Original Article

Correlates and Determinants of Reproductive Behavior among Female University Students in Tehran

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Abstract

Background: This paper aims to examine the reproductive health and behaviors which might expose young people at risks of STIs/HIV and potential correlates of such behaviors among female college students in Tehran.

Methods: This paper focuses on the study conducted on a sample of 1743 female undergraduate students in four multidisciplinary universities in Tehran during 2005–2006 using a two-stage stratified cluster sampling. The main focus was to determine the predictors of premarital heterosexual reproductive behavior among female students.

Results: The mean age of the unmarried students was 21.4 years. Low self-efficacy (OR=7.87, p <0.001), perceived peers' liberal attitude on virginity (OR= 4.33), perception of parents' liberal attitude towards relationship with the opposite sex and poor family atmosphere (OR=3.04 and 2.20, p <0.001, respectively) were predictors of ever having any type of sexual experience after controlling for other factors. The only predictors of penetrative sex remained in the logistic model were older age (OR=5.95), low self-efficacy (OR=10.86), poor family atmosphere (OR= 2.96), liberal parental attitude (OR=4.29) and liberal peer norms on virginity (OR= 4.90).

Conclusion: Interventional programs need to be designed at various levels such as enhancing self-efficacy, informing families of the protective role of a balanced control and monitoring over adolescents' behavior and choices of peer network against premarital sexual activity.

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Introduction

Intimate relationships before marriage, particularly sexual intercourse, are legally, culturally and religiously forbidden in Iran. Iran has experienced some periods of modernization during years before the Islamic revolution in 1979 and some clashes between modernity and traditions have initiated ever since, but tradition still has its importance in all aspects of people's life. Traditionally, virginity has to be proven at marriage and is important for marriage. Nevertheless, modernity have shown themselves in the Iranian society in recent years. It appears that our traditions and culture are under influence of some other cultures in different domains such as heterosexual relationships before marriage, particularly among young people. Access to global media, immigration and communication technology appear to have facilitated transmission of other permissive cultures into the country. Satellite television is illegal in Iran, but many people have access to satellite TVs illegally. Twenty seven percent of adolescent boys in 2002 had access to satellite

programs and more than one-third had access to the internet (34%) (1).

The gap between puberty and marriage has increased due to unemployment, female desire for higher education and economic hardship. Increased women's educational aspirations (2) seems to have important role in considerable elevation of age at marriage among women in Iran. The proportion of never married women aged 20–24 rose from 21.4% in 1976 to 39.5 % in 1996 (3). This rate increased to 47.1% in 2000 (IDHS[1] 2000). Hence, the gap between puberty and marriage has considerably risen in recent years.

Some evidence, although scarce, in Iran suggest some extent of heterosexual relationship including intimacy before marriage among young people (4–6), while there is no comprehensive and precise information about such risk taking behaviours, ways of protection and predictors of risk taking in sexual behaviours in Iran.

Although the rate of HIV infections is lower than 0.1% in the country and the country is in a concentrated epidemic situation, recent evidence shows that the mode of transmission is shifting from needle sharing to sexual routes. Owing to the sensitivity of addressing premarital sex in the society to the people and policy makers, the practical information on preventing STIs/HIV and pregnancy are not formally transferred to young people through educational system. Parents are also ill-prepared to address such issues to the youth. They lack communication skills and knowledge on sexual health. Hence, sexually active unmarried people normally fail to receive the required information and services for prevention of STIs/HIV infection, unwanted pregnancy and unsafe abortion and are vulnerable towards STIs and HIV/AIDS.

Health policymakers have been recently sensitized about this issue and have tried to find a culturally appropriate approach to prevent HIV/STI among young people including sexual risk taking behaviors. Very little is known about the nature and the extent of such behaviours among young people. Recognizing the nature of such behaviors and psychosocial, and individual predictors of sexual behaviours can help design culturally appropriate and efficient interventional programs to reduce related risks. This paper will provide a detailed and comprehensive picture of predictors of sexual and reproductive behaviours among female university students in Tehran.

1- Iranian Demographic Health Survery

Methods

Study population and sample: The data for this study was obtained as part of a mixed method study conducted among female university students in Tehran in 2005–2006.

