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Is Condom Use Habit Forming?

Condom Use at Sexual Debut and Subsequent Condom Use

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Objective: **The objective of this study was to assess whether using a condom at adolescent sexual debut is associated with an increased likelihood of subsequent condom use.**

Study Design: **A nationally representative sample was used, including 4024 sexually active adolescents (12–18 years) from the National Longitudinal Study of Adolescent Health. Logistic regression was used to model the association of condom use at sexual debut on condom use at most recent sex (mean interval, 23 months).**

Results: **Condom use at adolescent sexual debut was associated with a twofold increased likelihood of condom use during most recent sex (odds ratio, 2.28; 95% confidence interval, 1.91–2.73).**

Conclusions: **Among adolescents, early condom use is associated with an increased likelihood of subsequent condom use.**

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OVER 60% OF HIGH SCHOOL seniors in the United States have had sexual intercourse and one third of all high school students report sexual intercourse within the last 3 months.[1] Using a condom is one of the best methods for preventing the transmission of many sexually transmitted diseases (STDs), including chlamydia, gonorrhea, herpes simplex infection (HSV), and human immunodeficiency virus (HIV).[2–5] However, less than 60% of sexually active high school students report using condoms during last intercourse.[1]

Adolescents have the highest rate of STDs compared with all other age groups: 25% of the 15 million new cases of STDs diagnosed annually occur in teenagers.[6] At least 1 in 3 sexually active young people in the United States contract an STD by 24 years of age.[6] Adolescents are at highest risk for infection because they are more likely to be single, have multiple sex partners, engage in high-risk behavior, and have higher rates of failure with contraceptive methods.[6,7] Adolescent females are physiologically at higher risk for infection than older women because cervical ectopy is most common in young women and contributes to susceptibility of disease acquistion.[8]

Many safe-sex programs have been implemented that attempt to reduce the occurrence of unprotected sexual intercourse and its associated morbidities among teenagers. Some of these programs have successfully increased self-reported condom use and other forms of contraception among sexually active adolescents.[9–15] Nevertheless, it is not clear whether these programs are implemented early enough to instill the idea of regular condom use in the minds of adolescents before the onset of sexual activity.[16,17] This is particularly important because many young people are sexually active for months before seeking medical care for reproductive health, with as few as 40% of young women seeking health care for contraception within 12 months after sexual debut.[18]

Against this background, several studies of condom use in teenagers have found that adolescents reporting condom use during their most recent sexual experience frequently report having also used a condom at sexual debut.[19–22] The primary goal of this study is to assess whether the observed association between condom use at sexual debut and subsequent condom use is spurious, or if some adolescents get into the habit of using a condom from the onset of sexual activity. Acknowledging the potential for multiple and changing influences on condom use behavior over time, we explore the association in a nationally representative random sample of adolescents by adjusting for potentially confounding factors thought to influence condom use.

Our study is guided by a conceptual model of condom use that incorporates multiple independent factors previously shown to influence teenage condom use, including both stable traits and behaviors more proximate to sexual activity (Fig. 1). In addition to these factors, our model includes a direct effect of condom use at sexual debut on subsequent condom use. We theorize that when a teenager uses a condom at their sexual debut, the foundation for a habit of condom use is established. The logic is that for adolescents whose initial experience of sexual intercourse includes using a condom, condoms become a routine part of sex; we expect, therefore, that these adolescents will be more likely to regularly use condoms in their subsequent sexual encounters. By analogy, we consider the use of automobile seatbelts and bicycle helmets; we know that children trained to use these protective measures from day 1 are more likely to continue to use them over time, because for these children, helmets and seatbelts are an integral part of the experience of riding in a car or on a bicycle.[23,24] In contrast, adults asked to adopt these protective measures *after* they are already accustomed to riding without a seatbelt or helmet are slow to

