

# **Determinants of heterosexual relationships and sexual behaviours among elite young females in Tehran, Iran.**

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## **Abstract**

**Background:** This paper is based on a mixed method study conducted in 2005-6 aiming to investigate sexual conduct of female college students in Tehran. An objective was to assess social and individual factors responsible for variation in premarital heterosexual relationships and sex.

**Method:** This paper focuses on the survey conducted on a sample of 1743 female undergraduate students in four multidisciplinary universities in Tehran using a two- stage stratified cluster sampling. Main focus was to determine the predictors of premarital friendships and sexual intercourse among unmarried females.

**Results:** Nearly half of unmarried women (n=1400, mean age: 21.4) reported friendships with men, more than one-fifth reported any type of sex (23%) and one-tenth reported sexual intercourse. A model including strict parental control (OR=0.70), watching pornography (OR=1.37), low self-efficacy (OR=0.75), liberal personal attitudes (OR=1.14), peers' involvement in premarital relationships (OR=1.49) and perceived societal norms (OR=1.09) could predict more than 50% of chances to have premarital intercourse.

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

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## **Introduction**

Iranian society has strong endorsement to both tradition and culture and historically religion impart important role in people's life. Although Iran has experienced some periods of modernization during years before the Islamic revolution in 1979 and some clashes between modernity and traditions has initiated, but still tradition has its importance in all aspects of people's life.

Nevertheless, modernity and some arrays of westernization has shown itself in the Iranian community in recent years. It appears that our traditions and cultures are under influences of some other cultures in different domains including heterosexual relationships before marriage particularly among young people. Access to global media, immigration and communication technology appears that have facilitated transmission of other cultures into the country. Satellite television is illegal in Iran, but many people have access to satellite illegally. Twenty seven percent of adolescent boys in 2002 had access to satellite programs (34%) [1] and according to National Youth Organization in Iran, fifty one percent of adolescent have access to internet[2].

On the other hand, due to recent increase in females' educational aspiration[3] and economical problems related to marriage and unemployment rate, the age of first marriage has considerably increased in recent years. The proportion of never married women aged 20-24 rose from 21.4% in 1976 to 39.5 % in 1996 and 47.1% in 2000 [4] DHS 2000). Hence the gap between puberty and marriage has considerably risen in recent years.

A review of literature suggests that although some extent of such relationships exists among young people(28% premarital sex among adolescent boys in Tehran ) [5, 6], little is known about the nature of such relationships, the influence of various factors and the process of partnership such as protection during sex.

Due to the sensitivity of premarital partnership, sexually active unmarried people normally fail to receive required information and services for prevention STIs, HIV infection, unwanted pregnancy and unsafe abortion and are more likely prone to sexually transmitted diseases including HIV/AIDS. Hence, health policymakers have been recently sensitized to this issue and trying to find a culturally appropriate approach to prevent risk-taking behaviours among young people including sexual risk taking behaviours. Since a range of factors at various levels can contribute to young people's behavior, recognizing psychosocial and individual factors which predict premarital sexual relationships can inform the design of culturally appropriate and efficient interventional program to reduce the risk.

This article aims to address these gaps in evidence by describing heterosexual friendships and more intimate relationships including sex of a representative sample of unmarried female college students of universities in Tehran and by identifying predictors of such relationships. These finding are proposed to inform policy makers and program planners about range of such relationships and boost in designing effective interventions to reduce risk y behaviours.

## **Background:**

### *Factors associated with premarital heterosexual relationships and sex*

According to literature in both developed and developing countries, there are a range of risk and protective factors for sexual behaviours. Most programs developed for behavior change among young people have applied logic models implicitly or explicitly. These models encompass the achievable goal, behaviours that need to be changed, the risk and protective factors that affect behavior and interventions designed to change risk and protective factors [7, 8]. Although existing literature are mainly based on cross sectional studies and causal inferences are rarely examined, but identifying causal structure among such factors can help program designers to develop logic models. Nevertheless, the complexity of relationship between all these factors with each other and with the behavior needs to be acknowledged.

### *Social factors*

At the societal level, perception of societal norms, gender beliefs, determination by gender double-standards, reward or penalty by wider society for the sexual behavior have strong influence on sexual behavior [9-11]. Social disorganization such as substance use and violence are also risk factors of sexual behaviours[11].

Selected family factors are associated with sexual behaviour. These factors includes those related to family structure, the educational level, the family dynamics and attachment, family attitudes and values, and the communication of family with the child. Family disruption has been recognised as a risk factor for adolescent sexuality[8] while living with both biological parents was a protective factor for premarital sex [8, 12-14]. Place of residence, parents' type of marriage, family structure and stability, and living away from home are associated with sexual behaviours according to literature in developing countries [15]. Although, socio-economic status, connectedness and communication with parents, parents' restrictiveness, behaviours and attitudes of other family members were also examined in several studies in developing countries; their effect on sexual behavior is inconclusive. According to US literature, parents' education is a protective factor for adolescent sexuality. Moreover, better family interactions, connectedness and satisfactory relationships and appropriate parental supervision and monitoring are protective factors for adolescent sexuality, while general maltreatment and physical abuse is a risk factor [8]. Parental disapproval of premarital sex is also a protective factor for premarital sexuality among US teens. In addition, older sibling's early sexual behavior and early age of first sex are risk factors of sexual behaviors and parent-child communication about sex is a protective factor [8].

It has been shown that older peers and close friends are risk factor for sexual behavior according to US literature while positive peer norm is a protective factor. Peers involvement in alcohol and drug use, deviant behavior and sex and peers' permissive attitude towards premarital sexuality are identified as risk factors. Although large evidence suggest a positive

relationship between adolescents' perception of peer's sexual behavior and their own sexual experience [14, 16-18], it is not known whether adolescents are projecting either their own behaviour onto their peers or whether, once they initiated sexual activity, they tend to associate with others whom they perceive to be sexually active [15].

Partners' expectations and interactions in heterosexual relations are diverse based on the type of the relationship. Somehow, in romantic relationships, partners value the relationship so highly that they disregard social disapproval and outcomes. Having a romantic partner or a sexual partner who is older has been recognized as a risk factor for sexual behavior[8].

### ***Individual factors***

Being male and older age have had mix results with regard to teens's sexual behavior. While earlier physical maturity is a risk factor[11]. Greater connectedness to school, better academic performance and higher educational aspiration are protective factors, while having school problems is a risk factor[11]. Religiosity was shown to be negatively related with premarital sexual behavior [19, 20], although many studies showed no significant association between religious affiliation or religiosity with sexual initiation [20-28]. Media access was also shown to be related to premarital sexual behaviour. Movie watching and watching X-rated materials for adolescents' sexual behaviours had stronger influence on their sexual behavior than regular TV watching [15, 29, 30].

The relationship between knowledge about different aspects of reproductive health such as STIs/AIDS, sexuality, contraception and condoms and sexual behavior has been examined in different studies, but since most of these studies are cross sectional causal directions of these associations are unknown.

Attitudes toward sexuality before marriage are obviously important correlates for young people's sexuality. For instance, holding more liberal attitudes towards sex and perception of a

personal and social benefits than cost of having sex was strongly linked to the risk of sexual experience among young people[17, 20, 31]. However, these associations should be interpreted with caution, because sexual behaviour has a circular relationship with knowledge and attitude. Greater feeling of guilt about having sex, and taking a virginity pledge are introduced as protective factors[11].