The method of two-stage stratified random cluster sampling was employed with inclusion of all subjects at the second stage (female students in each class).

Practically, a total of 1743 students (526 students from governmental and 1217 students from private universities) were recruited within 8 months (from October 2005 till May 2006). To avoid overrepresentation, weighting based on discipline was implemented at the analysis stage.

Data collection: Details of data collection has been reported in another published paper of the original study (7, 8).

Measures: Owing to the fact that this was an exploratory study, no specific hypothesis was presumed at the initial step. A conceptual framework based on the results of existing literature on the predictors of premarital sexual relationships was considered (Table 1).

The scores developed for attitudes, norms, self-efficacy, family relationships, and family values were added to construct scales. Self-efficacy in this paper is a categorical variable which has been made from a scale variable. Three questions were asked from participants to assess their self-efficacy in saying no to premarital sex. These questions included: a) ability to refuse premarital sex with an attractive man (b) ability to refuse sex with someone whom you care, (c) ability to refuse sex with someone who wants to marry you. Answers were based on 5-point Likert scale. The answers to three questions have been added to make a scale variable ranging from 3 to 15. The scale variable was collapsed into three equal groups by cumulative percentage as low, average and high self-efficacy. High self-efficacy has been considered here as the reference category.

Family relationship and atmosphere is a scale variable and it is a variable representing some aspects of family relationship in the questionnaire which showed a high correlation. These family factors included "open communication, kindness, low conflict, happiness, understanding, and time spending with respondent at adolescent times". Family relationship and atmosphere have been

Table 1. Measurement of outcome and explanatory variables in the survey instrument

Dependent variables
Ever had premarital, Heterosexual friendship, Experience of physical intimacy, Ever had intimate contact (any type of sex), Type of sexual contact, Age at first sex
Explanatory variables
Demographic and individual factors
Age, Co-residency, Ever employed over the past year, Father's income, Religiosity, Current marital status, Personal attitude towards relationships, Personal attitude towards virginity, Intention to refrain from premarital sexual intercourse, Self-efficacy to saying no to premarital sexual contact, Vulnerability
University factors
Academic performance, University influences
Family Characteristics
Status of parental living, Parents' education, Family residence, Having siblings, Relationship and atmosphere between siblings, Endorsement of tradition and religion, Parental control, Parents' attitude toward heterosexual relationship, Parents' reaction to relationship with the opposite sex, Parents communication about morals and values, Mother-daughter communication about RH and relationships
Life-style and societal conduct
Leisure activities, Socializing with friends over the past 3 months, Smoking, Drinking alcoholic beverages
Peer influences
Perception of peers' risky behaviors (smoking, alcohol consumption), Perception of peers' friendship and sexual intercourse with men, Proportion of peers perceived to be religious, Communication and interaction with peers, Perceived peer norms toward heterosexual relationship, Perceived peer norms on virginity

shown as a collapsed version of the scale. To do this, frequency distribution of transformed scales was obtained and, using the cumulative percentage column for each scale, the distribution of each scale was collapsed into third. As the items had previously been recorded, for instance, low scores for family relationship indicated good relationship, therefore, the bottom third of distribution was categorized as a good family relationship, the middle third was moderate and the top third indicated a poor family relationship and atmosphere.

Data management and analysis: Completed questionnaires were gathered daily and checked and manually edited at the end of the working day before entering them into an Microsoft Access data base. After data cleaning and verification, they were converted to SPSS (Version 14) for statistical analysis. Data reduction was done using principal components analysis (factor analysis) in deriving scales from individual items.

Based on the conceptual framework, the association between factors presumed to be connected with premarital heterosexual relationships and sex was examined in a bivariate analysis. Multivariate analysis was carried out among selected variables identified as significant in the bivariate analysis, based on stepwise approach and the results obtained from the process alongside theoretical knowledge from the literature. The correlation matrix was used for reducing numbers of correlated factors entered into the model. Due to the influence of personal heterosexual experiences such as having boyfriends or sex on personal attitudes towards such behaviors, personal attitudes were excluded as a predictor in all multivariate analyses of these behaviors.

