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Longitudinal influences of friends and parents upon unprotected vaginal intercourse in adolescents

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Abstract

Background—Both friends and parents may influence occurrence of adolescent sexual intercourse, but these influences have not been studied together and prospectively.

Study Design—We conducted a longitudinal analysis of a nationally representative sample of adolescents aged 15 – 18 years (n=6,649), the National Longitudinal Study of Adolescent Health (Add Health). Baseline in-home and school interviews were conducted during 1995 and follow-up interviews in 1996. The main outcome measure was self-reported unprotected vaginal intercourse.

Results—In models which adjusted for age, race, parental attitudes towards contraception and pregnancy, and adolescent sexual intercourse practices at baseline, having a friend who engaged in sexual intercourse at baseline, either unprotected (OR 2.2, 95% CI 1.6, 3.2) or protected (OR 1.8, 95% CI 1.4, 2.4), increased the odds of unprotected intercourse vs. never intercourse in the adolescent at follow-up ($p<0.001$). A distant relationship with the father (OR 2.4, 95% CI 1.3, 4.3) vs. a close relationship at baseline also increased the odds of unprotected intercourse at follow-up compared to never intercourse ($p=0.028$). Parental attitudes were not associated with the outcome after consideration of the adolescent's attitudes and baseline sexual practices.

Conclusions—Having a friend who engages in sexual intercourse, unprotected or protected, increases risk of unprotected intercourse. Parental attitudes are less influential after consideration of adolescent baseline attitudes and sexual practices, suggesting that parental influences are strongest before 15 years of age. Our results suggest that early intervention among both parents and adolescents may decrease risk of unprotected intercourse.

Keywords

Epidemiology; adolescent; attitude; parent

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1. Introduction

In 2001, half of pregnancies in the United States were unintended. Among women aged under 24 years, greater than 75% of pregnancies were unintended [1]. The approximate time between onset of sexual activity in girls and medical services for contraception is roughly 1 year [2]. Acknowledging the important role that peers have in adolescence [3], interventions have engaged in peer-led programs to reduce unintended pregnancies in teenagers [4]. Unfortunately, these strategies have had limited success in delaying the initiation of sexual intercourse or improving birth control use [5].

The effectiveness of interventions might be improved by a better understanding of the influences of both parents and friends. Characterizing the associations between adolescent unprotected sexual intercourse and friends' behaviors, parental relationships, and parental attitudes is complicated by several issues. First, both friend and parental factors may influence adolescent sexual behaviors, but friend and parental factors have not been examined prospectively in the same study [6-13]. Second, the decision to engage in intercourse and the decision to use protection are not necessarily independent. For example, perceived parental approval of birth control has been suggested to increase probability of intercourse [10]. However, reports generally focus on intercourse and contraception as separate and independent behaviors [6,9,14-16] and do not take parental attitudes towards intercourse and contraception into account simultaneously. Therefore, in this report, we chose to focus upon unprotected intercourse as an outcome, rather than examining contraceptive use among adolescents who are already sexually active.

Third, adolescents may have similar sexual practices to their friends because they are influenced by their friends' behaviors. Alternatively, adolescents may also have similar practices because they associate with friends who are similar to themselves [17], described by the phrases "like associating with like" and "homophily" (homophily refers to the tendency for people to have (non-negative) ties with people who are similar to themselves in socially significant ways). It can be difficult to determine if similarity in adolescent-friend behaviors is due to homophily vs. the prospective influence of friends upon behaviors, particularly in cross-sectional studies. Finally, reports have often relied upon the adolescent's *reported perception* of their friends behavior, rather than actual behavior [18]. Quantifying the associations between friends' actual behaviors and adolescent behaviors can be methodologically challenging [18].

To address these gaps, we used a longitudinal, nationally representative sample to examine the impact of parents and friends upon adolescent sexual intercourse practices. The National Longitudinal Study of Adolescent Health, also known as Add Health, is a study designed to examine prospective influences upon young adult behaviors [19]. The survey interviewed both adolescents and friends regarding sexual behaviors, ascertained parental attitudes towards intercourse and contraception, and thus enabled measurement of influences in the adolescent social network.