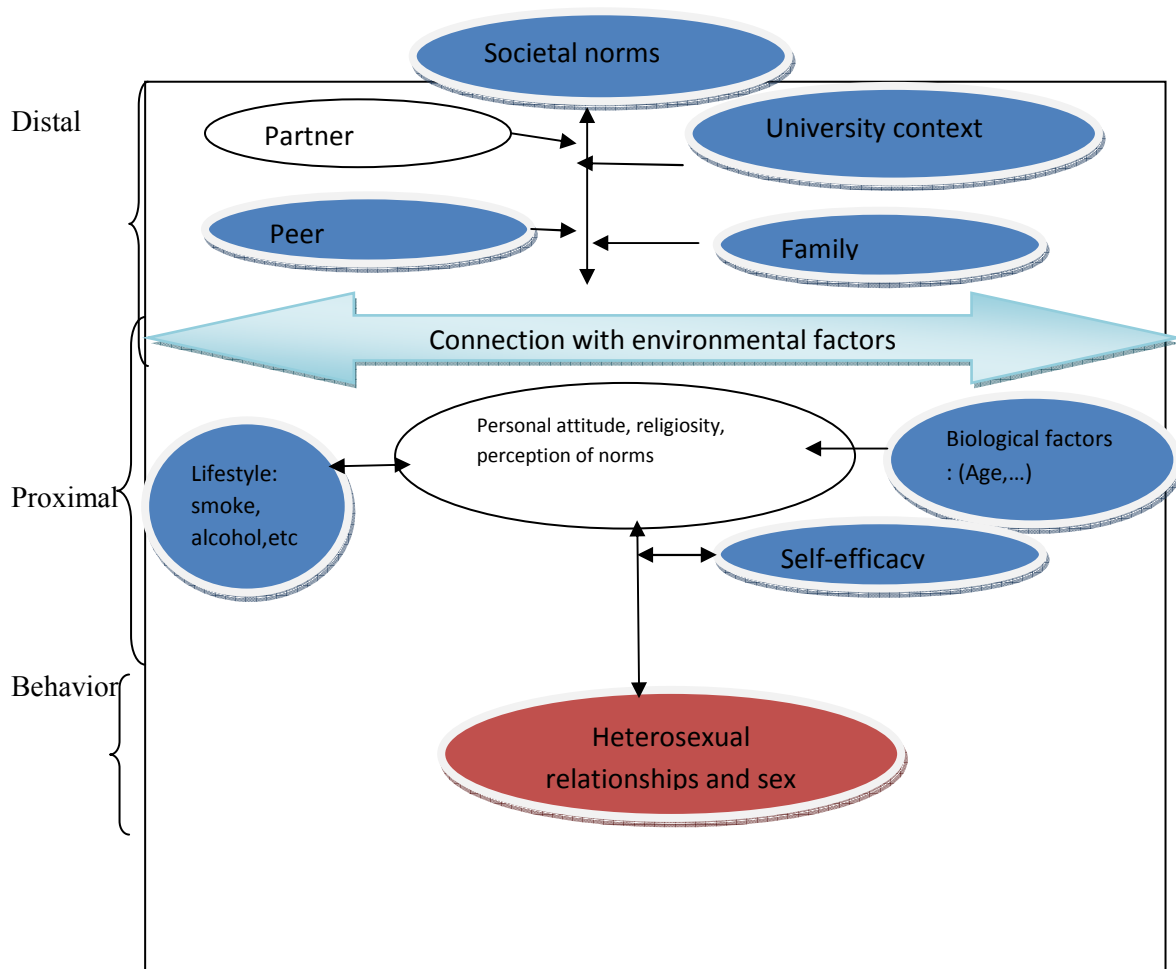
Cognitive and personality characteristics such as better cognitive development and internal locus of control are protective factor for sexual behavior[11]. The association between risk perception and sexual behavior was inconclusive and diverse. Similarly, mixed results have been obtained with regard to the association between self-efficacy and premarital sexual initiation [15].

Risky behaviours often accompany each other. Studies conducted in developed and developing countries have determined other risk-taking behaviours to be associated with sexual initiation among young people: weapon carrying, attending discos/clubs, smoking cigarettes, and using drugs and alcohol, physical fighting, delinquency are also risk factors of sexual behaviours [11, 13, 19, 32, 33]. Working for pay as a risk factor and for females, sport as a protective factor have been recognized [11].

### *The study conceptual framework*

Although this study was exploratory study, and no specific hypothesis was intended to be tested, in order to have a conceptual framework as a guide for our study elements of different recognized theories such as social –cognitive theory, health belief model, etc were considered. In this framework, factors on the above tend to affect factors on the below. However, there may be some reciprocal causality. It shows that initiation of premarital relations and sex is affected by both individual factors which are more proximal (lower half of the framework) and environmental factors which are more distal (upper half of the framework) and some factors which connect individual with the environment (factors related to families, peers and institutions such as university, society). In another paper interrelationships between

these factors and mediating role of each factor will be examined. Perceived societal norms, at the societal level, factors related to university at institutional level, factors related to family and peers as members of social network who surrounded the individual and finally factors related to individual are taken into account in this model. Individual factors such as age, religiosity, attitude, leisure activities and self-efficacy are presumed to be associated with sexual behavior. However, due to the fact that sexual activity is dyadic, another correlate of sexual behavior is partner's characteristic, but because the type of partnership for the each partnership or sexual activity had not been identified, factors related to partner are not be considered in the analysis in this paper. In this paper, personal attitude and religiosity are not considered as correlates of sexual behaviors because of their high possibility of being influenced by the behavior per se.



**Figure 1 Conceptual Framework**

## **Method**

### *Study population and sample*

The data for this study was obtained as part of a mixed method study conducted in 2005-2006 among female college students in Tehran. It included three phases; a pre-survey qualitative phase; a survey among both married and unmarried female college students; and post survey in-depth interviews with selected survey respondents. The pre-survey qualitative phase comprised four focus group discussions with youth and 18 in-depth interviews with selected sexually experienced and inexperienced youth. This phase was proposed to explore sexual norms, to inform overall research agenda and to generate hypotheses, to inform the content of survey instrument, and to identify the language appropriate for the study population. Post-survey in-depth interviews comprised 12 interviews with sexually experienced survey respondents from both private and government universities, who agreed to be interviewed after the survey. These interviews were intended to assist the researcher to better understand and enrich the information derived from the survey about the nature and process of such relationships.

This paper focuses on the data of unmarried survey participants in both governmental and private multidisciplinary universities of Tehran. Undergraduate students were focus of the study. Required sample size was estimated in different ways. One by costs, time, and feasibility of the study; another by detecting size of difference between outcome variable in two categories of interest with desired power and precision, and also by taking account of a design effect of two and assuming 10% non-response rate and that the ratio of female students in private universities to students in government universities is 1.5. It was decided to aim for sample of about 2000 (about 800 from governmental universities and 1200 from private universities).

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). Based on previous literature, academic discipline and type of university were two important associates of diversity of social behavior. From



among 75, 657 undergraduate female college students in four multidisciplinary universities in Tehran, the proportions of students in each discipline were identified. These were 10%, 59%, 13%, 9% and 9% in medical science, human science, basic science, technical science and arts, respectively. Using probability proportionate to size (PPS), the number of students in each discipline was calculated and then according to the proportion by type of university, another stratum at the second stage was defined (governmental vs. private). Male-based disciplines such as agricultural science was omitted. In order to select study subjects in each stratum, the university was chosen randomly and the desired number in each discipline was derived from the chosen university.

In practice, a total of 1743 students (526 students from governmental and 1217 students from private universities) were recruited within 8 months (from Oct. 2005 till May 2006). Based on discipline, weighting was implemented at the analysis stage. Overall, 75 clusters were selected from chosen universities. The clusters or classes from each university were selected at random with equal probability without replacement, until the required sample size for the university was reached. The number of students in each class varied considerably, by study unit and type of university, but an average each class, or cluster, comprised 23 female students. All female students in each selected class were invited to participate in the study. This sampling method assured a reasonably representative sample of female college students in Tehran.

### **Data collection**

Further to receiving ethical approval from ethical committee in Shahid Beheshti University in Tehran, university authorities and disciplinary directors were briefed about aims and objectives of the study and informed consent was obtained. Once classes were identified to be included, the corresponding lecturer was asked to set aside at least 50 minutes of the formal class for the data collection. Male students were asked to leave the class and after debriefing the aim of the study and its importance for female students and assurance of confidentiality, they were invited to fill the questionnaires. They were also invited to ask any question regarding the research and finally those that did not volunteer left the class. Written consent was obtained and the anonymous questionnaires were distributed.

A pilot-tested, structured, self-administered questionnaire was used for the survey. The questionnaire was informed by pre-survey qualitative study (FGDs and IDIs). The questionnaire consisted ten different sections (183 questions) including personal details, motivations and goals, family, leisure activities and socialization, peers interaction, reproductive health knowledge, norms, personal and peers beliefs towards sexuality and gender, sexual intention and experiences, self-efficacy and social desirability.

To reduce potential underreporting of sexual behavior and also to build rapport between participant and the researcher, some measures were undertaken such anonymity and confidentiality which ensured reduction of social desirable answers [34]. Multiple-item indicators were used to have more reliable indicators (e.g. Likert Scale for attitude and norms)[35]. Careful wording and the presence of a trained interviewer to answer queries during questionnaire administration improved the reliability of the survey questionnaire. A pre-survey qualitative study maximized the validity of the questionnaire. It informed the questionnaire and also assisted identification of the appropriate language for the study population. Accordingly offending questions 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", or "anal sex" or "oral sex". 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 each other scale item (item-item correlation). This provided a measure of the overall reliability of the scale. The index of Cronbach's alpha coefficient, which ranges between 0 and 1 was estimated. Alpha Cronbach coefficients for the majority of the important scales constructed in this study were well above 0.7.

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

Among 1748 completed questionnaires, only five questionnaires were incomplete with missing answers to the key questions which were discarded. Most non-responses indicated that the respondents were not sure about choosing one of the five options provided and they actually did not know the response. Non-response rates for attitudinal statements were typically lower than 2%.

