in all intercourses,' 'Yes, sometimes' or 'No, I never used condoms during intercourse.' The last two modalities were considered as 'non-regular condom use' in analyses. No questions were asked about other contraceptives to avoid lengthening the questionnaire and subsequent missing answers.

To measure attitudes towards sexuality, items from a scale measuring attitudes towards sexual health among university students were used (Nemcic *et al.*, 2005). However, any items related to personal sexual health care were removed based on cultural considerations, because it was considered too intimate and irrelevant to the study objectives (see below). Only items related to attitude towards sex (principles of sexual behaviours and safe sex) were kept in the questionnaire. These were translated into Arabic and back-translated by two independent translators and then verified by two researchers; discrepancies were resolved by consensus. The questionnaire was then pilot-tested on 20 individuals to ensure adequate understanding of the composing items. The pre-test directed the researchers to remove the questions that were unanswered by the majority of the pre-tested individuals, i.e. the hygiene, sexual partner's gender and sexual intercourse type related questions. None of the questions was modified after this step.

Validation of sexuality related scale among university students

Data were entered and analysed using SPSS version 19.0. A validation step of the sexuality related scale used was first carried out: a factor analysis using the principal component analysis method was used to construct a validity assessment. The final structure of the scale was retained after sample adequacy was ensured, in addition to inverse image, communalities and items loading over factors evaluation. A Promax rotation was selected because factors were inter-related. Furthermore, reliability analysis using Cronbach's α coefficient was also verified.

The factor analysis using principal components analysis explained 55.71% of the total variance. The reliability analysis of the total scale was 0.854, indicating a good internal consistency. The analysis of included items gave a structure of six factors: liberal attitude towards sexuality, negative attitude towards condom use, false beliefs about sexuality matters, imprudent attitude towards sexuality, absence of health concerns about sexuality, and naturalistic attitude towards sexuality (Table 1). Only one item was removed due to low loading on all factors (necessity to trust someone before having sexual relationship with them). The scale was judged to have adequate construct validity and reliability. In addition, external nomological validity was also assessed: individuals who were regularly sexually active scored significantly higher on the total scale and on subscales than individuals who had tried sexual activity, who also scored higher than those who have never had any sexual activity ($p < 0.01$ for all).

Table 1. Factor analysis[a] of sexuality scale responses among university students in Lebanon

Items loaded to factors	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Total scale
Factor 1: Liberal attitude towards sexuality							
It is awesome to have sex with a stranger	0.861						
Sex should not be delayed for later	0.812						
There is no need to be close to someone to have sex with him/her	0.772						
The best way to have fun is to get drunk and have sex	0.759						
The objective of a party is to encounter somebody and have sex	0.756						
It is boring to always have sex with the same person	0.751						
Sex should not be delayed until ready to cope with its consequences	0.659						
We should not deeply think before having sex	0.598						
Factor 2: Negative attitude towards condom use							
Condoms decrease pleasure in sexual relationships		0.757					
Condom use is not practical in sexual relationships		0.635					
In a steady relationship of >1 month, there is no need for condom use		0.497					
Factor 3: False beliefs about sexuality matters							
Oral contraceptives protect against sexually transmitted diseases			0.787				
No change of sexuality is necessary, even upon a doctor's advice			0.673				
If a partner refuses the condom it is OK not to do as he likes			0.415				
Sex is a private matter, and buying a condom may diffuse it			0.413				
Sexually transmitted diseases cannot be caught with a regular partner			0.407				
Factor 4: Imprudent attitude towards sexuality							
It is not important to discuss with the partner before having sex				0.878			
It is not important to know about hygiene of the partner before sex				0.543			
It is not important to be lawful in a sexual relationship				0.511			
Since there is no pleasure with a condom, it should not be used				0.474			
Sex is not an intimate experience				0.457			
Factor 5: Absence of health concerns about sexuality							
Instantaneous pleasure is more important than health					0.806		
The possibility of catching a sexually transmitted disease is not enough to change our sexual habits					0.708		

Table 1. (*Continued*)