Using data from Add Health, we sought to answer several questions. The first question was whether friends' sexual practices influenced future adolescent unprotected vaginal intercourse. The second question was whether parental factors influenced future adolescent unprotected vaginal intercourse, after consideration of peer behaviors. The final question was whether the influence of friend and parental factors upon future adolescent behavior persisted after consideration of adolescent's own baseline behaviors as well as attitudes.

2. Materials and methods

2.1. Study population

The characteristics of the Add Health study, a longitudinal nationally representative survey of U.S. students who were in grades 7-12 in 1995, have been previously described [19]. In 1995, the baseline survey consisted of an in-home interview of students ($n=20,745$) selected from 80 high schools and feeder schools. Participants were reinterviewed in 1996, approximately 9-18 months after baseline, with the exclusion of high school seniors; 14,738 adolescents participated in both the baseline and follow-up surveys. Of the 14,738 respondents, those who attended schools from which all students were selected to be interviewed were asked to nominate up to 5 male and 5 female friends ($n=2729$), and the remainder were asked to nominate 1 male and 1 female friend ($n=12,209$) during each survey wave. Romantic friends were distinguished from non-romantic friends and romantic relationships were not analyzed in this report. Previous analyses of Add Health have found that the number of out-of-school friend nominations was small, averaging less than one per participant, and the practices of out-of-school friends did not differ from in-school friends [9].

For the purposes of this report, we included 1) individuals who answered questions regarding sexual behavior, who were limited to adolescents ≥ 15 years of age at the baseline interview, and 2) individuals with at least one non-romantic friend who was also a participant in the study and therefore had direct interview information on sexual behavior. At baseline, this information was available for 6,649 individuals. At follow-up, this information was available for 3,899 individuals. As each individual could report more than one friendship, there were 14,159 adolescent-friend pairs at baseline and 7,973 adolescent-friend pairs at follow-up for whom information about intercourse and contraception was available. Of the original 14,159 adolescent-friend pairs, 3,049 adolescent-friend pairs persisted as friend pairs at follow-up.

2.2. Data collection

Questions that inquired after sexual behaviors were asked only of participants aged ≥ 15 years of age. For sensitive questions, participants listened to questions through earphones and directly entered their responses into a laptop computer in order to avoid interviewer biases. Baseline and follow-up surveys inquired after: most recent-reported sexual intercourse and contraceptive practices, contraceptive knowledge, attitudes towards pregnancy and contraception, self-efficacy for contraception, adolescent perceptions of parental attitudes towards sexual intercourse and contraception, and adolescent perceptions of closeness with each parent. Deidentified responses are available for public use and this study was declared exempt by the University of Michigan Institutional Review Board.

2.3. Measurements

Intercourse was assessed as ever engaging in vaginal intercourse vs. never engaging in vaginal intercourse. Contraception was assessed as any contraceptive use in the most recent episode of sexual intercourse, including condoms and other barrier methods and hormonal contraception; withdrawal was not as included as contraception. Intercourse and contraception use were defined as a categorical variable of unprotected intercourse vs. protected intercourse vs. no intercourse, i.e., never engaging in vaginal intercourse for both adolescents and their friends; friend sexual practices were obtained through direct interviewing of the friend rather than adolescent report of friend behavior.

Adolescent attitudes towards contraception were assessed through an unweighted average of a 5-point Likert scale of 7 items (Cronbach's $\alpha=0.81$), with higher scores indicating more

positive attitudes towards contraception (range 1-5) [14]. Contraceptive self-efficacy was assessed through an unweighted sum of a 5-point Likert scale of 3 items (Cronbach's $\alpha=0.61$), with higher scores indicating greater uncertainty regarding ability to use contraception (range 3-15) [20]. Adolescent contraception attitudes and self-efficacy were analyzed as continuous variables.

Attitudes towards pregnancy were summarized per previously published analyses and were assessed using a 5-item scale (Cronbach's $\alpha=0.72$) [14]. Participants were asked how strongly they agreed or disagreed with the following statements, "If you got pregnant: it would be embarrassing for your family; it would be embarrassing for you; you would have to decide whether or not to have the baby, and that would be stressful and difficult; you would be forced to grow up too fast; and getting pregnant at this time is one of the worst things that could happen to you." Participants who agreed with all 5 statements or strongly agreed with 4 statements and agreed with one were termed as having "anti-pregnancy" attitudes. Respondents who disagreed or strongly disagreed with at least 3 statements were termed as having "pro-pregnancy" attitudes, those who neither agreed nor disagreed with at least 2 statements were classified as being ambivalent, and remaining respondents were considered to have "mainstream" attitudes [14].