The lie scale was used to assess whether survey respondents who reported behaviours with less social acceptability such as having had boyfriend and sexual intercourse were more truthful than those who did not report these behaviours.. The scale included nine questions. Each question had a binary response (yes, no). “Yes” is scored "0" and “no” is scored "1". The scores of this scale ranges between 0 and 9. The reliability of this test has been assessed in Iran’s culture [36]. The mean score of lie scale was not significantly different among those who reported having a boyfriend and 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 relationships and sex among females may be underreported.

### **Measures**

Owing to the exploratory nature of the study in Iran, no specific hypothesis was presumed at the initial step. According to the conceptual framework, dependent and independent variables were selected.

**Outcome variables for this paper:** Two key measures were considered as dependent or outcome variables. The first measure “whether or not the respondent had ever had a boyfriend”. Those who reported a history of having boyfriend were asked “whether they have ever had vaginal sex, anal sex or both”. Hence, another key indicator is “ ever have had a sexual intercourse”. The second indicator is a computed variable that those who either reported having had a vaginal sex, or anal sex or both are considered as having ever had sexual intercourse or penetrative sex and vice versa.

### **Individual attributes:**

Selected indicators included respondents’ age, religiosity, involvement in other risk-taking behaviours such as smoking, alcohol, pornography watching, access to internet and satellite. Moreover, survey respondents were asked a range of different questions regarding their self-

efficacy to say no to unwanted sexual contact. They were asked about their “ability to refuse sexual contact (any type) with: 1) someone who cares about him, 2) someone who is attracted to, and 3) someone who wants to marry him. Scores to each question ranged between 1 (definitely no ability) to 5 (definitely able). To measure self-efficacy as scale variable, the scores of three questions were added. This index varied from 3 (poor self-efficacy) to 15 (good self-efficacy). Personal attitude towards premarital relationships is a constructed scale variable which ranges from 5 (the most conservative) to 25 (the most liberal). It is the sum of scores of five attitudinal questions on the acceptability (a) mixed sex socializing, (b) having girlfriend, (c) having boyfriend, (d) dating, and (e) physical intimacy. Another scale variable is personal attitude towards values about virginity such as views towards: (a) pre-marital sexual intercourse when love each other, (b) boys not respect girls who agree to have sexual intercourse with, (c) girls regret after sexual intercourse, (d) importance of remaining virgin for females, (e) hesitate any type of sexual contact before marriage, (f) religious belief in premarital sexual intercourse, (g) family values in premarital sexual intercourse. Five point Likert Scale was used for each question and the total score of this scale ranges from 7 (the most conservative) to 35 (the most liberal).

### **Family indicators:**

Father’s income is a categorical variable which is used interval variable (range: 1-3). Selected dichotomous measures were included such as “residency in Tehran or other provinces”, living with both parents or not. Selected categorical variables such as mother’s education and fathers’ education were considered as interval variables which their scores varied from 1 (least education) to five (highest education). In addition, some scale variables were constructed such as family atmosphere or relationship which is a variable based on responses to six aspects in the family including “parent-youth communication”, “kindness”, “level of conflict in family”, “happiness”, “understanding”, and “time spending”. Response to each aspect varies from one to

five. One represents the best situation and five represent the worse in each aspect. The scale variable ranges from 6 (the best) and 30(the worst). Family value is also another scale variable that represents both tradition and religiosity in the family. The index is a sum of responses or scores to the two aspects of family; family endorsement to tradition and religion. It ranges from 2(traditional and religious), to 10 (modern and not-religious). Parental control during adolescent time is an interval variable based on one question which ranges from 1(very strict) to five (very permissive). Parent –child communication on morals is similar to parental control and ranges between 1(good communication) and five (poor communication). Parents' attitude towards premarital relationships is also a scale variable which represents the parents' attitude to a range of premarital relationships including having a boyfriend, going to mixed parties and dating with a man. The five point Likert scale was used. The scale ranged from 3 (very conservative) to 15(very liberal and permissive ). Parents' reaction is also a scale variable which is based on respondents' view of their parents' reaction to some hypothetical heterosexual relationships of their daughters (father's and mother's attitude on premarital friendship with men, physical contact such as hand holding and kissing and sexual contact). The responses to each statement include 5 options ranging from 1(very harsh reaction) to 5(very relax reaction). The scale ranges from 6 (very harsh reaction) to 30(very relax reaction).

#### **Peer influences and interaction:**

Five measures of peer influences were included in the analysis: an index of perception on peers' involvement in other risk-taking behaviours, perception on peer's involvement in premarital heterosexual relationships, peer norms on relationships and virginity, and communication and interaction with peers. Peers' involvement in risk-taking behaviours is a scale variable. It is based on two questions about number of friends who smokes and drink alcohol. The responses to each question ranged from 1(none) to 5(all). This index ranges from 2 (the least) to 10(the majority). The index of peer's involvement in premarital relationships was

based on the responses to two questions; number of friends who have a boyfriend and have premarital sex. The categories and ranges are identical with the previous index.

To construct peer norm on relationships, the responses to three questions regarding their peers' attitude on (a) friendship with opposite sex, (c) dating, (d) sexual intimacy were added. It ranges from 3(the most conservative) to 15 (the most liberal). Five point Likert scale was used for each attitudinal question. To construct peer norms on virginity, responses to four questions about peers' attitude on (a) pre-marital sexual intercourse in a love relationship, (b) on pre-marital sexual intercourse when contraceptive used , (c) on regret after sexual intercourse for females , and (d) on the importance virginity for females were added. The index ranges from 4(very conservative) to 20(very liberal).

Communication and interaction with peers is a scale variable and has been constructed by adding the responses to three questions : (a) ease of discussing on personal matters with female friends, (b) going out with female friends, and (c) peer pressure for having relationship with the opposite sex. The scale ranges from 3 (the minimum interaction) to 15 (the maximum interaction).

### **University factors**

Selected factors related to the university were considered in the analysis. Types of university by gender ( single sex vs. mixed sex) and by sector (private vs. government). Students were asked about their discipline and responses comprised of five main disciplines including medical science, human science, basic science, technical and engineering and arts.

### **Societal factors:**

Perceived social norm on premarital heterosexual relationships and sex was the only social factor considered in the analysis. It is a scale variable which indicates the sum of the scores of five questions regarding the views of the respondents of the acceptability and tolerance of the society regarding socializing, friendship, dating, physical intimacy, and sexual relationships with the opposite sex. This scale variable varies from 5(the most conservative and unacceptable) to 25 (the most liberal and acceptable).

## **Data management and analysis**

Completed questionnaires were gathered daily and checked and manually edited at the end of the working day and then entered into an access data base. After data cleaning and verification, they were converted to SPSS-14 for statistical analysis. Data reduction was done using principal components analysis (Factor analysis) in deriving scales from individual items. Data were weighted based on the discipline.

Based on the conceptual framework, the associations between factors presumed to be connected with premarital heterosexual relationships and sex was examined in the bivariate analysis. Multivariate analysis were carried out among significant variables in Bivariate analysis and also based on enter approach and the results obtained from the process alongside theoretical knowledge from the literature. Five different logistic models were examined and predictors in each model were compared. The correlation matrix was used for reducing numbers of correlated factors entered into the model and high multicollinearity was checked before specification of factors for entering into the models. 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. Using the pairwise approach, a correlation matrix coefficient is 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.

## **Results**

### *Respondents characteristics*

Of the 1743 survey respondents, 80% were unmarried (n=1401). In the sample, students of private universities were nearly two fold of students in government universities. The mean age of unmarried students was 21.4 years with little difference by type of university. Religiosity among students of government universities is significantly greater than that among students of private universities. About 9.5% have ever smoked and about 10% have ever drunk alcohol. Drinking alcohol is significantly more common among students of private universities compared with public universities. Access to internet was more common compared to access to satellite (86% vs. 56%), however, students of private

universities reported significantly greater access to satellite than public students (63% vs. 48%,  $P < 0.001$ ). Self-efficacy to say no to unwanted premarital sex showed a score of 12 (range 3-15) which reflect a relatively good self-efficacy on average, however self-efficacy is significantly better among students of public universities than their counterparts in private universities.

The majority of survey respondents live with their both parents (89%). The percentage of students whose families live in Tehran is significantly greater in private universities than the corresponding rate in government universities (93% vs. 73%,  $P < 0.001$ ). Father's level of education is higher than mother's education with no significant difference by type of university. Family atmosphere is moderately good and is less than median score within the range between good and poor atmosphere (score:  $14.1 < 18.0$ ). Students of private universities seem to be not significantly different with those of government universities with regard to family atmosphere, family religiosity and tradition, parental control during adolescence and parent-child communication on morals and values. While, interestingly they are different in terms of parents' attitude and parents' reaction towards premarital heterosexual relationships and sex. Parents of students in private universities are significantly more liberal in attitude and permissive in reaction than parents of students of government universities.