Quality of data: Multiple-item indicators were used to have more reliable indicators (*e.g.* Likert Scale for attitude and norms) (9). Careful wording of the questionnaire and the presence of a trained interviewer to answer queries during questionnaire administration improved the reliability of the survey tool. A qualitative study was conducted prior to the survey to maximize the validity of the questionnaire. It informed the questionnaire and also assisted identification of an appropriate language for the study population. Accordingly, offending questions were omitted or modified. For instance, "sexual contact" or "Tamas-e-Jensi" was understood as two categories of sex; "complete sex", and "incomplete sex". Most respondents perceived complete sex as "penetrative vaginal sex", and incomplete sex as "sex by touch", "anal sex" or "oral sex". Since only a few questions relied on the respondents' memory, recall bias in past sexual behaviors was not a major issue. Anonymity and confidentiality ensured reduction of socially desirable answers (10). A pilot was also conducted among 54 students from one governmental university.

The reliability of scales was assessed by examining the consistency of a person's response on an

item compared with other items (item-item correlation). This provided a measure of the overall reliability of the scales. The index of Cronbach's alpha coefficient, which ranges between 0 and 1, was estimated. Alpha Cronbach coefficients for the majority of the scales constructed in this study were well above 0.7.

The total response rate among female students of different universities was high. Only a few students (2–3) from each class or cluster asked to leave the class before distribution of the questionnaires for reasons not related to the study subject. Assuming an average size of 23 students in each class, non-response rate was about 8–10%.

Among all the 1748 filled out questionnaires, only five questionnaires were discarded due to incomplete or missing answers to key questions. Most non-responses indicated that the respondents were not sure about choosing one of the five options provided. Non-response rates for attitudinal statements were typically lower than 2%.

Pairwise deletion was used particularly in multivariate analysis for missing items (*e.g.* factor analysis, regression, *etc.*) that is based on zero-order correlation matrix. For correlation between any two or three variables, all cases that had non-missing values for those two or three variables were used to calculate the correlation even if those cases had missing values on other variables used in the analysis. Using this pairwise approach, the correlation matrix coefficient was based on a different number of cases. Even in cross-tabulation and t-test and ANOVA test the results can be based on slightly different sample sizes.

The lie scale was used to assess whether survey respondents who reported behaviors with less social acceptability such as having boyfriends, sexual intercourse and physical intimacy were more truthful than those who did not report such behaviors. The scale included nine questions and each question had a binary response of yes or no. “Yes” was scored "0" and “no” was scored "1". The scores of this scale ranged between 0 and 9. The reliability of this test was assessed based on Iranian people's culture (11). The mean score of lie scale was not significantly different among those who reported having a boyfriend, physical intimacy or sexual intercourse and those who did not report or did not answer the question (p= 0.578, p=0.619). Therefore, the data were trustworthy. Nevertheless, because of cultural sensitivity of female sexuality in Iran, the prevalence of heterosexual relationship and sex among females may be underreported.

Approval for the study was obtained from the ethics committee of Avicenna Research Institute, as well as university authorities and disciplinary directors.

Results

Demographic and background characteristics: Of the 1743 survey respondents, 80% were unmarried (n=1401). Number of students in private universities was nearly two fold of students in government universities. The majority of students studied social science (55.5%), only 9.7% and 10.1% studied technical science and art, respectively. 42.2% of the sample were in age range of 20-21 years and 28% were between 22-23 years. the majority were either moderately or very religious. 44.6% reported access to satellite. Majority (86.1%) reported access to internet. 9.8% ever smoked and 9.8% also ever drunk alcoholic beverages. Differences between students of private and government universities have been shown in the table 2.

Bivariate analysis of premarital heterosexual relationships: Premarital heterosexual friendships as prerequisite of premarital sexual behaviours are important. Among unmarried respondents, more than half (52%) had had intimate friendship with the opposite sex. While 23% had had some type of sexual contact and 10% had had intercourse. The majority of those with a history of heterosexual friendship had had physical intimacy with a man (67%). Among those who had experienced physical intimacy, more than two-thirds (70%) had sex by touch and finally among those who had sex by touch, only 37% had experienced penetrative sex (vaginal intercourse, anal intercourse or both). These findings revealed that heterosexual relationships were very likely to lead to physical intimacy such as kissing and hugging. Similarly, those who experienced physical intimacy were more likely to experience sex by touch or oral sex but only a small fraction of those who had experienced sex by touch or oral sex had progressed to anal or vaginal sex.