Adolescents were also asked, "How would your mother/father feel about your having sex at this time in your life?" Adolescents were also asked, "How would your mother/father feel about your using birth control at this time in your life?" There were a large number of missing responses regarding the father's attitude regarding intercourse, and for the purposes of further analysis, a single parental variable characterizing attitude towards intercourse was created where we used the attitude of the less favorable parent. Similarly, due to the missing data regarding the father's attitude towards contraception, we created a single variable characterizing parental attitude towards contraception using the attitude of the less favorable parent. Parental attitudes were characterized as negative, neutral, or positive.

Participants were also asked how close they were with their mother and father on a 5-point scale and responses were characterized as close, somewhat close, and not close.

2.4. Statistical analyses

In order to analyze the three-category outcome variable (adolescent unprotected vaginal intercourse, protected vaginal intercourse, and no intercourse) and to account for the repeated observations of a single adolescent in the dataset, we constructed a series of multivariable binomial regression models to determine the associations between factors of interest at baseline (friend and parental variables) with adolescent unprotected intercourse at follow-up. We created three sets of binomial models: unprotected intercourse vs. no intercourse, excluding adolescents engaging in protected intercourse; protected intercourse vs. no intercourse, excluding adolescents engaging in unprotected intercourse; and protected intercourse vs. unprotected intercourse, excluding adolescents who were not sexually active. For simplicity, we only illustrate the models comparing unprotected intercourse with the other categories.

All models adjusted for clustering upon any single individual in the event that a single adolescent reported several friends, with additional adjustment for age and race/ethnicity (Table 2). To determine if adolescents' own sexual practices and attitudes at follow-up might be mediators or confounders, additional models adjusted for adolescent sexual practices at baseline, adolescent attitudes towards pregnancy and contraception at follow-up, and whether the friendship persisted at follow-up (Table 3).

In sensitivity analyses, we also examined whether there was interaction between the relationship of the parent and the attitude of the parent upon adolescent unprotected intercourse, i.e., whether parental attitudes would have a stronger influence upon unprotected intercourse if an adolescent reported a closer relationship with a parent; interactions were not significant (results not shown) and were not included in the final models. Due to the small proportion of users of other methods of birth control aside from condoms, we did not engage in an analysis of type or method of contraception. Due to the relatively small number of participants who reported friendships that continued from baseline to follow-up, we were unable to stratify by the gender of the adolescents and their friends. Analyses were conducted using SAS software (SAS Institute, Inc., Cary, North Carolina), which accounted for the weighting used in the Add Health Survey; generalized estimating equations accounted for multiple observations of the same adolescent across examinations of multiple friendships. Observations with missing outcome or predictor variables are excluded from the analysis.

3. Results

Table 1 illustrates the characteristics of individual and friends in each of the waves. During the first survey, adolescents were approximately 15 years of age, and half of the sample was non-Hispanic white. Approximately 35% reported having a friend who had had sexual activity during the baseline and follow-up surveys; of note, friend reports of intercourse status had similar distribution because friends were also participants.

The majority of individuals reported being close with their mother and father during both surveys, although the proportion that reported closeness with their mother was higher. During both the baseline and follow-up survey, the majority of parents held negative attitudes towards adolescent intercourse. Parental attitudes towards contraception were more evenly distributed, with 34% of parents holding positive attitudes towards contraception at baseline and 36% holding positive attitudes at follow-up, with the proportion of parents with negative attitudes towards contraception decreasing between baseline and follow-up. Adolescent attitudes towards contraception were positive overall and adolescents were fairly confident in their ability to use contraception, and approximately half held mainstream attitudes towards pregnancy.