In contrast to family, students' view of their peers' involvement in risk taking behaviors including sexual behaviors are significantly different by type of university. The percentage of students of private universities who perceive their peers are involved in risk-taking behaviors and premarital sex is significantly greater than the corresponding rate in students of government universities. Significantly more students of arts come from private than governmental universities (13% vs. 4%,  $p < 0.001$ ) and more students of medical science come from government than private universities (28.4% vs. 3.4%). About one third of governmental students in the sample were studying in female sex universities, while this rate was only 5% among students of private universities (Table 1).



Table 1 Characteristics of unmarried female college students participated in the survey, 2005-6.

	Total (N=1378)	Private (N=936)	Government (N=441)
<b><i>Socio-demographic</i></b>			
Age (mean)	21.4	21.2*	21.5
Not religious (%)	18.0	18.8*	16.4
Ever smoked (%)	9.4	10.4	8.4
Ever drunk alcohol (%)	9.8	11.5**	6.1
Access to satellite (%)	56.3	63.0***	48.1
Access to internet (%)	86.1	85.0	88.4
Pornography watching (range: 1-4)	2.20	2.26**	2.09
Self-efficacy to say no to premarital sex (range: 3-15)	12.0	11.6***	12.9
Personal attitude on premarital relationships (range : 5-25)	16.16	16.82***	15.61
Personal attitude on virginity(rage : 7-35)	13.18	13.82***	12.41
<b><i>Family</i></b>			
Father's income (range:1-3)¥	2.20	2.19*	2.22
Live with both biological parents (%)	88.7	89.2	87.8
Mother's education (range:1-5)	3.8	3.8	3.7
Father's education (range :1-5)	4.1	4.1	4.1
Family residence in Tehran (%)	86.9	93.4*	72.7
Family atmosphere (range: 6-30 )	14.1	14.1	14.1
Family religiosity and tradition (range:2-10 )	5.9	6.0	5.7
Parental control during adolescence (range: 1-5)	2.7	2.7	2.7
Parent-child communication about morals(range: 1-5)	2.2	2.2	2.2
Parental attitude towards premarital relationships(range:3-15)	6.0	6.2*	5.6
Parent reaction towards heterosexual relationship(range: 6-30)	12.8	13.0*	12.4
<b><i>Peers</i></b>			
Perception of peer's involvement in risk-taking behaviour (range: 2-10 )	2.7	2.9***	2.5
Perception of peer 's involvement in premarital heterosexual relationships (range: 2-10)	4.4	4.7***	3.7
Peer norms on premarital relationship(range: 4-20)	12.8	13.4***	11.6
Peer norms on virginity (range: 4-20)	8.2	8.6***	7.5
Communication and interaction with peers (range: 3-15)	10.1	9.9***	10.0
<b><i>University</i></b>			
<b><i>Academic Discipline</i></b>			
Medical Sc.	11.3	3.4***	28.4
Human Sc.	55.5	59.6	46.7
Basic Sc.	13.3	14.1	11.7
Technical & engineering	9.7	9.9	9.3
Arts	10.1	12.9	3.8
Study in single sex university (range)	13.7	5.0***	32.6
<b><i>Heterosexual relations and sexual outcomes</i></b>			
Ever had boyfriend (%)	51.6	57.0***	40.3
Ever had sex (%)	23.1	27.7***	13.0
Ever had penetrative sex (%) (N=)	10.0	12.4***	4.8

\*p&lt;0.05, \*\*P&lt;0.01, \*\*\*p&lt;0.001

¥ One represents monthly father's income lower than 3000000 R.. Two represents average income between 3000000 R. and 5000000 R. and three represents monthly incomes more than 5000000 R.

### ***Premarital heterosexual friendship and sexual relations***

More than half (52%) of unmarried female college students reported that have ever had a boyfriend. Interestingly this rate is significantly greater among students of private universities than students of government universities (57.0% vs. 40.3%,  $p < 0.001$ ). Almost the same proportion (49%) had ever dated a man. More than one-third of unmarried respondents have ever had physical intimacy such as hand holding and hugging with a man (39%). Nearly 23% of unmarried respondents had ever experienced any type of sexual contact including touching of genitals. Nearly 11% had experienced oral sex, 6.8% vaginal intercourse and 4.8% anal intercourse. Sex by touch was described by most sexually experienced interviewees as female-male genital touching and getting aroused with no vaginal, anal or oral penetration while both are naked.

About one fourth (23%) reported premarital sexual relations. This encompasses all different types of sex. Similar to premarital friendship, premarital sexual relations were also more common among students of private universities compared to students of government universities (28% vs. 13%,  $P < 0.001$ ). Only 10% reported penetrative sex before marriage which includes either vaginal sex, or anal sex or both. Premarital penetrative sex is also significantly more common among students of private university than students of government universities (12% vs. 5%,  $p < 0.001$ )

Over one-third (37%) of unmarried sexually experienced respondents had their first sexual experience including sex by touch, less than six months preceding the survey. Around 41% had their first sexual intercourse more than 12 months before the survey. Interestingly, nearly half (47%) had sexual debut before entrance the university. Students of private universities were more likely to have had their first sexual intercourse before university entrance than their counterparts in public universities (49% vs. 36%,  $P < 0.05$ ). About two-thirds of sexually experienced girls (62%) regretted their first sexual intercourse with no significant difference by type of university. Most respondents reported that their first sexual partner was their boyfriend either without marital motive (45%) or with marital motive (42%). First sexual intercourse in 8% of cases was forced. Only 1.4% of first partners were casual (no relationship with the person). The majority of respondents (74%) did not use any method against HIV/AIDS and STDs at their first sexual experience because their sexual contact was not vaginal intercourse.

Most respondents reported that their first sex was based on willingness of both parties. More than one-third of respondents (35%) reported that their first sex happened because the man persuaded them to have sex. The majority of respondents reported that their first sex happened in the partner's residence (63%), while in 17% of cases it occurred in her residence. In about 10% of cases it happened in a friend's residence. The majority of respondents (77%) reported that their first sex was unplanned with no significant difference by type of university. Nearly 22% of respondents were concerned about STDs, HIV/AIDS at their first sex. Withdrawal and condoms were the two common methods used as contraception in first vaginal intercourse.

### **Bivariate analysis of factors associated with premarital relationships**

Bivariate analysis shows that factors at various levels are associated with premarital friendships and sexual relations including society, institutions, peer, family and individual. At individual level, apparently age, religiosity, involvement in other risk taking behaviors such as smoking and drinking alcohol, access to satellite and pornography and low self-efficacy are significantly associated with both partnership and sexual intercourse before marriage. However, access to internet did have any significant association with premarital partnership and sex. The strength of these associations between such factors and penetrative sex is even greater than premarital friendships. For instance, about 28% of those with premarital friendship considered themselves as irreligious compared to 8% of those without such experience, while nearly 42% of those with penetrative sex were considered themselves to be irreligious, compared to 16% of those with no such experience ( $p < 0.001$ ).

From among family factors, fathers' low income is a protective factor for both premarital heterosexual friendship and sex. Father's income was significantly greater among those who reported having ever had a boyfriend and having ever had sex compared with those with no experience of boyfriend and sex before marriage. Hence students with lower economic status are less likely prone to experience friendship with the opposite sex and sexual relations before marriage than those with better father's income.

Parents' education was significantly better among those who reported premarital friendship with the opposite sex and also sexual relations compared to those with no such experiences. Mother's education compared to father's education was more influential in premarital sex (mean score: 4.1 vs. 3.8,  $P < 0.01$ ).

Residency of family in Tehran was also significantly associated with more involvement in premarital friendship with the opposite sex compared to those whose families do not reside in Tehran (90% vs. 84%,  $p < 0.01$ ), while there was not associated with premarital sex.

Family atmosphere or relationship was significantly poor among students who reported premarital heterosexual friendships and sex (mean score: 14.7 vs. 13.4,  $p < 0.001$  and 15.8 vs. 13.9,  $P < 0.001$ ). Even family atmosphere among those with experience of premarital sex was poorer than their counterparts with premarital friendship (15.8 vs. 14.7). Families are also significantly less religious and traditional among students who reported premarital heterosexual friendship and sex compared with those with no such experiences. Parental control among students who reported premarital friendship and sex with the opposite sex was significantly stricter compared to those without such experiences.

Parent-child communication about morals and values is significantly poor (higher score) among students who reported experiences of premarital heterosexual friendships and sex compared to their counterparts with no such experiences (mean scores: 2.3 vs. 2.1,  $p < 0.01$ , 2.5 vs. 2.2,  $p < 0.01$ , respectively).

Interestingly parents of students who reported experiences of premarital friendships and sex have significantly more liberal attitudes towards such relationships (mean score: 7.2 vs. 4.7,  $p < 0.001$ , and 8.4 vs. 5.8,  $p < 0.001$ , respectively). They are significantly more permissive towards their daughters' hypothetical such experiences compared to the parents of students without such experiences (mean score: 14.0 vs. 11.5,  $p < 0.001$ , and 15.6 vs. 12.6,  $p < 0.001$ ).