Items loaded to factors	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Total scale
Factor 6: Naturalistic attitude towards sexuality							
Thinking about sexually transmitted diseases decreases pleasure						0.802	
Contraceptives decrease spontaneity of sexual relationships						0.537	
The use of a condom means that we do not trust others						0.490	
Percentage of variance explained	24.12	12.06	7.79	4.12	3.89	3.71	55.71
Cronbach's α for reliability analysis	0.896	0.636	0.625	0.425	0.489	0.525	0.854
Subscale mean according to sexual activity							
Never had any sexual activity	3.91	4.14	6.47	5.90	2.32	4.80	27.64
Have tried sexual activity	13.40	4.49	6.75	7.19	2.84	5.00	39.27
Is regularly sexually active	14.28	5.56	7.54	7.81	2.69	5.16	43.07
p-value for between-group differences using ANOVA[b]	<0.001	<0.001	<0.001	<0.001	<0.001	0.005	<0.001

[a]Kaiser-Meyer-Olkin measure of sampling adequacy = 0.908; p <0.001. Results are presented after Promax rotation with Kaiser normalization; the extraction method is by principal component analysis.

[b]Post-hoc differences of means were significant using Bonferroni tests for all two-by-two comparisons, except: means of factor 3 and of factor 6 between individuals who had never had sexual activity and those who have tried; means of factor 5 and factor 6 between individuals who had tried sexual activity; and those who were regularly sexually active.

Additional statistical analyses

In the descriptive analysis, means and standard deviations were presented for continuous variables, while percentages were presented for categorical variables. In bivariate analysis, correlation coefficients, ANOVA and Bonferroni post-hoc tests for means comparison between groups and the chi-squared test for comparing percentages were used. A *p*-value of less than 0.05 was considered significant.

Finally, multivariate analyses were carried out: when the dependent variable was dichotomous (ever had sexual activity/regular condom use among sexually active individuals), a stepwise descending logistic regression was used; when the dependent variable was continuous (attitude towards sexuality), a stepwise descending multiple regression was used. This backward regression type allowed removal from the model of all independent variables that have no significant effect on the dependent variable, leading to a more parsimonious model of sexual behaviours and attitude correlates (simpler and easier to understand). Sample adequacy to data and other conditions was verified for both types of analyses before the final models were accepted.

Independent variables included sex, age class, dwelling region, private (versus public) university, socioeconomic status, problematic smoking, cigarette and waterpipe consumption, problematic alcohol consumption, risk involvement, excitement, motives and apprehension, and attitude towards sexuality. To assess the correlates of ever having sexual activity, two models were constructed, taking attitude towards sexual activity as a major independent variable in one model and its subscales in another one. Although the interactive terms of sex with sexual attitude and with risk-taking motives were introduced, all interactions were subsequently removed from the analysis because of non-consistent results and models inadequacy to data.

Results

Declared sexual activity among university students

Among 3384 students, 88 (2.6%) were married and therefore removed from the analysis. Of the non-married individuals, 2750 (83.4%) answered the questions on sexuality: 1116 males (40.6%) and 1634 females (59.4%). Males' mean age was slightly higher than that of females (20.80 versus 20.53 years; $p < 0.001$). Around 15% had engaged in sexual activity, while 20% were regularly sexually active. Among males, 34.8% had never engaged in sexual activity, 29.9% had tried it and 35.3% were regularly sexually active. Among females, the results were 85.1%, 5.3% and 9.6% respectively ($p < 0.001$) (Fig. 1).

Among those who had ever had sex, 36.3% had always used condoms, 36.5% had used them irregularly and 27.2% had never used them. For males, these figures were 41.3%, 38.7% and 20.1%, respectively; for females, they were 26.6%, 34.9% and 38.4% ($p < 0.001$).

Age of first relationship was 13 years or below for 4.8%, 15 years or below for 22.6%, 17 years or below for 66% and 20 years or below for 92% of individuals. This age was significantly lower for males (mean = 16.5 years; SD = 202) than for females (mean = 18.6 years; SD = 2.5) ($p < 0.001$).
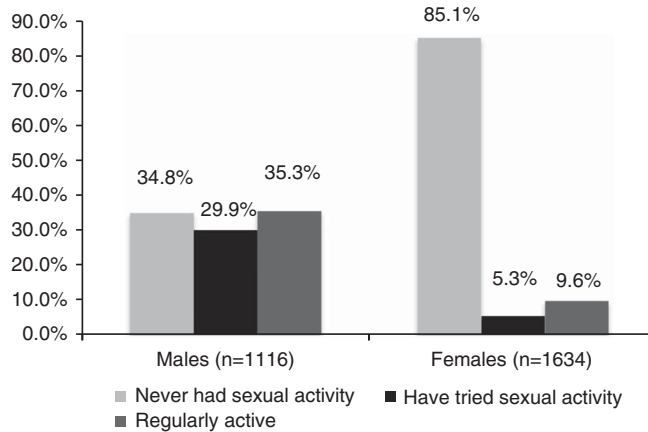
Fig. 1. Declared sexual activity among university students in Lebanon ($p < 0.001$). Among those who ever had sex, 36.3% had always used condoms, 36.5% had used them irregularly and 27.2% had never used them.