Table 2 presents the longitudinal binomial logistic regression models of the odds of adolescent unprotected intercourse at follow-up in association with parental and friend factors at baseline, with adjustment for whether the friendship persisted at follow-up. Having friends who engaged in either unprotected or protected intercourse at baseline was associated with increased odds of unprotected adolescent intercourse vs. no intercourse at follow-up (Table 2, Model 1). However, having sexually active friends did not significantly affect the odds of protected intercourse compared to unprotected intercourse (Table 2, Model 2).

Having a close relationship with the father was protective against any sexual activity, but relationship with the mother was not associated with sexual activity or contraception (Table 2, Model 1). Negative parental attitudes towards contraception were associated with a lower odds of unprotected adolescent intercourse and negative parental attitudes towards intercourse were associated with a lower odds of unprotected adolescent intercourse as well, although the latter association did not reach statistical significance (Table 2, Model 1).

In order to ascertain whether the influence of friends and/or parent factors at baseline upon adolescent sexual practices at follow-up was confounded or mediated through adolescent factors, we added adolescent factors to the models. Table 3 shows associations between

friend and parental variables with adolescent intercourse, after adjusting for the adolescents' own sexual practices at baseline, attitudes towards pregnancy and contraception at follow-up, and age, race, persistence of the friendship at follow-up. Having a friend who engaged in unprotected or protected intercourse at baseline still increased the odds of adolescent unprotected sexual activity at follow-up (Table 3, Model 1), and friend sexual practices were still not associated with protected vs. unprotected intercourse (Table 3, Model 2). Parental attitudes towards pregnancy and contraception were not associated with intercourse or the use of contraception (Table 3). However, closeness of the relationship with the father, but not the mother, was still associated with adolescent sexual activity at follow-up.

4. Discussion

As adolescents transition from a parent-oriented to a peer-oriented state, they enter a vulnerable period during which they can engage in risky behaviors without adequate precautions [3]. In this large, nationally-representative sample of adolescents in the U.S., we found that any sexual activity in friends, whether protected or unprotected, increased the odds of any vaginal intercourse in adolescents within the next 2 years. However, an adolescent's decision to use contraception was not associated with their friends' contraceptive practices.

We also found that parental attitudes were associated with adolescent sexual practices before consideration of adolescent factors. However, the association was no longer significant after consideration of the adolescents' sexual practices at baseline and attitudes at follow-up. This suggests that parental influences primarily were enacted, if at all, prior to the average baseline age of adolescents in the survey, i.e., 15 years of age.

Primary prevention strategies aimed at reducing unintended pregnancy have attempted to delay initiation of sexual intercourse or improve birth control use, often without success, and traditional abstinence programs may actually increase the risk of unintended pregnancy [5]. Such programs include interventions focusing on peer-led intervention [4] and less commonly upon parents [25]. Since we found that both peer and parental variables influence unprotected intercourse and potentially contraception, our results suggest that leveraging parental, peer, and adolescent attitudes might result in more effective strategies for unintended pregnancy prevention. Our results also suggest that parental variables might be mediated, in part, through adolescent behaviors that are present at age 15, so intervention at a younger age might leverage parental influences most successfully.

Our findings are in accord with previous studies that have found that friends and parents may each influence adolescent behaviors. However, previous studies conflict regarding the relative importance of friend and parental factors, and we are not aware of other studies that have examined their joint effects upon future unprotected intercourse. Moreover, previous reports examining the association between adolescent attitudes and intercourse have usually examined intercourse and contraception separately, by examining adolescent attitudes towards pregnancy with pregnancy incidence [24] or adolescent contraceptive attitudes and efficacy and contraception use [14,20].

Sieving et al. [9] found that initiation of any sexual intercourse in adolescents was associated with greater prevalence of sexual activity in friends. Parental factors were not considered and protected and unprotected intercourse were not distinguished from each other. In a cross-sectional analysis, Berenson et al. [6] found that discussions about condom use with friends and family were associated with greater odds of adolescent condom use. However, these associations were not significant for adolescent family planning in general. Another previous cross-sectional report also found that parent-adolescent discussions regarding

contraception increased adolescent condom use, but only when parents were rated highly regarding their comfort, openness, and skill by their children [21]. Parents who were rated lower had adolescent children who used contraception less frequently.