Mother-daughter communication on important issues including sex is significantly lower among students who reported premarital friendships and sex with the opposite sex compared to those with no such experiences.

Those students who reported premarital friendships and sex reported lower respect to their parents' views compared to those who did not report such experiences. The mean score of those with such experiences is significantly more than those with no such experiences (2.7 vs. 1.7,  $p < 0.001$ , and 3.0 vs. 2.2,  $p < 0.001$ , respectively). Another supporting finding for this claim is that the inconsistency between parents-respondents' values was significantly more among students with premarital heterosexual relationships and sex than those who reported none of these behaviors. The higher the score, the more is the inconsistency in values between parents and children and vice versa (Table 2).

From among peer factors, perception of peers' involvement in other risk-taking behaviors (smoking and alcohol) was significantly greater among students with premarital friendships and sex compared to the students with no such experiences (mean score: 3.3 vs. 2.2,  $p < 0.001$  and mean score: 4.4 vs. 2.6,  $p < 0.001$ ). Similarly, their perception of peers' involvement in premarital relationships and sex is greater among students with premarital friendships and sex compared to their counterparts with no such experiences. In addition, peer norms on relationships and virginity among students with premarital friendships and sex was significantly more liberal than their counterparts with no such experiences. Communication and interaction with peers also is significantly greater among students with premarital friendships and sex with the opposite sex compared to their counterparts with no such experiences.

From among university factors, the rate of premarital heterosexual friendships and sex was significantly greater among students who study human science and arts compared to their counterparts in other disciplines. In contrast, the students who study medical sciences or basic sciences are less likely reported premarital friendships and sex with the opposite sex compared to students of other discipline. Interestingly, the proportion of students who study in female sex university was significantly lower among those who reported premarital friendships with the opposite sex compared to those with no such experiences (10.7% vs. 17.2%,  $p < 0.001$ ). Similarly, the proportion of students in single sex universities was significantly lower among students with premarital sex compared to those without such experiences (6% vs. 14.6%,  $p < 0.01$ ).

Table 2 Selected characteristics of unmarried female college students by ever having boyfriend and ever had penetrative sex

	Ever had boyfriend		Ever had penetrative sex	
	No (N=653)	Yes (N=695)	No (N=1184)	Yes (N=133)
<b>Individual</b>				
Age(mean)	21.1	21.6***	21.3	22.2***
Not being religious (%)	8.4	27.5***	15.9	41.7***
Ever smoked (%)	3.7	15.8***	7.7	30.8***
Ever drunk alcohol (%)	2.0	17.5***	6.5	42.1***
Access to satellite (%)	43.1	68.7***	54.6	82.0***
Access to internet (%)	<b>85.0</b>	<b>87.0</b>	<b>86.0</b>	<b>87.3</b>
Access to pornography(range: 1-4)	1.8	2.6***	2.1	3.0***
Self efficacy to say no to premarital sex(range: 3-15)	13.1	11.0***	12.3	8.8***
<b>Family</b>				
Father's income (range : 1-3)	2.12	2.28***	2.19	2.36*
Live with both biological parents (%)	89.5	87.5*	88.7	82.9*
Mother's education(range: 1-5 )	3.6	4.0***	3.8	4.1**
Father's education (range : 1-5 )	4.0	4.2***	4.1	4.3*
Family residence in Tehran (%)	83.7	89.7**	<b>86.7</b>	<b>89.4</b>
Family atmosphere (range: 6-29 )	13.4	14.7***	13.9	15.8***
Family religiosity and tradition (range: 2-10 )	5.6	6.2***	5.8	6.6***
Parental control during adolescence (range:1-5 )	2.7	2.6**	2.7	2.5*
Parent-child communication about moral(range: 1-5)	2.1	2.3**	2.2	2.5**
Parental attitude towards premarital relationships(range: 3-15)	4.7	7.2***	5.8	8.4***
Parent reaction towards heterosexual relationship(range: 6-30 )	11.5	14.0***	12.6	15.6***
Mother-daughter communication on important issues and sex	20.6	19.6**	20.2	18.6*
Respondent's respect for parents' views	1.7	2.7***	2.2	3.0***
Consistency between parents' value and respondents' values	2.1	3.2***	2.6	3.5***
<b>Peers</b>				
Perception of peer's involvement in risky sexual behaviour (range : 1-3)	2.2	3.3***	2.6	4.4***
Perception of peer 's involvement in premarital heterosexual relationships (range: 1-3)	1.4	2.0***	4.2	7.0***
Peer norms on relationships (range: 4-20)	10.7	14.8***	12.5	16.3***
Peer norms on virginity (range: 4-20)	6.9	9.5***	7.8	12.0***
Communication and interaction with peers (range: 3-15)	10.5	9.3***	10.0	9.3**
<b>University</b>				
<i>Academic discipline</i>				
Medical Sc.	14.5	8.6***	11.5	6.0***
Human Sc.	51.4	59.5	55.0	63.9
Basic Sc.	18.0	8.5	13.9	2.3
Technical & engineering	9.7	10.2	10.0	11.3
Arts	6.4	13.3	9.6	16.5
Study in single sex university (%)	10.7	17.2**	14.6	6.0**
<b>Societal</b>				
Mean Score of Perceived social norms on premarital heterosexual relationships and sex(5-25)	12.98	14.10***	<b>13.35</b>	<b>15.40</b>

\*p<0.05, \*\*P<0.01, \*\*\*p<0.001

Perception of societal norms among students who reported premarital friendship with the opposite sex was significantly liberal than their counterparts without such experience. However, this perception was not significantly different between sexually experienced and non-experienced.

Table 3 and 4 shows the strength of correlation between variables using Pearson and partial correlation of main factors of the conceptual framework. Comparative assessment of the correlation coefficients of these tables clearly indicates that how some of these factors are correlated with each other and it assists our understanding of the complexity of association of different factors with each other and in interpreting the results of multivariate analysis and in model specification. According to Table 3, religiosity, self efficacy, personal attitudes, parents attitude and peer norms are significantly correlated with each other. But these correlations are some how because of their correlations with other factors, hence they do not reflect direct and pure correlation coefficient. Table 4 examines the correlation coefficient between two variables when the influence of other variables in the table is controlled. So as this shows the pure correlation between two variables. Clearly in table 3 the correlation coefficients are bigger than their corresponding figures in Table 4. In fact once the influences of other variables are controlled, the common variance shared between two variables is removed and pure correlation is appeared. Interestingly, following removal of the influence of other factors, many of significant coefficients becomes insignificant. Father's income, mother's education and father's education are also significantly correlated which are not shown in the tables.

In Table 3, religiosity is significantly correlated with all factors except family strictness in controlling the child during adolescence, family relationships and perceive societal norm. Religiosity has the highest correlation with personal attitude (0.45 and 0.52,  $p < 0.01$ ). However, in partial correlation matrix, religiosity only is correlated with personal attitude (0.12, 0.20,  $p < 0.01$ ), parents' attitude and peer norms on relationships.

Table 4 illustrate that personal attitude and peer attitude on virginity have highest correlation coefficient (0.47,  $P < 0.01$ ) after control for all other factors and also the correlation between personal attitude and peer norms on relationships is high (0.45,  $P < 0.01$ ). This high correlation can be because of a common

**Table 3. Pearson correlation matrix of selected factors associated with premarital partnerships and sex**

Pearson correlation	Religiosity	Self-efficacy	Personal attitude on relationships	Personal attitude on virginity	Family strictness in controlling	Family atmosphere	Parents' attitude	Peer norms relations	Peer norms on virginity	Peer involvement in risk behaviour	Peer involvement in premarital relationships	Peer communication	Perceived norms
Religiosity	<b>1.000</b>												
Self-efficacy	<b>-.27(**)</b>	<b>1.000</b>											
Personal attitude on relationship	<b>.45(**)</b>	<b>-.20(**)</b>	<b>1.000</b>										
Personal attitude on virginity	<b>.52(**)</b>	<b>-.30(**)</b>	<b>.53(**)</b>	<b>1.000</b>									
Family, strictness in controlling	.02	.04	-.02	.01	<b>1.000</b>								
Family relationship	0.06	<b>-.11(**)</b>	<b>.09(**)</b>	<b>.14(**)</b>	<b>-.07(**)</b>	<b>1.000</b>							
Parent's attitude on relationship	<b>.41(**)</b>	<b>-.17(**)</b>	<b>.48(**)</b>	<b>.48(**)</b>	<b>.18(**)</b>	<b>-.11(**)</b>	<b>1.000</b>						
Peer norms on relationship	<b>.44(**)</b>	<b>-.19(**)</b>	<b>.67(**)</b>	<b>.51(**)</b>	-.04	<b>.08</b>	<b>.47(**)</b>	<b>1.000</b>					
Peer norm on virginity	<b>.44(**)</b>	<b>-.27(**)</b>	<b>.45(**)</b>	<b>.72(**)</b>	-.00	<b>.07</b>	<b>.43(**)</b>	<b>.58(**)</b>	1.000				
Peers' involvement in smoking and alcohol	<b>.38(**)</b>	<b>-.19(**)</b>	<b>.38(**)</b>	<b>.53(**)</b>	-.02	<b>.05</b>	<b>.45(**)</b>	<b>.43(**)</b>	<b>.54(**)</b>	<b>1.000</b>			
Peer involvement in premarital friendship and sex	<b>.40(**)</b>	<b>-.28(**)</b>	<b>.49(**)</b>	<b>.57(**)</b>	-.03	<b>.13(**)</b>	<b>.46(**)</b>	<b>.58(**)</b>	<b>.60(**)</b>	<b>.64(**)</b>	<b>1.000</b>		
Peer communication	<b>-.19(**)</b>	<b>.10(**)</b>	<b>-.29(**)</b>	<b>-.18(**)</b>	.02	-.02	<b>-.26(**)</b>	<b>-.32(**)</b>	<b>-.19(**)</b>	<b>-.24(**)</b>	<b>-.35(**)</b>	<b>1.000</b>	
perceived norms	.03	.00	<b>.14(**)</b>	<b>.15(**)</b>	.06	-.07	<b>.21(**)</b>	<b>.20(**)</b>	<b>.15(**)</b>	<b>.18(**)</b>	<b>.21(**)</b>	<b>-.12(**)</b>	<b>1.000</b>