Socio-demographic characteristics and risky attitudes, behaviours and activities

Higher age groups included significantly more individuals who had tried sex and who were engaged in regular sexual activity ($p < 0.001$). The same was true of individuals from private universities, Mount Lebanon region, those of higher socioeconomic status, current cigarette and waterpipe smokers and problematic alcohol and tobacco consumers ($p > 0.001$). Moreover, individuals with regular sexual activity had significantly higher means of excitement and motives for risky behaviours, with lower apprehension of risky behaviours ($p < 0.001$) (Table 2).

Multivariate analyses

A favourable attitude towards sexual activity (adjusted odds ratio, ORa = 1.06; $p < 0.001$), and a liberal one in particular (ORa = 1.19; $p < 0.001$), was associated with ever having had sexual activity. Moreover, male sex, Mount Lebanon dwelling, higher socioeconomic status and age group, motives for risky behaviours, current cigarette smoking and problematic alcohol consumption were also associated with ever having had sexual activity. Among those who ever had sexual activity, realizing that risky behaviours are dangerous (ORa = 1.02; $p = 0.002$) and a liberal attitude towards sex (ORa = 1.06; $p = 0.002$) were associated with regular condom use. However, declaring being bothered by condoms (ORa = 0.62; $p < 0.001$) and female sex (ORa = 0.44; $p = 0.003$) were inversely associated with condom use.

Finally, the study suggested that participants who had motives ($\beta = 0.14$; $p < 0.001$) and those who feel excited about risky behaviours ($\beta = 0.11$; $p < 0.001$), current cigarette ($\beta = 4.35$; $p < 0.001$) and waterpipe smoking ($\beta = 2.21$; $p < 0.001$) and problematic alcohol consumption ($\beta = 0.600$; $p = 0.002$) embraced a more liberal attitude towards sex. It is noted that female participants ($\beta = -7.58$; $p < 0.001$) and individuals who

Table 2. Socio-demographic characteristics and risky attitudes, behaviours and activities among university students in Lebanon

Variable	Never had sexual activity $N = 1750$	Have tried sexual activity $N = 411$	Is regularly sexually active $N = 538$	p-value
Age class				<0.001
17–19 years	568 (76.1%)	93 (12.5%)	85 (11.4%)	
20–21 years	749 (62.9%)	181 (15.2%)	261 (21.9%)	
22 years+	431 (57.1%)	137 (18.1%)	187 (24.8%)	
University				
Public university	1141 (73.6%)	158 (10.2%)	252 (16.2%)	<0.001
Private university	609 (53.0%)	254 (22.1%)	286 (24.9%)	
Mouhafaza (governorate)				<0.001
Beirut	196 (61.1%)	65 (20.2%)	60 (18.7%)	
Mount Lebanon	697 (54.7%)	243 (19.1%)	334 (26.2%)	
North Lebanon	372 (79.8%)	34 (7.3%)	60 (12.9%)	
South Lebanon	299 (74.2%)	44 (10.9%)	60 (14.9%)	
Bekaa	166 (79.4%)	20 (9.6%)	23 (11.0%)	
Socioeconomic status				<0.001
Very high	602 (75.9%)	73 (9.2%)	118 (14.9%)	
High	391 (73.9%)	62 (11.7%)	76 (14.4%)	
Intermediate	401 (57.9%)	126 (18.2%)	165 (23.8%)	
Low	267 (47.7%)	133 (23.8%)	160 (28.6%)	
Current cigarette smoker				<0.001
No	1615 (73.6%)	269 (12.3%)	310 (14.1%)	
Yes	132 (26.2%)	143 (28.4%)	228 (45.3%)	
Current waterpipe smoker				<0.001
No	1432 (69.0%)	294 (14.2%)	348 (16.8%)	
Yes	315 (50.6%)	118 (18.9%)	190 (30.5%)	
Problematic smoking[a]				<0.001
No intervention required	915 (80.9%)	93 (8.2%)	123 (10.9%)	
Brief intervention required	440 (48.4%)	208 (22.9%)	262 (28.8%)	
More intensive treatment required	52 (28.4%)	62 (33.9%)	69 (37.7%)	
Problematic alcohol consumption[a]				<0.001
No intervention required	1466 (74.1%)	239 (12.1%)	274 (13.8%)	
Brief intervention required	190 (35.3%)	122 (22.6%)	227 (42.1%)	
More intensive treatment required	7 (13.2%)	20 (37.7%)	26 (49.1%)	
Excitement due to risky behaviours[b,c]	47.94 (25.08)	58.64 (21.47)	57.65 (23.63)	<0.001
Has motives for risky behaviours[b]	40.50 (14.76)	48.17 (15.59)	52.96 (20.74)	<0.001
Feels danger from risky behaviours[b]	82.78 (15.59)	75.41 (18.78)	71.76 (21.52)	<0.001