University context: The prevalence of having boyfriends, physical intimacy or sex by touch was significantly greater among senior than junior students but not in the case of penetrative sex. Arts, social science and technical and engineering students were significantly more likely to have boy-

Table 2. Selected demographic and background characteristics and media access among participants by university context

Characteristics	Type of university		Both	P-value
	Governmental (%)	Private (%)		
Year of study				
1st & 2nd	45.5	49.6	48.3	0.094
3rd & 4th	54.5	50.4	51.7	
Academic Discipline				
Medical Sc.	28.4	3.4	11.3	<0.001
Social Sc.	46.7	59.6	55.5	
Basic Sc.	11.7	14.1	13.3	
Technical & engineering	9.3	9.9	9.7	
Arts	3.8	12.9	10.1	
Percent in single-sex universities	32.6	5.0	13.7	<0.001
Family residence in Tehran	72.7	93.4	86.9	<0.001
Age groups				
<20	11.3	17.6	15.6	<0.001
20-21	52.3	37.6	42.2	
22-23	26.2	28.8	28.0	
>23	10.2	16.0	14.1	
Mean age (*years*)	21.23	21.50	21.41	0.04
Religiosity				
Religious	30.5	23.8	26.0	0.029
Somewhat	53.1	57.4	56.0	
Not religious	16.4	18.8	18.0	
Access to satellite TV programs in the past 28 days				
No access	52.8	40.7	44.6	<0.001
Access				
No days	13.6	7.8	9.7	<0.001
1-10 days	18.4	29.1	25.7	
11-27 days	6.5	7.8	7.4	
28 days (every day)	8.8	14.5	12.6	
Access to internet & chat rooms				
Yes, using chat rooms	26.7	29.0	28.3	0.103
Yes, not using chat rooms	61.5	55.9	57.7	
No	11.8	15.1	14.0	
Ever smoked	8.4	10.4	9.8	0.142
Ever drunk alcohol	6.1	11.5	9.8	0.001
N	443	958	1401	--

Note: Because of non-responses, the N for different variables differed and the sample was weighted by discipline

friends and physical intimacy than their counterparts in basic science or other disciplines. Discipline was not associated with type of sex among those who had sexual intimacy. The experience of having a boyfriend and physical intimacy among students who studied in co-educational universities was significantly greater than their counterparts in single-sex universities. Moreover, students in private universities had greater experience of having boyfriends and physical intimacy than those studying in governmental universities. Unexpectedly, those who were dissatisfied with their academic performance were significantly more involved in premarital physical intimacy and also non-penetrative sex than those who were satisfied with their university performance. However, there was no link between poor academic performance and progression to penetrative sexual acts (not shown).

Background and individual factors: The older the respondent, the higher was the prevalence of having boyfriends and physical intimacy before

marriage but not sexual contact. Many individual and background factors such as age and religiosity were associated with different extent of premarital heterosexual relationships, but father's income, life style factors such as smoking and drinking, media factors such as access to internet, personal attitude on virginity and self-efficacy appeared to be the most important potential associates of premarital sexual intercourse.

Family factors and premarital heterosexual relationships: Students whose parents were alive but lived separately reported more experience of having a boyfriend and penetrative sex than those who lived with their parents or their parents (both or one) have died, as the number of students whose parents lived separately was very small, this finding was not of great substantive importance.

Those students whose parents were better educated reported significantly more experience of having boyfriends, physical intimacy and penetrative sex than students with less educated parents. Furthermore, father's education was more closely associated with premarital penetrative sex than mother's education.

Interestingly, family residence was only associated with premarital friendships but not with other advanced intimate relationships such as physical intimacy or sexual contact.

Students who suffered from a poor family atmosphere reported significantly more friendships with men (about 59%) than those with a good family atmosphere (45%). Interestingly, those respondents whose parents moderately controlled them during adolescent years reported the least experience of having boyfriends (47%). Both having very permissive parents and very strict parents during adolescent period were associated with increased experience of having boyfriends among respondents.

Peer interaction and communication: Students who perceived all or a majority of their peers were involved in risky behaviours such as smoking and alcohol consumption reported significantly more experience of having a boyfriend (87%), physical intimacy (86%) and penetrative sex (45%) than those who perceived none or a few of their peers were involved in such behaviours (39%, 48%, and 33%, respectively).