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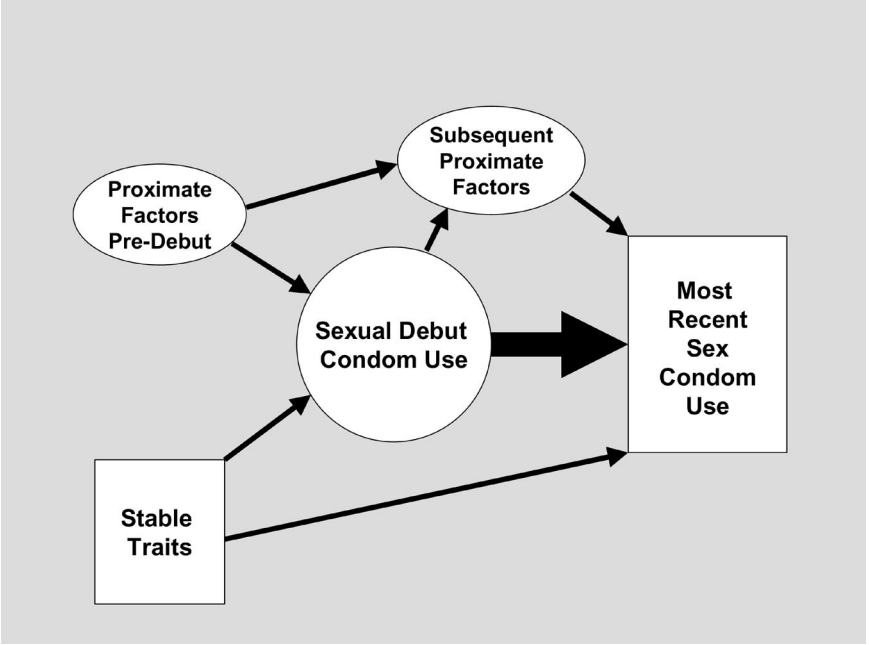

Fig. 1. A conceptual model of condom use.

change their behavior, and often fail to do so unless formal sanctions are in place.[25,26] Based on this theory of habit formation, we hypothesize that although some of the observed association between condom use at sexual debut and subsequent condom use reflects selection effects, a strong direct effect will persist in models that include appropriate confounding factors.

Materials and Methods

Data

We used data from wave 1 of the National Longitudinal Study of Adolescent Health (Add Health). Add Health is a stratified nationally representative sample of adolescents attending high school in the United States. Between September 1994 and April 1995, more than 90,000 students in grades 7 to 12 who attended 1 of 143 sampled schools completed a self-administered, in-school questionnaire. These respondents were then stratified by grade and gender and sampled to generate a core sample of approximately 12,000 adolescents for the in-home phase of the study; in addition, Add Health oversampled various minority groups. A total of 20,745 adolescents completed the in-home questionnaires between April and December 1995. Weighting of the full sample ensures a nationally representative sample of 7th to 12th graders in the United States.

Topics covered by the in-home interview included health status, nutrition, peer networks, decision-making processes, family composition and dynamics, educational aspirations and expectations, employment experience, romantic partnerships, sexual partnerships, substance use, and criminal activities. Interviewers used laptop computers to record answers for the in-home questionnaires, with audio-CASI (audio-computer-assisted self-interview) used for sensitive topics to ensure confidentiality and to minimize parental and interviewer influence. All study participants provided informed consent. Details of the sample design and methodology are available at www.cpc.unc.edu/addhealth/design.

Sample

Our primary analysis sample was restricted to the 4024 adolescents 12 to 18 years old who reported having sexual intercourse, defined as vaginal intercourse, at least twice and with a minimum of 30 days separating the date of first intercourse from that of most recent intercourse. We required this interval of at least 1 month between encounters to avoid scenarios in which the first and last intercourse occurred proximately (ie, during the same date). We also constructed a subsample of respondents ($n = 698$) for whom we were able to match data describing their first and most recent sexual partner.

Analysis Strategy

We began by estimating the direct effect of self-reported condom use at first sex on self-reported condom use at most recent sex in our primary sample. Then we reestimated this effect, controlling for a broad set of potentially confounding factors. We followed a similar strategy for our partnership sample, including characteristics of the partnerships. All models were estimated using logistic regression and corrected for Add Health's sample design by using STATA's survey routine.

Confounding Factors

Our adjusted models include potential confounders previously reported to influence the likelihood of condom use among adolescents. We distinguish between relevant personal and demographic characteristics that are stable over time and proximate behaviors associated with particular sexual experiences. Stable factors are included to distinguish those adolescents who are predisposed to use condoms from those who are less likely to use condoms, net of other factors. Because the proximate factors are time-varying and dependent on the individual's experience, they could be present (or absent) at sexual debut and absent (or present) at most recent sex. Among stable traits, we considered gender, race,[22,27–30] intelligence, and socioeconomic status. Proximate factors include age,[29,31–35] risk-taking behaviors,[27,34,36–38] depressive symp-

TABLE 1. Characteristics of Sexually Active Adolescents In Main Sample (N = 4024) and Partnership Subsample (N = 698)