[a]Measured by the ASSIST score.

[b]Measured by RIPS score.

[c]No significant difference between the means for individuals who have tried sexual activity and those who are regularly active; all other post-hoc two-by-two comparisons are significant according to Bonferroni testing.

Table 3. Multivariate analyses of sexuality attitudes and practice among university students in Lebanon

Dependent variable	Independent variable	ORa/β [95% CI]	p-value	Model characteristics; unretained variables
Had ever had sexual activity	Excitement about risky behaviour	0.99 [0.99; 1.00]	0.091	Nagelkerke R^2 = 0.534; HL[a] = 0.102; Unretained variables: feeling that risky behaviours are dangerous; current waterpipe smoking.
	Motives for risky behaviours	1.01 [1.00; 1.02]	0.007	
	Favourable attitude towards sex	1.06 [1.05; 1.08]	<0.001	
	Female sex versus males	0.25 [0.19; 0.33]	<0.001	
	Private versus public university	1.58 [1.19; 2.10]	0.002	
	Mount Lebanon versus Beirut	1.95 [1.28; 3.00]	0.002	
	Higher socioeconomic quartile	1.26 [1.11; 1.43]	<0.001	
	Higher age class	1.64 [1.36; 1.98]	<0.001	
	Current cigarette smoking	2.55 [1.73; 3.75]	<0.001	
	Problematic smoking	1.06 [1.00; 1.12]	0.069	
	Problematic alcohol consumption	1.19 [1.02; 1.39]	0.026	
Has regular sexual activity	Excitement about risky behaviour	0.99 [0.99; 1.00]	0.072	Nagelkerke R^2 = 0.575; HL = 0.117; Unretained variables: feeling that risky behaviours are dangerous; current waterpipe smoking; bothered by condoms, erroneous beliefs about sex; imprudent attitude about sex; naturalistic attitude towards sex.
	Motives for risky behaviours	1.01 [1.00; 1.02]	0.028	
	Liberal attitude towards sexuality	1.19 [1.16; 1.22]	<0.001	
	No health concerns with sex	0.92 [0.84; 1.01]	0.092	
	Female sex versus males	0.43 [0.32; 0.59]	<0.001	
	Private versus public university	1.40 [1.04; 1.88]	0.028	
	Mount Lebanon versus Beirut	1.78 [1.14; 2.77]	0.011	
	Higher socioeconomic quartile	1.16 [1.02; 1.32]	0.026	
	Higher age class	1.70 [1.40; 2.07]	<0.001	
	Current cigarette smoking	2.33 [1.56; 3.50]	<0.001	
	Problematic smoking	1.05 [0.99; 1.12]	0.100	
	Problematic alcohol consumption	1.69 [1.00; 1.34]	0.051	

Outcome	Variable	OR [95% CI]	p	Notes
Regular condom use	Feeling that risky behaviours are dangerous	1.02 [1.01; 1.03]	0.002	Nagelkerke R^2 = 0.357; HL = 0.279; Unretained variables: excitement about risk; motives for risk; current cigarette smoking; current waterpipe smoking; socioeconomic status; erroneous beliefs about sex; imprudent attitude towards sex; naturalistic attitude towards sex; private university; age class; problematic alcohol consumption.
	Liberal attitude towards sex	1.06 [1.02; 1.10]	0.002	
	Being bothered by condoms	0.62 [0.56; 0.68]	<0.001	
	No health concerns with sex	0.89 [0.77; 1.02]	0.083	
	Female sex versus male	0.44 [0.26; 0.76]	0.003	
	Mount Lebanon versus Beirut	0.41 [0.23; 0.73]	0.003	
	Northern Lebanon versus Beirut	0.29 [0.12; 0.67]	0.004	
	Problematic smoking	0.95 [0.89; 1.01]	0.083	
Favourable attitude towards sex	Female sex versus male	−7.58 [−8.69; −6.47]	<0.001	R^2 = 0.444; all VIF <1.4; adequate linearity and normality of residues. Unretained variables: private university; socioeconomic status; higher age class; problematic smoking.
	Motives for risky behaviours	0.14 [0.11; 0.18]	<0.001	
	Feeling that risky behaviours are dangerous	−0.18 [−0.21; −0.15]	<0.001	
	Excitement about risky behaviour	0.11 [0.08; 0.13]	<0.001	
	Current cigarette smoking	4.35 [2.97; 5.73]	<0.001	
	Current waterpipe smoking	2.21 [1.00; 3.43]	<0.001	
	Problematic alcohol consumption	0.60 [0.22; 0.97]	0.002	