Notably, perception of peers' liberal attitude towards premarital relationships and sexual intercourse and also frequent communication and interaction with friends were significantly associated with both having boyfriends, and penetrative sex (not shown).

Multivariate analysis of ever having a boyfriend, any type of penetrative or non-peneterative sex: The probability of having a boyfriend among students whose parents approved premarital relationship was four times (OR=4.11, p <0.001) of that among students whose parents did not. The probability of having a boyfriend among students with low self-efficacy was nearly 3.4 times of students with high self-efficacy. Students who perceived their peers' had liberal towards heterosexual relationships attitudes, were also 3.4 times more likely to have boyfriends than those who perceived them to be conservative in this regard. The other significant predictors were being less religious, having mothers with better education, poor family atmosphere, studying in private universities and having permissive parents in reaction to heterosexual relationships, respectively (Table 3, model 1).

To examine the influence of growing up in Tehran on the association between types of university and premarital friendship, two different regression models were fitted and adjusted ORs were compared. The significance of association between type of university and premarital friendship in the first model, in which family residence is not considered, is greater than the second model. In the second model, another important change was the reduction of significance of association between peer norms and premarital friendship.

Factors associated with ever having any type of sex in bivariate analysis were entered into the logistic model as well (not shown). Since the predictors of premarital sex in a voluntary situation are considered, coercive sexual debut were excluded from the analysis and no significant change was observed. Students with low self-efficacy were nearly eight times more likely to be sexually experienced than students with high self-efficacy (Adjusted OR=7.87, p <0.001).

Students who perceived their peers to be liberal in their attitude on virginity were 4.33 times more likely to have sexual experience than the reference group. Perception of parents' liberal attitude towards relationship with the opposite sex and poor family atmosphere were also predictors of having sexual contact after controlling for other factors (Adjusted OR=3.04 and 2.20, p <0.001, respectively).

Table 3. Crude and adjusted odds ratio of factors associated with having boyfriend

Associated factors	Ever having boyfriends					
	Crude OR	95%CI	Model 1		Model 2	
			Adjusted OR	95% CI	Adjusted OR	95% CI
Type of university						
Private (ref. Governmental)	2.17***	1.72-2.73	1.62*	1.06-2.47	1.43*	0.99-2.08
Religiosity						
Religious	1.00		1.00		1.00	
Somewhat religious	3.09***	2.35-4.07	1.59*	1.08-2.36	1.74*	1.11-2.72
Not religious	9.19***	6.28-13.44	2.32**	1.41-3.84	2.63***	1.53-4.53
Self-efficacy						
High	1.00		1.00		1.00	
Average	2.59***	1.91-3.51	1.73**	1.18-2.52	2.23***	1.44-3.47
Low	5.81***	4.38-7.70	3.44***	2.42-4.89	3.53***	2.41-5.17
Mother's education						
Illiterate/ primary school	1.00		1.00		1.00	
Middle/high school	1.76***	1.30-2.39	1.42	0.85-2.38	1.61**	1.06-2.43
University graduate	2.58***	1.85-3.61	2.38*	1.29-4.04	2.36**	1.26-4.41
Family relationship & atmosphere						
Good	1.00		1.00		1.00	
Moderate	1.39*	1.07-1.80	1.15	0.80-1.64	1.72**	1.15-2.57
Poor	1.76***	1.35-2.30	1.86**	1.28-2.70	1.88**	1.27-2.78
Parental control during adolescence						
Very permissive/ permissive	1.00**		1.00		1.00	
Moderate	0.77	0.55-.1.08	0.65*	0.47-0.90	0.81	0.48-1.37
Very strict/strict	1.12	0.79-1.59	0.69	0.42-1.13	1.33	0.80-2.21
Parents' attitude †						
Disapprove	1.00		.00		1.00	
No idea	2.40***	1.84-3.12	1.85**	1.27-2.68	2.47***	1.64-3.72
Approve	8.59***	6.27-11.77	4.11***	2.64-6.39	4.22***	2.67-6.68
Perception of peer norms on relationship with men						
Conservative	1.00		1.00		1.00	
Moderate	4.96***	3.79-6.48	2.34***	1.64-3.35	1.06	0.69-1.64
Liberal	9.50***	6.68-13.49	3.43***	2.17-5.43	2.93***	1.81-2.75
Constant			0.32***		0.25***	