Independently, close relationships with fathers, although not with mothers, decreased the odds for being sexually active. This is consistent with other studies that have found that relationship satisfaction with parents were associated with adolescent sexual activity [22] and may reflect the quality of the communication between the adolescent and the parent [21]. We are not aware of comparisons of the relationship with the father and mother upon adolescent intercourse. Others have found that a household where both biological parents are present decreased the odds of engaging in any intercourse [9]. Thus, it is possible that having both parents in the household decreases the odds of intercourse by increasing closeness with each parent, or that closeness with the father is a proxy for other measures that might influence sexual activity, such as closer parental monitoring or socioeconomic status [23]. While previous studies have also found that adolescents with two parents living in the home tended to show more negative attitudes towards pregnancy than adolescents living only with their mothers [24], we found that the association between closeness with the father and sexual activity persisted after adjustment for adolescent attitudes. We may not have seen a greater influence of the close relationship with the mother because most adolescents reported close relationships with their mothers, and thus this comparison may have been underpowered.

Strengths of our analysis include the fact that we examined data from a community-based study that directly ascertained individual and friend sexual behavior along with individual attitudes in detail. We also distinguished unprotected sexual intercourse, a particularly high-risk behavior, from any intercourse, as opposed to contraception use only. Finally, we examined longitudinal, rather than cross-sectional, associations, and therefore control for the adolescent's own behavior at baseline. By reducing the influence of behaviors on the selection of friends, our results are more likely to represent the true effects of peers, rather than just associations.

Limitations of this analysis are the lack of information on friends who were not included in the Add Health sample, although the surveys suggest that this sample was relatively limited as Add Health was a school- and community-based sample and the majority of adolescents report friendships within their schools and community. We were unable to assess the influences of other potentially important significant others upon adolescent sexual behavior, including physicians, religious counselors, and media figures. We did not characterize sexual partners, i.e. whether the relationship was romantic and closeness with the adolescent. Therefore, it is possible that this modified the relationship between friend practices and parental beliefs with unprotected intercourse. We assessed parental attitudes towards intercourse and contraception via adolescent report, and these perceptions may have differed from actual parental attitudes. However, we would expect that parental attitudes would exert their influence upon teens through teen perceptions. Finally, our power for conducting gender-specific longitudinal analyses was limited.

Further studies are also needed to investigate how parents can be taught to frame contraceptive discussions in a manner that discourages intercourse but encourages protection if needed, and at what age such communications should occur.

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Table 1

Characteristics of participants at baseline and follow-up, means (standard deviations) or n (%)

Characteristics	Baseline	Follow-up
	n=6,649	n=3,899
Age (years)	15.7 (1.7)	16.3 (1.6)
Race/ethnicity		
Non-Hispanic white	3,514 (53)	2,143 (55)
African-American	1,170 (18)	668 (17)
Hispanic	1,073 (16)	573 (15)
Other	885 (13)	512 (13)
Status of intercourse		
No intercourse	4,128 (63)	2,315 (66)
Protected intercourse	1,646 (25)	861 (25)
Unprotected intercourse	806 (12)	339 (10)
Number of friendship ties	14,159	7,973
Perceived closeness to mother		
Not close	237 (4)	130 (3)
Somewhat close	591 (9)	410 (11)
Close	5764 (87)	3325 (86)
Perceived closeness to father		
Not close	710 (11)	302 (8)
Somewhat close	996 (16)	298 (8)
Close	4524 (73)	3074 (84)
Parental attitude towards intercourse		
Negative	5234 (84)	2989 (79)
Neutral	870 (14)	719 (19)
Positive	144 (2)	93 (2)
Parental attitude towards contraception		
Negative	3027 (49)	1626 (43)
Neutral	1094 (17)	810 (21)
Positive	2100 (34)	1351 (36)
Adolescent attitude towards pregnancy		
Anti-pregnancy	926 (19)	623 (16)
Pro-pregnancy	532 (11)	349 (9)
Ambivalent	751 (15)	639 (17)
Mainstream	2718 (55)	2211 (58)
Adolescent contraception self-efficacy (range 1-15)*	5.4 (2.5)	5.3 (2.4)
Adolescent attitude towards contraception (range 1-5)†	3.8 (0.8)	3.9 (0.8)

* Higher number indicates lower confidence in ability to use contraception.