[a] Hosmer and Lemeshow's goodness-of-fit test.

consider risky behaviours as dangerous ($\beta = -0.18$; $p < 0.001$) reported an unfavourable attitude towards sexuality.

Discussion

The study found that a substantial proportion of Lebanese university students had tried sexual activity (15%) or were regularly sexually active (20%). These results are similar to those previously found in Lebanon (Barbour & Salameh, 2009) and in other countries witnessing health transition, such as China (Zhang *et al.*, 2013), but lower than those reported in developed countries such as Ireland (Lally *et al.*, 2014). That males are more involved in sexual activity has also been found in a previous study in Lebanon (Barbour & Salameh, 2009) and in the literature, since girls' virginity is generally considered more important worldwide (Wilson *et al.*, 2013; Fernandez *et al.*, 2013; Moore *et al.*, 2013), in Arab countries (Barbour & Salameh, 2009; AlQuaiz *et al.*, 2013) and in Muslim countries in particular (Shirazi & Morowatisharifabad, 2009; Al-Shdayfat & Green, 2012; Wong, 2012; Awwad *et al.*, 2013).

A liberal attitude towards sex, motives for risky behaviours, current cigarette smoking and problematic alcohol consumption were all found to be associated with ever having sexual activity. A liberal attitude towards sex is known to increase risky sexual activity (Zou *et al.*, 2013), with subsequent vulnerability to unwanted pregnancies and sexually transmitted diseases. An association of risky sexual behaviour with substance and alcohol abuse has also been demonstrated (O'Hare, 2001). In fact, evidence suggests that in young people risky behaviours are inter-correlated in a synergistic way, with numerous risky behaviours including substance abuse, delinquency, violent and aggressive behaviours and unplanned and unprotected sexual intercourse due to the disinhibitory effect of abuse substances (Coker *et al.*, 1994; Sibai *et al.*, 2009). Moreover, studies have demonstrated that having motives for risky behaviours in general is associated with higher engagement in risky sexual intercourse (Kloep *et al.*, 2009), even in females (Shapiro *et al.*, 1998).

Among those who had sex, only a third regularly used condoms during intercourse, males more than females. This finding is similar to previous study results (Barbour & Salameh, 2009) and to those of other studies, where females were found to be less likely to use condoms than males (Hoque & Ghuman, 2012). Realizing that risky behaviours are dangerous, health concerns related to sexual relationships and a liberal attitude towards sex were associated with regular condom use. However, being bothered by condoms was inversely associated with condom use. These results were mostly expected and are quite similar to those found by other researchers. In Italy for example, condoms were not used by 46.4% of the participants in the case of sex with a regular partner and by 9.5% with casual partners (liberal sex) (Bergamini *et al.*, 2013). Similar results were found in Zimbabwe (Nkomazana & Maharaj, 2013). An interesting result was that having a liberal attitude towards sex was correlated with regular condom use, which could indicate that this high-risk group is being reached by health-related promotional activity. It could explain the difference in condom use frequency between males and females, given that a more liberal attitude could entail less taboo, more seeking of counselling from health professionals and more explicit requirement for condom use by the sexual partner. This remains to be established in future research.

Finally, participants who have motives and feel excited about risky behaviours, current cigarette and waterpipe smoking and problematic alcohol consumption embrace a more liberal attitude towards sex; it is noted that female participants and individuals who consider risky behaviours as dangerous did not report favourable attitudes towards sexuality. The same correlates seem to apply to a favourable attitude towards sex and to its practice, confirming the link between attitude and practice (Askun & Ataca, 2007). However, there are still other factors that could affect attitude and practice of sexual activity, such as ethnic group and religion, level of religiosity, peer pressure and norms, and parental monitoring, which were not measured in this study. These remain to be studied in future projects.