*p <0.05, **p <0.01, ***p <0.001, † parents' attitude towards heterosexual relationships. The effects of age, academic discipline, father's income and education have been controlled in both models, In addition, In model 1, the role of university type by gender and in model 2, family residence have been controlled as well

After controlling for age, type of university, father's income and education, the only predictors of penetrative sex remaining in the logistic model were low self-efficacy (Adjusted OR=10.86), poor family atmosphere (Adjusted OR=2.96), liberal parental attitude (Adjusted OR=4.29) and liberal peer norms on virginity (Adjusted OR=4.90), (Table 4).

Discussion

This study revealed that a significant minority of unmarried female students were exposed to risks related to sexual relationships. Rate of heterosexual friendship among female students was less than what was perceived and reported in a small scale study among male college students in Tehran (12). However, reported sexual experience among females who had the experience of having a boyfriend in our study (18%) was significantly lower than the corresponding rate among male students in Tehran shown in another study (68%) (12). A study on 150 college students from private universities in Ghouchan (a city in Khorasan province) revealed similar rates of heterosexual friendship and sexual experience to our study (54.5% and 12%, respectively) (13). Regarding

Table 4. Crude and adjusted odds ratios of factors associated with having penetrative sex

Associated factors	Ever having penetrative sex (N=1273)			
	Crude OR	95%CI	Adjusted OR	95% CI
Type of university				
Governmental	1.00		1.00	
Private	3.26***	2.02-5.25	2.10	0.85-5.22
Religiosity				
Religious	1.00		1.00	
Somewhat religious	3.18**	1.62-6.21	1.24	0.45-3.41
Not religious	9.32***	4.67-18.58	2.35	0.82-6.73
Self-efficacy				
High	1.00		1.00	
Average	7.53***	3.16-17.95	2.32	0.88-6.16
Low	19.98***	9.11-43.83	10.86***	4.70-25.08
Mother's education				
Illiterate/primary school	1.00		1.00	
Middle/high school	2.08*	1.09-3.95	1.28	0.45-3.65
University graduate	2.56**	1.32-4.98	2.08	0.62-7.03
Family relationship & Atmosphere				
Good	1.00		1.00	
Moderate	1.73*	1.05-2.87	1.57	0.81-3.07
Poor	2.87***	1.79-4.59	2.96**	1.53-5.75
Parental control during adolescence				
Very permissive/permissive	1.00		1.00	
Moderate	1.01	0.58-1.76	0.58	0.33-0.02
Very strict/strict	0.74	0.42-1.28	0.96	0.44-2.07
Parents' attitude toward relationship with men				
Disapprove	1.00		1.00	
No idea	2.36**	1.32-4.20	3.72**	1.45-9.54
Approve	5.61***	3.24-9.70	4.29**	1.63-11.28
Perception of peer norms on virginity				
Conservative	1.00		1.00	
Moderate	2.45*	1.17-5.11	1.55	0.54-4.47
Liberal	11.53***	6.11-21.74	4.90**	1.90-12.68
Constant			0.00***	

*p <0.05, ** p<0.01, ***p <0.001, The role of age, type of university by gender, academic discipline, father's income and education were controlled in the above logistic regression model

the experience of having a boyfriend, according to previous recent studies, the rate among female high school students was higher than the corresponding rate among female university students. Rahnama showed that greater percentage of females in high schools in Tehran reported premarital heterosexual friendships (14). Rate of premarital sex in another study among 1192 female high school students in Tehran was nearly 13% (15). Mohammadi reported that 27.7% of adolescent boys aged 15–18 have reported sexual experience in a household survey (1). The compareson between rates among high school and university students reflects that females who enter universities might have boyfriends and experience premarital sex less likely than those who fail to enroll in universities. These comparisons can only be made with the assumption that a representative sample in each study has been selected.