**\*\* P<0.01**



**Table 4: Partial correlation matrix of selected factors associated with premarital partnerships and sex**

Partial correlation	Religiosity	Self-efficacy	Personal attitude on relationships	Personal attitude on virginity	Family strictness in controlling	Family atmosphere	Parents' attitude	Peer norms relations	Peer norms on virginity	Peer involvement in smoking and alcohol	Peer involvement in premarital relationships	Peer communication	Perceived norms
Religiosity	<b>1.000</b>												
Self-efficacy	<b>-.11(**)</b>	<b>1.000</b>											
Personal attitude on relationship	<b>.12(**)</b>	<b>-.00</b>	<b>1.000</b>										
Personal attitude on virginity	<b>.20(**)</b>	<b>-.12(**)</b>	<b>.18(**)</b>	<b>1.000</b>									
Family, strictness in controlling	.01	.03	.05	.00	<b>1.000</b>								
Family relationship	-.01	-.07	.06	<b>.12(**)</b>	-.02	<b>1.000</b>							
Parent's attitude on relationship	<b>.12(**)</b>	<b>-.00</b>	<b>.18(**)</b>	<b>.12(**)</b>	<b>.24(**)</b>	<b>-.21(**)</b>	<b>1.000</b>						
Peer norms on relationship	<b>.09(**)</b>	.03	<b>.45(**)</b>	<b>-.09(**)</b>	-.05	.03	.07	<b>1.000</b>					
Peer norm on virginity	.01	.02	<b>-.11(**)</b>	<b>.47(**)</b>	.00	-.04	-.00	<b>.28(**)</b>	<b>1.000</b>				
Peers' involvement in smoking and alcohol	.05	.04	-.04	<b>.13(**)</b>	-.06	-.01	<b>.17(**)</b>	-.04	<b>.09(**)</b>	<b>1.000</b>			
Peer involvement in premarital friendship and sex	-.01	<b>-.10(**)</b>	.04	.01	-.03	.05	.03	.20	<b>.19(**)</b>	<b>.37(**)</b>	<b>1.000</b>		
Peer communication	-.01	.03	<b>-.08 (**)</b>	.06	.01	.01	-.07	<b>-.11(**)</b>	.06	-.00	<b>-.17(**)</b>	<b>1.000</b>	
perceived norms	<b>-.11(**)</b>	.05	-.02	.05	.05	.07	.07	<b>.10(**)</b>	-.04	.06	.06	-.03	<b>1.000</b>

Note: The partial correlation coefficients describe the linear relationship between two variables while controlling for the effects of all other variables in the Table , N=1086

**\*\*P<0.01**

Table 5: Multivariate analysis of factors associated with premarital friendships with the opposite sex among female college students

	Crude OR	Adjusted OR				
		Model 1	Model 2	Model 3	Model 4	Model 5
<b>Socio-demographic</b>						
Age	1.11(1.05-1.17)***	1.11(1.05-1.18)**			1.09(1.01-1.19)*	1.10(1.02-1.20)*
Never smoked (ref.)	1.00	1.00			1.00	
Ever smoked	4.99(3.16-7.90)***	1.98 (1.11-3.53)*			1.20(0.61-2.34)	
Never drunk alcohol (ref.)	1.00	1.00			1.00	1.00
Ever drunk alcohol	10.93(6.06-19.73)***	3.31 (1.65-6.63)**			0.80(0.36-1.78)	1.33(0.35-1.61)
No access to satellite (ref.)	1.00	1.00			1.00	
Access to satellite	2.89(2.31-3.61)***	1.81 (1.39-2.36)***			1.12(0.80-1.58)	
Pornography watching(range: 1-4)	2.05(1.83-2.30)***	1.71 (1.49-1.95)***			1.27(1.08-1.50)**	1.27(1.04-1.45)*
Self-efficacy to say no (range: 3-15)	0.84(0.81-0.87)***	0.87 (0.84-0.90)***			0.89 (0.85-0.93)***	0.88(0.84-0.92)***
Personal attitude towards premarital relation	1.23(1.19-1.26)***					1.10(1.05-1.15)***
<b>Family</b>						
Father's income	1.32(1.14-1.53)***		1.19(0.98-1.43)			
Mother's education(range: 1-5 )	1.31(1.18-1.45)***		1.05(0.92-1.20)			
Family not reside in Tehran	1.00		1.00		1.00	1.00
Family reside in Tehran	1.70(1.22-2.37)**		1.01(0.52-1.96)		1.17(0.71-1.92)	1.30(0.81-2.08)
Family atmosphere (range: 6-29 )	1.07(1.05-1.10)***		1.13(1.10-1.17)***		1.07(1.03-1.11)***	1.05(1.01-1.09)**
Parental control (range: 1-5 )	0.94(0.74-0.96)**		0.68(0.58-0.80)***		0.83(0.67-1.01)	0.80(0.65-0.98)*
Parental attitude on relationships(range: 3-15)	1.34(1.28-1.40)***		1.39(1.31-1.45)***		1.20(1.12-1.28)***	1.17(1.09-1.25)***
<b>Peers</b>						
Perception of peer norm on heterosexual relationships (range: 1-3)	1.23(1.20-1.27)***		1.09(1.06-1.13)***		1.06(1.02-1.11)**	1.00(0.96-1.06)
Peers involved in smoking and drinking alcohol	2.26(1.95-2.61)***			1.11(0.96-1.29)		
Peers involved in premarital relationships	2.07(1.91-2.25)***			1.72(1.55-1.92)***	1.49(1.33-1.66)***	1.47(1.31-1.65)***
Communication and interaction with peers	0.79(0.75-0.83)***			0.95(0.88-1.01)		0.99(0.92-1.07)
<b>University</b>						
Type of university	1.00				1.00	
Government(ref.)	1.97(1.56-2.48)***				1.13(0.77-1.65)	
Private						
Academic discipline						
Medical Sc.(ref.)	1.00				1.00	
Human Sc.	1.96(1.38-2.78)***				0.86(0.49-1.50)	
Basic Sc.	0.79(0.51-1.24)				1.00(0.51-1.96)	
Technical & engineering	1.77(1.11-2.83)*				0.64(0.31-1.34)	
Arts	3.58(2.20-5.82)***				1.02(0.48-2.17)	
Perceived Social norms(5-25)	1.06(1.04-1.09)***				1.10(0.96-1.04)	1.00(0.96-0.92)
<b>Constant</b>		0.107*	0.070***	0.043***	0.006***	0.004***
<b>Adjusted R<sup>2</sup></b>		0.293	0.286	0.414	0.474	0.481
<b>N</b>		1221	1213	1286	1041	1027

\*P<0.05, \*\*P<0.01, \*\*\*P<0.001

Table 6: Multivariate analysis of factors associated with premarital sexual intercourse with the opposite sex among female college students (\*P<0.05, \*\*P<0.01, \*\*\*P<0.001