This study may have several limitations. First, there is a risk of selection bias because of the substantial refusal rate (16.5%) to answer questions related to sexuality. This was expected due to the intimate nature of the questions, and probably caused an underestimate of sexual activity declaration, in females in particular. In fact, declaring engagement in sexual activity is still a cultural taboo in oriental countries, which can result in a further underestimate the rates of sexual intercourse occurrence among females (Awwad *et al.*, 2013). Conversely, males tend to exaggerate reporting their sexual activity because of its cultural association with masculinity, leading to an overestimation of their declared sexual activity. Thus, information biases are possible, although the questionnaires were self-administered and all precautions were made to preserve participants' anonymity and privacy; an overestimation of the difference in attitude and behaviours between males and females is expected. A selection bias is also possible, because of the convenient sampling and since there was no way of assessing the profiles of non-participants in the study: the non-random nature of the sampling could lead to an over-representation of students who skip classes and may have higher risky behaviours. On the other hand, the length of the questionnaire may also have led to an under-representation of this student category, leading to compensation of the latter phenomenon. Residual confounding is also a possibility, although several factors known to affect sexual attitude and practice were taken into account. An additional limitation results from the inability to take into account the interaction of attitude towards sexuality and the RIPS subscale with sex. These types of interaction gave inconsistent results along the multivariate models and were thus not considered adequate for adjustment. Additional studies taking into account all these limitations would be necessary to confirm the results.

Despite these limitations, interventions to improve attitudes towards sexual activity, and safe sex in particular, are suggested. In other countries such interventions have been shown to decrease sexually transmitted diseases and improve reproductive health (Amazaki & Shimizu, 2008; Ismael *et al.*, 2012). Whether the same applies in the Lebanese context of conservative values (Awwad *et al.*, 2013) remains to be established in future studies. Meanwhile, health promotion may be achieved by education, with teachers' and parents' support, as shown in some other developing countries (Shrestha *et al.*, 2013). Parental and peer support is expected to be particularly important since it has been shown to affect other risky behaviours such as problematic alcohol drinking among Lebanese university students (Salamé *et al.*, 2013). Separate and different interventions among male and females in Lebanon are suggested: while the former need to have better knowledge about the health risks of disorganized, unprotected sex and

other risky behaviours to further improve their safety status, the latter should be encouraged to use protective measures if they ever engage in sexual activity.

In conclusion, it was found that a substantial proportions of university students in Lebanon have regular sexual activity, but only a small percentage use condoms for protection. These practices were affected by an overall favourable attitude towards sexuality, and liberal sex in particular. Interventions are required among males in particular in view of these attitude and behavioural changes.

Acknowledgments

References

Al-Shdayfat, N. M. & Green, G. (2012) Reflections on sex research among young Bedouin in Jordan: risks and limitations. *Cultural Health & Sexuality* **14**(1), 101–111.

Alkaiyat, A., Schaetti, C., Liswi, M. & Weiss, M. G. (2014) Condom use and HIV testing among men who have sex with men in Jordan. *Journal of the International AIDS Society* **17**, 18573.

AlQuaiz, A. M., Kazi, A. & Al Muneef, M. (2013) Determinants of sexual health knowledge in adolescent girls in schools of Riyadh-Saudi Arabia: a cross sectional study. *BMC Women's Health* **13**, 19.

Amazaki, M. & Shimizu, Y. (2008) Relationship between awareness of STDs and condom use by University students: development of an awareness scale for prediction of condom use. *Nippon Koshu Eisei Zashi* **55**(5), 306–317.

Askun, D. & Ataca, B. (2007) Sexuality related attitudes and behaviors of Turkish university students. *Archives of Sexual Behavior* **36**, 741–752.

Awwad, J., Nassar, A., Usta, I., Shaya, M., Younes, Z. & Ghazeeri, G. (2013) Attitudes of Lebanese university students towards surgical hymen reconstruction. *Archives of Sexual Behaviour* **42**(8), 1627–1635.

Barbour, B. & Salameh, P. (2009) Knowledge and practice of university students in Lebanon regarding contraception. *East Mediterranean Health Journal* **15**(2), 387–399.