Premarital heterosexual friendship and physical intimacy can be prerequisites of premarital sexual relationships. The question is what differences exist between young people who become involved in such relationships in terms of family characteristics, personal and individual characteristics, peers and environmental and societal factors with those who do not. This study aimed to assess social and individual factors that are responsible for variation in heterosexual relationships and sex. Programs tailored at societal, institutional, interpersonal, familial and individual levels to help young people abstain premarital sex, to postpone their sexual debut or have safe sex can be informed by predictors of such behaviors.

At institutional levels, university and its associates were shown to be linked with premarital relationships. Students of private universities were 1.6 times more likely to have boyfriends than their counterparts in governmental universities. They initiated their relationships earlier and were more likely to have multiple partners than students in governmental universities. Such differences may

reflect either different socio-economic characteristics of students in private universities or existence of a different context between private and state-run universities. However, among sexually experienced students, greater percentage of students of private universities had had their sexual debut before university entrance, compared to students of government universities (49% *vs.* 36%, respectively), the former explanation appears to be more justified. To examine these possibilities, the association between university context and, premarital relationships and sexual contact were assessed by using multivariate analysis after controlling for the socio-economic and family characteristics. Type of university was shown to be the predictor of only having boyfriend but not sexual contact upon controlling for socio-economic and family characteristics. In other words, the odds of having boyfriend but not sex among students of private universities even after controlling all socio-economic and familial factors was significantly greater than among students from governmental universities. Since, the majority (94%) of private students in the sample compared to governmental universities (72%), came from Tehran, the importance of the type of university as a predictor of premarital friendship with the opposite sex reduced, when family residence of respondents was controlled in model 2 (Table 4). One third of students of governmental universities were from other provinces and had more close social control and more restrictive culture and norms during their adolescence compared to Tehrani students.

Another explanation is that students from private universities who can afford the university expenses might be less qualified than students who are accepted in a highly competitive governmental universities. Poor academic performance is shown to be associated with premarital physical intimacy and sexual contact in this study. Young women with poor academic performance tended to initiate their premarital relationships and sex earlier, even before university entrance. This finding can also imply that once students get involved in heterosexual relationships, type of university does not determine their progression into more intimate relationships including any type of sex and penetrative sex.

Although bivairate analysis showed that type of university was associated with premarital relationships and sexual behavior by gender and discipline, but discipline did not have any significant association with premarital relationships and sexual behavior after controlling for socio-economic and family characteristics. This result implies that students who, for instance, choose arts may have different socio-economic or family characteristics versus those who study basic sciences. This difference may also be due to greater interaction between women and men in certain disciplines such as arts. It is also possible that the discipline itself could erode traditional boundaries. The association between studying in arts and greater involvement in premarital sexual relationships was shown among Indian college students; they were perceived to be involved in a relatively undemanding academic schedule (16).

Family atmosphere and parents' characteristics are also associated with premarital sexual behaviors. Young women whose parents were divorced or lived separately were more likely to report premarital relationships than other women. Similar findings have been obtained in other studies among adolescents which reveal the importance of the presence of both parents in the family and associated parental control and monitoring in postponing premarital sexual relationships (17). Many studies suggested that living with both parents is a protective factor for premarital sex among young people (18, 19). The absence of father was shown in another study to have the most adverse influence in the early initiation of premarital sex, particularly for females (20).

Students who lived in Tehran, and were more modern and less religious were more likely to have premarital friendship with men. Different studies have shown different associations between the place of residence (rural of urban) and involvement in premarital sex among adolescents (21–24). Our study showed that those women whose families lived in other cities were more conservative in both sexual attitude and behaviour. Some studies showed a direct association between living away from home during adolescence and increased sexual behavior (25), but young women in this study were originally from cities which tended to be more conservative than Tehran. Moreover, they had left home in their early twenties and not during their adolescent years which, may account for the inverse association in this study.

According to the result of this study, two different types of females were more likely to experience premarital friendships. One group comprised of women with high social status, high income of

fathers and even educated parents who were surrounded by peers who are less religious and less supportive of societal norms. Such women may socialise frequently with friends and are involved in other risk taking behaviors such as smoking and drinking as a sign of attachment to modern life. The second group consisted of unmarried women who were disadvantaged both economically and socially. They had separated parents, very strict parents or poor family atmosphere and communication about morals and norms. They were also likely to have low self-efficacy to resist men's sexual advances due to their poor family background and family support.