† Higher number indicates more positive attitude towards contraception

Table 2

Associations between friend and parental variables at baseline with the odds of adolescent intercourse at follow-up, adjusting for age, race, and friendship status at follow-up

	Model 1 Odds ratio (95% confidence interval) for unprotected intercourse vs. no intercourse.		Model 2 Odds ratio (95% confidence interval) for protected intercourse vs. unprotected intercourse.	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Friends intercourse status (Reference = no intercourse)		<0.001		0.13
Unprotected intercourse	3.3 (2.6, 4.1)		0.78 (0.61, 0.98)	
Protected intercourse	2.6 (2.2, 3.2)		0.78 (0.64, 0.95)	
Closeness with mother (Reference = close)		0.71		0.78
Not close	1.1 (0.47, 2.8)		0.96 (0.42, 2.2)	
Somewhat close	1.3 (0.75, 2.1)		0.83 (0.50, 1.4)	
Closeness with father (Reference = close)		<0.001		0.43
Not close	2.2 (1.4, 3.5)		0.96 (0.61, 1.5)	
Somewhat close	2.1 (1.4, 3.1)		0.76 (0.51, 1.1)	
Parental attitude towards intercourse (Reference = positive attitude)		0.007		0.43
Negative	0.63 (0.24, 1.6)		1.8 (0.80, 4.0)	
Neutral	1.4 (0.49, 3.7)		1.8 (0.80, 4.3)	
Parental attitude towards contraception (Reference = positive attitude)		0.04		0.28
Negative	0.62 (0.43, 0.89)		0.79 (0.54, 1.2)	
Neutral	0.87 (0.57, 1.3)		0.72 (0.46, 1.1)	

Table 3

Associations between friend and parental variables at baseline with the odds of adolescent intercourse at follow-up, adjusting for age, race, and friendship status at follow-up, as well as the adolescent sexual practices at baseline and attitudes towards pregnancy and contraception at follow-up

	Model 1 Odds ratio (95% confidence interval) for unprotected intercourse vs. no intercourse.		Model 2 Odds ratio (95% confidence interval) for protected intercourse vs. unprotected intercourse.	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Friends intercourse status (Reference = no intercourse)		<0.001		0.22
Unprotected intercourse	2.2 (1.6, 3.2)		0.88 (0.67, 1.2)	
Protected intercourse	1.8 (1.4, 2.4)		0.82 (0.65, 1.0)	
Closeness with mother (Reference = close)		0.47		0.33
Not close	0.64 (0.23, 1.8)		1.1 (0.43, 3.0)	
Somewhat close	1.3 (0.67, 2.4)		0.65 (0.38, 1.1)	
Closeness with father (Reference = close)		0.028		0.14
Not close	2.4 (1.3, 4.3)		0.98 (0.60, 1.6)	
Somewhat close	1.6 (0.90, 3.0)		0.63 (0.41, 0.98)	
Parental attitude towards intercourse (Reference = positive attitude)		0.41		0.58
Negative	2.1 (0.63, 6.9)		1.4 (0.6, 3.3)	
Neutral	2.6 (0.67, 9.8)		1.6 (0.67, 3.8)	
Parental attitude towards contraception (Reference = positive attitude)		0.33		0.28
Negative	1.0 (0.61, 1.7)		0.85 (0.55, 1.3)	
Neutral	1.6 (0.84, 2.9)		0.67 (0.41, 1.1)	
Attitude towards pregnancy (Reference = mainstream)		0.15		0.10
Anti-pregnancy	0.81 (0.46, 1.4)		1.2 (0.72, 1.9)	
Pro-pregnancy	1.7 (0.79, 3.6)		0.65 (0.39, 1.1)	
Ambivalent	0.64 (0.36, 1.1)		1.4 (0.86, 2.4)	
Contraceptive self-efficacy*	0.99 (0.90, 1.1)	0.79	0.96 (0.89, 1.0)	0.24
Attitude towards contraception [†]	0.83 (0.61, 1.1)	0.24	1.4 (1.1, 1.8)	0.007

* Higher number indicates lower confidence in ability to use contraception.

[†] Higher number indicates more positive attitude towards contraception.