Bergamini, M., Cucchi, A., Guidi, E., Stefanati, A., Bonato, B., Lupi, S. & Gregorio, P. (2013) Risk perception of sexually transmitted diseases and teenage sexual behaviour: attitudes towards in a sample of Italian adolescents. *Journal of Preventive and Medical Hygiene* **54**(2), 114–119.

Brakel, K. (2008) *Studies on Youth Policies in the Mediterranean Partner Countries: Palestinian Occupied Territories EuroMed Youth III Programme.* Euromed, Ramallah. URL: http://www.youthpolicy.org/national/Palestine_2009

Carvalho, K., Sant'Anna, M. J., Coates, V. & Omar, H. A. (2008) Medical students: abuse of psychoactive substances and sexuality aspects. *International Journal of Adolescent Medicine and Health* **20**(3), 32–328.

Center for Disease Control (2012) *Epi Info™ software, version 7.1.0.6.* URL: www.cdc.gov

Center for Educational Research and Development (2009) [*List of Universities in Lebanon*]. Beirut, Lebanon. URL: http://www.crdp.org/CRDP

Coker, A., Richter, D., Valois, R., McKeown, R., Garrion, C. & Vincent, M. (1994) Correlates and consequences of early initiation of sexual intercourse. *Journal of School Health* **64**, 372–377.

Fernández, A. M., Celis-Atenas, K., Córdova-Rubio, N., Dufey, M., Corrêa Varella, M. A. & Benedetti Piccoli Ferreira, J. H. (2013) Youth sexuality: behaviors, attitudes and differences by sex and personality variables in Chilean university students [in Spanish]. *Revista médica de Chile* **141**(2), 160–166.

Hiltabiddle, S. (1996) Adolescent condom use, the health belief model, and the prevention of sexually transmitted disease. *Journal of Obstetric Gynecology and Neonatal Nursing* **25**(1), 61–66.

Hoque, M. & Ghuman, S. (2012) Contraceptive practices in the era of HIV/AIDS among university students in KwaZulu-Natal, South Africa. *SAHARA Journal* **9**(1), 15–19.

Ismael, A. S. & Sabir Zangana, J. M. (2012) Knowledge, attitudes and practice of condom use among males aged (15–49) years in Erbil Governorate. *Global Journal of Health Science* **4**(4), 27–36.

Kabiru, C. & Orpinas, P. (2009) Factors associated with sexual activity among high-school students in Nairobi, Kenya. *Journal of Adolescence* **32**(4), 1023–1039.

Kloep, M., Guney, N., Cok, F. & Simsek, O. F. (2009) Motives for risk-taking in adolescence: a cross-cultural study. *Journal of Adolescence* **32**, 135–151.

Lally, K., Nathan-V., Y., Dunne, S., McGrath, D., Cullen, W., Meagher, D., Coffey, J. C. & Dunne, C. (2014) Awareness of sexually transmitted infection and protection methods among university students in Ireland. *Irish Journal of Medical Science* **184**(1), 135–142.

Mantzouranis, G. & Zimmermann, G. (2010) Taking risks, worth it? Risk behaviours and perceiving their risks among adolescents. *Neuropsychiatrie de L'enfance et de L'adolescence* **58**, 488–494.

Moore, M. J., Barr, E. M. & Johnson, T. M. (2013) Sexual behaviors of middle school students: 2009 Youth Risk Behavior Survey results from 16 locations. *Journal of School Health* **83**(1), 61–68.

Nemcic, N., Novak, S., Maric, L., Novosel, I., Kronja, O., Hren, D., Marušic, A. & Marušic, M. (2005) Development and validation of questionnaire measuring attitudes towards sexual health among university students. *Croatian Medical Journal* **46**(1), 52–57.

Nkomazana, N. & Maharaj, P. (2013) The prevalence of condom use among university students in Zimbabwe: implications for planning and policy. *Journal of Biosocial Science* **45**(5), 643–659.

O'Hare, T. (2001) Substance abuse and risky sex in young people: the development and validation of the risky sex scale. *Journal of Primary Prevention* **22**(2), 89–101.

Primack, B. A., Switzer, G. E. & Dalton, M. A. (2007) Improving measurement of normative beliefs involving smoking among adolescents. *Archives of Pediatric and Adolescent Medicine* **161**(5), 434–439.

Quadrel, M. J., Fischhoff, B. & Davis, W. (1993) Adolescent (in)vulnerability. *American Psychology* **48**(2), 102–116.