Poor family atmosphere is connected with poor parent-child communication. Proper parent-child communication about family life issues and sexual and reproductive health was shown to be associated with healthier sexual behavior of adolescents in a study in Nigeria (17). A recent study revealed a significant association between higher family support and lower risk-taking behaviors such as smoking and drinking (26).

Our findings revealed that religiosity acted as a protective factor at the level of premarital heterosexual friendship but, when it came to penetrative sex among those who were involved in heterosexual friendships, religiosity did not exert any influence on sexual behavior. Religiosity has been shown in many studies to be linked to a lower tendency to premarital sex (19, 24, 27–30). A study among ethnic minorities during early adolescents in London revealed that religiosity was also associated with lower risk of smoking and drinking, but not drug use (26). In Iran, religious people are less likely to get involved in premarital friendships and dating and therefore, their opportunities for involvement in sex are limited. Hence, religious convictions appear to play a protective role in sexual behaviours of adolescents and young people.

Smoking and drinking alcohol, access to satellite TV programs and frequent socialisation with peers are associated with premarital friendships with men. Peer connectedness is associated with increased risk for drug use (26). Young women who exhibit such behaviors have low self-efficacy and lower motive to refrain from premarital sexual intercourse. However, reverse causation is possible; the influence of sexual behavior on perception of self-efficacy and intention should not be ignored. The link between premarital sexual activity and alcohol use has been documented in earlier studies (31–34). These results are consistent with Jessor's cluster of risk behaviors among adolescents (35). STIs/HIV risk behaviors among adolescents was also shown in other studies to be associated with other risk behaviors such as alcohol and drug use (36–38). Other evidence also suggests that, when the youth commit first social deviant act, the personal and social factors that used to inhibit deviant behavior lose their influence. There is a correlation between different types of deviant behavior, which is called syndrome of deviance (39).

Liberal peer norms, peers' involvement in any type of premarital sex and other risky behaviors were all shown to be associated with premarital relationships, physical intimacy and sex. However, these associations may simply reflect the fact that "Birds of a feather flock together". Hence, identification of the direction of causality is difficult. Earlier studies have also shown a link between involvement in premarital sex and perception of peers' involvement in sex (40).

Low self-efficacy is the most influential factor for both having premarital heterosexual friendship and any sexual practice, particularly penetrative sex. Self-efficacy represents the skills and motivations for carrying through the intention (41). The protective role of self-efficacy in young people's sexual behavior was found in earlier studies (42, 43). There is a strong correlation between intention and the individual's perception of ability to say no to premarital sexual intercourse, or self-efficacy, among both sexually experienced and inexperienced young women. However, the strong correlation shown between low self-efficacy and involvement in sex and penetrative sex should be interpreted with caution. Other previous cross-sectional studies also revealed mixed results about self-efficacy and initiation of sex before marriage (44). There is a possibility that sexually inexperienced students overestimate and sexually experienced females underestimate their self-efficacy.

In cross-sectional studies identification of causation of some factors that continuously interact with each other is impossible to achieve with confidence. In this study sexual activity had a complex relationship with other associated behaviors. The notion of interaction between different individual behaviors makes it difficult to explain which caused which. Having less religious conviction, alcohol and drug use, smoking, having

sexually experienced peers and holding liberal attitude towards sex are among factors which are likely to be associated with sexual behavior. Though, these factors are hypothesized to be positively associated with pre-marital sex, although a direct causal relationship is impossible to establish. However, factors related to family and institutions are among those factors that are less likely to be affected by sexual activity and causality can be inferred with more confidence for these factors.

Conclusion

Factors related to family and parents such as parents' attitude appear to exert the greatest influence on premarital heterosexual friendships at the first step while factors related to individual such as self-efficacy which are linked with interpersonal communication are more associated with premarital sexual behavior, particularly sexual intercourse. Protective social determinants of behaviors such as healthy relationships among family members, moderate parental control, parental communication with youth about morals and religion can be promoted through specific programs designed for parents and families. Improving interpersonal skills such as self-efficacy and encouraging religious convictions among the youth and prevention of other risk-taking behaviors such as smoking and alcohol consumption also can have positive influence on abstinence or even healthy sexual behavior.

Interventional programs need to enforce protective factors at social and individual levels to protect young people from risks associated with premarital relationships and sex.

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