	Crude OR	Adjusted OR				
		Model 1	Model 2	Model 3	Model 4	Model 5
<b>Socio-demographic</b>						
Age	1.13(1.06-1.21)***	1.12(1.02-1.24)*			1.07(0.93-1.23)	1.07(0.93-1.23)
Never smoked (ref.)	1.00	1.00			1.00	1.00
Ever smoked	5.33(3.48-8.16)***	1.55(0.84-2.85)			0.88(0.42-1.85)	0.88(0.42-1.85)
Never drunk alcohol (ref.)	1.00	1.00			1.00	1.00
Ever drunk alcohol	10.48(6.92-15.87)***	4.39(2.51-7.69)***			1.84(0.88-3.82)	1.04(0.49-2.18)
No access to satellite (ref.)	1.00	1.00			1.00	1.00
Access to satellite	3.74(2.37-5.90)***	1.39(0.79-2.44)			0.88(0.40-1.92)	0.88(0.40-1.92)
Pornography watching(range: 1-4)	2.09(1.76-2.48)***	1.63(1.31-2.04)***			1.35(1.01-1.82)*	1.37(1.01-1.86)*
Self-efficacy to say no (range: 3-15)	0.81(0.77-0.85)***	0.82(0.77-0.87)***			0.76(0.70-0.83)***	0.75(0.68-0.82)***
Personal attitude towards virginity(range:7-35 )	1.22(1.18-1.26)***					1.14(1.07-1.21)***
<b>Family</b>						
Father's income	1.38(1.07-1.78)*		1.18(0.87-1.60)			
Mother's education(range: 1-5 )	1.33(1.10-1.59)**		0.99(0.79-1.24)			
Family not reside in Tehran	1.00		1.00			1.00
Family reside in Tehran	1.30(0.71-2.38)		1.01(0.52-1.96)			1.16(0.39-3.44)
Family atmosphere (range: 6-29 )	1.10(1.06-1.15)***		1.15(1.10-1.21)***			1.05(0.98-1.13)
Parental control (range:1-5 )	0.77(0.62-0.96)*		0.62(0.48-0.80)***			0.70(0.50-0.99)*
Parental attitude on relationships(range: 3-15)	1.25(1.18-1.31)***		1.33(1.24-1.42)***			1.06(0.95-1.18)
<b>Peers</b>						
Perception of peer norm on virginity (range: 1-3)	1.88(1.70-2.08)***			1.14(1.07-1.23)***		0.98(0.97-1.10)
Peers involved in smoking and drinking alcohol	1.60(1.45-1.75)***			1.04(0.92-1.18)		
Peers involved in premarital relationships	1.88(1.70-2.08)***			1.60(1.40-1.84)***		1.49(1.23-1.79)***
Communication and interaction with peers	0.71(0.57-0.91)**			1.05(0.962-1.16)		1.08(0.95-1.24)
<b>University</b>						
Type of university						
Government(ref.)	1.00				1.00	
Private	2.72(1.67-4.43)***				1.49(0.66-3.38)	
<b>Academic discipline</b>						
Medical Sc.(ref.)	1.00				1.00	
Human Sc.	2.30(1.07-4.93)*				1.72(0.43-6.96)	
Basic Sc.	0.34(0.09-1.28)				1.12(0.49-2.54)	
Technical & engineering	2.32(0.94-5.70)				1.13(0.26-4.96)	
Arts	3.45(1.47-8.15)**				0.49(0.5-1.55)	
Perceived Social norms(5-25)	1.12(1.07-1.17)***				1.07(1.00-1.14)*	1.09(1.01-1.16)*
<b>Constant</b>		0.010***	0.004***	0.001***	0.000***	0.000***
<b>Adjusted R<sup>2</sup></b>		0.310	0.195	0.316	0.476	0.516
<b>N</b>		1190	1182	1272	1015	1002

factor such as behavior, not simply the influence of peers on personal attitude. This means that people are involved in premarital relationships tend to associate with peers with liberal norms and their personal attitude also become more liberal. Hence, the relationship is a bit complex and it can not be concluded with certainty which caused which. Parental control during adolescent years is only correlated significantly with parents' attitude (0.24,  $P < 0.01$ ).

Table 5 shows the crude and adjusted odds ratios of selected factors at different levels. Crude Odds ratios of the majority of selected factors reflect their significant association with premarital friendships except family residency in Tehran or other cities. The highest odds ratio devotes to alcohol consumption (OR=10.5,  $p < 0.001$ ) and it will be followed by smoking (OR=5.33,  $p < 0.001$ ), access to satellite (OR=3.74) and studying arts (OR=3.45,  $p < 0.001$ ). Since these factors have also some inter-relations and association with each other, using different logistic models, it has been tried to find the most important and influential predictor of premarital friendships (Table 5) and sexual intercourse (Table 6) at various levels.

Model 1 incorporate selected subset of individual factors which were significantly associated with premarital friendships. These are age, smoking, drinking alcohol, access to satellite, pornography watching, self efficacy and personal attitude towards premarital relationships. In the first model, the odds ratio or predictive effects of each factor is reduced by controlling the effect of other individual factors in the model compared to crude odds ratio. The significance level of the odds ratios of age, smoking and alcohol consumption also reduces. Predictors at individual level in the Model 1 accounted for approximately 29% of the variance in the premarital friendships (Adjusted  $R^2 = .29$ ) which was significant at the  $P < 0.05$ . Alcohol consumption (OR=.3.31,  $p < 0.01$ ) was the most influential predictor, followed by smoking (OR=.1.98,  $p < 0.05$ ) and access to satellite (OR=1.81,  $p < 0.001$ ).

Model 2 includes subset of family factors such as father's income, mother's education, family residency in Tehran, family relationships or atmosphere, parental control during adolescence and parents' attitude on relationships .Predictors at the level of family (the model 2) accounted for approximately 29% of variance in the premarital friendships (Adjusted  $R^2 = 0.286$ ) which was significant at the  $P < 0.001$ . The most influential predictor [Type text]

at family level for premarital friendships is parental attitudes towards such relationships (OR=1.39,  $p<0.001$ ) followed by family atmosphere (OR=1.13,  $p<0.001$ ) and parental control (OR=0.68,  $p<0.001$ ).

Model 3 incorporates predictors related to peer groups such as peer norms and peers' behaviors. This model accounted for 41% of variance at premarital friendships (adjusted  $R^2 = 0.41$ ) which is highly significant at the  $p<0.001$ . The most influential predictor at peer level is perception of peers' involvement in premarital relationships (OR=1.72,  $P<0.001$ ).

Model 4 includes a mixture of selected factors at various levels such as individual, family, peer, university and society. In this model, the odds ratios most factors are decreased and some predictors become insignificant. The only predictor remains significant in the model 4 comprise age, pornography watching, self-efficacy, family atmosphere, parents' attitude, peer norms on relationships, and peer involvement in premarital relationships. The most important predictor among other predictors is the perception of peers' involvement in premarital relationships (OR=1.49,  $P<0.001$ ). This model accounted for 47% of variance at premarital friendships (adjusted  $R^2 = 0.47$ ) which is highly significant at the  $p<0.001$ .

In the model 4, personal attitude was excluded from individual factors, while in the model 5 it was added and its influence on the odds ratios was examined. Model 5 excluded university factors as well. In this model personal attitude appeared as a significant predictor of premarital friendship with the opposite sex (OR=1.10,  $P<0.001$ ). In the model 5 compared to model 4, the odds of family atmosphere and its significance is decreased (from OR=1.07,  $p<0.001$  to OR=1.05,  $p<0.01$ ). Odds of parental control changed into significant (from insignificant OR=0.83 to significant OR=0.80,  $p<0.01$ ) and the odds of parents' attitude decreases from 1.20 to 1.17. Interestingly the odds of perception of peer norms on heterosexual relationship become insignificant. Hence in the model 5, age, pornography watching, self-efficacy to say no, personal attitude, family atmosphere, parental control, parents' attitude and perception of peers' involvement in premarital relationships are predictors of

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premarital friendships. This model accounted for about half of variance at premarital friendships (adjusted  $R^2 = 0.48$ ) which is highly significant at the  $p < 0.001$ . Therefore personal attitude seems to have an interaction with family atmosphere and parents attitude because with its entrance into the model, their influence of those factors become insignificant.

Similar to table 5, Table 6 also regressed some variables against premarital penetrative sex using five different models. As it is evident, most variables at different levels have significant crude odds ratio except residency in Tehran. Model 1 which shows the multivariate analysis of individual factors indicates that only age, drinking alcohol, pornography watching and self-efficacy are predictors of premarital penetrative sex. This models accounts for only 31% of variance in premarital penetrative sex (Adjusted  $R^2 = 0.31$ ).

In the 2<sup>nd</sup> model, from among family factors, only family atmosphere, parental control and parental attitude are significant predictors of premarital penetrative sex. This model accounts for only 19% of variance in premarital sexual intercourse.

The 3<sup>rd</sup> model, from among peer factors, only peer norms on virginity and perception on peers' involvement in premarital relationship are predictors of penetrative sex before marriage. This model also accounts for about 32% of variations in penetrative sex before marriage.

In the model 4, in which factors at individual , family, peers, society and university levels are entered, only pornography watching, self-efficacy, family atmosphere, parents' attitude, peer norms on virginity, perception of peers' involvement in premarital relationships and societal norms remained significant predictors in the model. This model accounts for about 48% of the variations in premarital sexual intercourse.