Rahamefy, O., Rivard, M., Ravaoarinoro, M., Ranaivoharisoa, L., Rasamindrakotroka, A. J. & Morisset, R. (2008) Sexual behaviour and condom use among university students in Madagascar. *SAHARA Journal* **5**(1), 28–35.

Rosenthal, A., Elinav, H., Ramlawi, A., Shasha, D., Olshtain-Pops, K., Korem, M. *et al.* (2011) HIV/AIDS among Palestinians: detection, clinical presentation, prognosis and HIV testing patterns, 1994–2010. *International Journal of Infectious Disease* **15**(6), e377–e381.

Salamé, J., Barbour, B. & Salameh, P. (2013) Do personal beliefs and peers affect practice of alcohol consumption in Lebanon university students? *Eastern Mediterranean Health Journal* **19**(4), 340–348.

Salameh, P., Jomaa, L., Issa, C., Farhat, G., Zeghondi, H., Gerges, N. *et al.* (2012) Assessment of health risk behaviours among university students: a cross-sectional study in Lebanon. *International Journal of Adolescence and Youth* **1**, 1–14.

Salameh, P., Salamé, J., Waked, M., Barbour, B., Zeidan, N. & Baldi, I. (2014) Risk perception, motives and behaviours in university students. *International Journal of Adolescence and Youth* **19**(3), 279–292.

Shapiro, R., Siegel, A. W., Scovill, L. C. & Hays, J. (1998) Risk-taking patterns of female adolescents: what they do and why. *Journal of Adolescence* **21**, 143–159.

Shirazi, K. K. & Morowatisharifabad, M. A. (2009) Religiosity and determinants of safe sex in Iranian non-medical male students. *Journal of Religious Health* **48**(1), 29–36.

Shrestha, R. M., Otsuka, K., Poudel, K. C., Yasuoka, J., Lamichhane, M. & Jimba, M. (2013) Better learning in schools to improve attitudes toward abstinence and intentions for safer sex among adolescents in urban Nepal. *BMC Public Health* **13**, 244.

Siegel, A. W., Cousins, J. H., Rubovits, P., Parsons, J. T., Lavery, B. & Crowley, C. L. (1994) Adolescent perceptions of the benefits and risks of their own risk taking. *Journal of Emotional and Behavioral Disorders* **2**, 89–98.

Sibai, T., Tohme, R. A., Beydoun, H. A., Kanaan, N. & Sibai, A. M. (2009) Violent behavior among adolescents in post-war Lebanon: the role of personal factors and correlation with other problem behaviors. *Journal of Public Health (Oxford)* **31**(1), 39–46.

UNAIDS (2011) *Middle East and North Africa: Regional Report on AIDS*. URL: http://www.unaids.org/en/media/unaids/contentassets/documents/unaidspublication/2011/JC2257_UNAIDSMENA-report-2011_en.pdf

Vivancos, R., Abubakar, I. & Hunter, P. (2008) Sex, drugs and sexually transmitted infections in British university students. *International Journal of STD and AIDS* **19**(6), 370–377.

Wilson, K. L., Smith, M. L. & Menn, M. (2013) Abstinence-related word associations and definitions of abstinence and virginity among Missouri high school freshmen. *Journal of School Health* **83**(11), 787–794.

Wong, L. P. (2012) An exploration of knowledge, attitudes and behaviours of young multiethnic Muslim-majority society in Malaysia in relation to reproductive and premarital sexual practices. *BMC Public Health* **12**, 865.

World Health Organization (2010) *Validation of the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) and Pilot Brief Intervention: A Technical Report of Phase II Findings of the WHO ASSIST Project*. URL: www.who.int. (accessed August 2014).

World Health Organization (2013) *Sexually Transmitted Infections (STIs). The Importance of a Renewed Commitment to STI Prevention and Control in Achieving Global Sexual and Reproductive Health*. URL: http://www.who.int/reproductivehealth/publications/rtis/rhr13_02/en/ (accessed August 2014).

Zhang, D., Pan, H., Cui, B., Law, F., Farrar, J. & Ba-Thein, W. (2013) Sexual behaviors and awareness of sexually transmitted infections among Chinese university students. *Journal of Infection in Developing Countries* **7**(12), 966–974.

Zou, Y., Yan, H., Wu, H., Chen, R., Huang, D. & Li, S. (2013) Female undergraduate fine arts students: a high-risk population for multiple sexual partners, unwanted pregnancy and sexually transmitted infections in China. *European Journal of Contraception and Reproductive Health Care* **18**(2), 127–136.