Finally model 5 that consider as well the effect of personal attitude accounts for more than half of variations in premarital sexual intercourse (Adjusted  $R^2 = 0.52$ ). In this model, inclusion of personal attitude cause reduces the influence of family atmosphere and parents' attitude in the way that make their role as predictors insignificant, in contrast family control becomes a significant predictor in the fifth model. These changes may imply a reverse  
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correlation between family atmosphere and parents' attitude and parental control. In this model, pornography watching, self-efficacy and personal attitude are individual significant predictors of premarital penetrative sex. From among family factors, parental control is a significant predictor and from among peer factors, perception of peers' involvement in premarital relationships is a strong predictor of penetrative sex and finally societal norms remains significant predictor.

### **Discussion:**

This research adds to limited information about predictors of premarital friendships and sex in a context with traditional values. Results are suggestive that risk and protective factors are rooted in different levels such as society, family, friends and individuals. Importantly, the relationship of individuals with important others and institutions surrounding them are also influential. The relationship between parents and child within family relationships and association with peers are examples of such association. This is consistent with other researches. [11]

Some of these factors directly influence the behavior and some have indirect effects. Comparing crude odds ratio and adjusted odds ratio shows nicely that how these factors are inter linked with each other once the effect of them are controlled in logistic regression, only limited factors remain significant predictors of premarital friendships and sex in logistic regression[11].

Our study showed that older age is a predictor of premarital friendship among females but not penetrative sex. The older teens become, the more likely they are to have relationships with the opposite sex. Although in the logistic model, age was not shown as a significant predictor for penetrative sex, it should be noted that due to controlling the effect of many other factors, age loses its significance in multivariate analysis. This finding is not consistent with other evidences that introduced age a predictor factor for initiation sex [11]. A similar recent study also showed similarly that age positively associated with the odds of having had a romantic partnership for females (odds:1.1), but not having had sex. While for males, age was positively associated with having had sex

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(odds: 1.1)[37] . Watching pornography is another significant predictor which is related to both having more liberal peers and parents or even parents with low supervision and monitoring. Comparing model 1 to model 4 and 5 reflects that the influence of watching pornography will be reduced once the family factors and peer factors are controlled, however, its influence remains significant. So pornography watching, per se is a good predictor of premarital friendships (OR=1.27,  $p<0.1$ ) which is consistent with other studies[29, 37].

Our findings, like those of previous researches[29, 37] suggest that liberal personal attitude are significant and important predictors of premarital friendships. However, it should be noted that it is subject to getting some influences from the behavior pre se. That means involvement in premarital friendship may cause liberal personal attitude.

The other theme is perceived attitude and norms and behaviors both among peers and their parents. Those who perceive to have a liberal peers and parents are likely to report premarital friendships. So perception of the liberal norms in surrounding people is a good predictor of such relationship, particularly, if individuals perceived that most of their friends or peers are involved in premarital relationships. This is a strong predictor of their own relationships. The role of peer permissive values about premarital relations and sex on premarital relationships and sex have been shown in other previous researches[37]. There is strong evidences that personal attitude are affected by attitudes and norms of peers and parents[11].

Interestingly, strictness in parental control during adolescent time incurs reverse influence on premarital friendship and sex, while establishment of a close relationship within a good family atmosphere is shown to have a protective effect on premarital relationships. There are conflicting evidences about the relationship between strictness of parental monitoring and controlling on premarital sex. A review showed a protective role for greater parental strictness in monitoring on initiation of sex[11, 38, 39] and a few even showed it as a risk factors [40]and many studies did not find any significant association[41, 42]. However, a recent study in India suggests a marginal association between strictness of parents control and premarital partnership[37]. This in fact challenges

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the common perception among parents that strict supervision of children may inhibit their formation of romantic or sexual relationships[37].

Disadvantages in personal traits or within the family seem to have a predictive effect on premarital friendships and sex such as low self-efficacy and poor family relationships and lack of a balanced parental control. This factor can be changed by programs designed to improve self-efficacy and the relationship within the family.

With regard to premarital penetrative sex, it seems that by including personal attitude in model 5, the influence of parents' attitude decreases and become insignificant. Hence compared to premarital friendship in which both personal attitude and parents' attitude are significant predictors, regarding penetrative sex, the influence of personal attitude become more prominent and parents' attitude loses its significance. This finding suggest that personal attitude are more responsible for involvement in premarital sexual intercourse than parents' attitude , while with regard to premarital friendship, parents' attitude is also important as well as personal attitude.

Because many of these factors affect each other and also affect behavior, a few of them have a large individual impact on the behavior. For instance parents' attitude affect personal attitude and it affects behavior. Parents control may affect teen's sexual norms and also opportunity to have sex and then affect sexual behavior or parents' controlling may affect pornography watching and pornography watching affect the propensity to have sex and sexual activity.

The results of multivariate analysis reflect that in general distal factors such as perception of peer behavior and norms have the greatest impact on both premarital friendship and penetrative sex (OR=1.47, OR=1.49, respectively). Other proximal factors such as personal attitude and pornography watching are also among factors with high influence. Family atmosphere and parents' attitude as distal factors do not significantly influence premarital penetrative sex after controlling of the influence of personal attitude (Model 5, Table 6).

**Limitation:**

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An important limitation of this study is that causality can not be well determined, because this is a cross sectional study and causality was not examined rigorously. Factors related to individuals and peers are likely to be affected by engagement of youth in sexual relationships. It means that, for instance, once an unmarried girl involves in premarital relationship and sex, she tends to associated with similar peers and it affects her perception of her peers' behavior. Even she may practice some of other risk taking behaviors such as drinking alcohol or pornography watching. However, factors related to their family seem to be unlikely influenced by their behavior. Although this is an important limitation, it can be tolerated because many of the predictors or antecedents are more distal and logically come prior the sexual behaviours. For example, characteristics of family and parents are more likely affect the teens' sexual behaviours than vice versa.

Another important limitation is that causal linkage can not be well understood from these finding. For instance, based on crude odds ratio, the mother education, father's income and type of university and discipline are predictors of premarital sexual intercourse, but it is not exactly clear causal associations and relationships. For instance whether educated mothers hold more liberal attitudes towards premarital sex or they have less supervision or time spent on their teens. Why students in private universities are more sexually experienced than those in government universities. Is that due to better father's income, poor academic performance, etc. Causation can be examined in another paper.

Another limitation of this study is the possibility for under reporting premarital relationships and sex. Despite all efforts made to maximize the anonymity and confidentiality, since premarital relationships, particularly sex for female compared to men in the Iranian traditional context is prohibited; there is always a risk that some girls have not reported their premarital relationship. However, this risk has been minimized using various tactics such as lie scale test to check the truthfulness of answers.

Another limitation of this study is related to the sample which has focused only on females. These results may not be applicable to young boys, particularly other studies have shown some gender based differences in predictors of premarital sexual relationships[37]. For instance, sexual norms and values of peers have a greater impact on girls' [Type text]

sexual behavior than boys[11]. These results might not be applicable to other groups of young peoples who are not college students or other female college students reside in other cities and provinces.

### **Program and policy implications**

Based on these results, interventions need to be designed at various levels to have the maximum effect. That means that enhancements of individual traits such as self-efficacy and family traits such as family relationships and atmosphere both together have greater impact on postponement of sexual relationships before marriage compared to focusing on only one dimension.

Regarding the role of pornography watching on premarital friendship it may be discussed that a greater interaction and communication with friends may cause more chances of unsupervised time and access to pornography. So there is not a single strategy to control pornography watching. It might be possible through a better monitoring or control over type of peers that associate with the young people. Hence there is no single strategy for changing this factor as a predictor.

Because liberal peers' and parents' norm predict premarital friendships and sex, this needs to be emphasized to interventions for parents. The choice of peers adolescent have is a factor that parents can impart some influences on that from the early stages of initiating friendships and assist their adolescent choose appropriate peer network. Moreover, the role of enhancing the relationship within the family both between parents and children and between couples and also practicing a balanced and appropriate supervision and control over adolescents needs to be emphasized in all interventional programs targeting parents.

Another study with mixed methods is recommended to be conducted among male college students and those out of university which explores men's motivations for premarital relationships and sex and their views towards virginity and the suitable bride as well as the predictors of such relationships.

### **Acknowledgement:**

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This study was carried out as a PhD dissertation in Centre for Population Studies, Department of Epidemiology and Population Health, London School of Hygiene and Tropical Medicine. A Grant by the Wellcome Trust was awarded for this thesis. During the fieldwork in 2005-6, this study was conducted based on Family Research Institute, under Shahid Beheshti University. The Authors would like to appreciate strong dedication and kind support of Dr Mazageri, Dr Pouretamad and Dr Zadeh Mohammadi affiliated in Family Research Institute of Shahid Beheshti University during the field work of the study.

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