Characteristic	Main Sample Mean ± Standard Error (range)	Partnership Subsample Mean ± Standard Error (range)
Female	.53 ± .01	.66 ± .03*
Age, years	16.7 ± .03 (12–18)	16.7 ± .06 (12–18)
Race		
White	.66 ± .04	.79 ± .03*
Black	.21 ± .03	.10 ± .02
Hispanic	.09 ± .02	.08 ± .02
Asian	.02 ± .01	.02 ± .01
Native American	.01 ± .00	0
Other	.01 ± .00	.02 ± .01
Socioeconomic status	5.6 ± .12	6.32 ± .20
IQ	101.6 ± .58	106.27 ± .81
Sex education	.86 ± .01	.88 ± .02
Characteristics of sexual activity		
Age at sexual debut (years)	14.4 ± .07	15.6 ± .09*
Age at most recent sex (years)	16.4 ± .03	16.6 ± .07*
Condom use at sexual debut	.62 ± .01	.70 ± .02*
Condom use at most recent sex	.57 ± .01	.57 ± .03
Oral contraceptive use at most recent sex	.22 ± .01	.31 ± .03*
Duration between sexual debut and most recent sex (months)	23.2 ± .68 (1–97)	11.5 ± .68*
History of ever diagnosis of sexually transmitted disease	.08 ± .01	.05 ± .01*
Risk-taking behavior		
Drunk or high at most recent sex	.10 ± .01	.05 ± .01*
Risk-taking scale	1.10 ± .03 (0–3.8)	.94 ± .03*
Attitude		
Pregnancy now is bad (1–5)	4.17 ± .03	4.30 ± .06
If HIV+ = will suffer (1–5)	4.43 ± .02	4.49 ± .05
Negative feelings scale	0.57 ± .01 (0–2.42)	0.53 ± .02
Perceived risk		
General risk of getting AIDS (1–5)	2.09 ± .02	1.99 ± .05*
General risk of getting STDs (1–5)	2.01 ± .02	1.97 ± .05
Risk of AIDS if unprotected sex (1–5)	3.36 ± .03	3.25 ± .06
Risk of pregnancy if unprotected sex (1–5)	3.19 ± .02	3.35 ± .05*
Self-efficacy		
With partner and birth control (1–5)	4.25 ± .02	4.35 ± .05
Motivation for birth control (1–5)	3.92 ± .02 (1.38–5)	4.11 ± .04*
Maternal approval of birth control (1–5)	3.79 ± .04	3.87 ± .07

*$P < 0.01$.

toms,[39] attitudes and perceived risk of infection and pregnancy,[35,38,40,41] self-efficacy,[29,42] parental support of birth control,[7,20,30,32,35] and partnership characteristics.[30,31,33,35,40,43,44]

Results

Sample Descriptives

Slightly more than half of the adolescents in our primary sample were female (53%) and the average age was 16.5 years (range, 12–18 years). Adolescents self-identified as white (65%), black (22%), Hispanic (9%), Asian (2%), Native American (1%), or other (1%). The population had a mean family socioeconomic status score of 5.6 (range, 0–10) and a mean intelligence score of 101.6 (range, 13–146) as measured by the standardized Add Health Picture Vocabulary Test. The majority (86%) reported having received some type of sexual education (information on pregnancy or AIDS) in school. Additional descriptive data are reported in Table 1.

As shown in Table 1, the partnership subsample sample differs from the main study sample in several important ways. In general, we were only able to match partnership data for respondents who had fewer sex partners and had been sexually active for a relatively short period of time. Thus, the subsample is more likely to be female, white, older at sexual debut and at most recent sex, and more likely to report using a condom at sexual debut. They also report a shorter time interval between first and most recent sex, more often report using oral contraceptives at most recent sex, and more often report feeling at risk for pregnancy and increased personal motivation to use birth control. The subsample is less likely to report a history of STD, risk-taking behavior, being drunk or high at most recent sex, negative feelings, and perceived chance of acquiring AIDS.

Multivariate Logistic Regression Model of Main Sample

Table 2 reports odds ratios (OR) from 2 models that regress condom use at most recent sex on selected independent variables. Model 1 reports the direct unadjusted effect of using a condom at sexual debut on the probability of using a condom at most recent sex; consistent with other studies, we find that using a condom at sexual debut was associated with a substantially increased odds of using a condom at most recent sex (OR, 2.60; 95% confidence interval [CI], 2.16–3.11). Model 2 estimates

TABLE 2. Logistic Regression Models of Predictors of Condom Use at Most Recent Sex With Main Sample (N = 4024)

	Odds Ratio (95% confidence interval)
Model 1 (unadjusted)	
Condom use at sexual debut	2.60 (2.16–3.11)*
Model 2 (multivariate adjusted)	
Condom use at sexual debut	2.28 (1.91–2.73)*
Stable traits	
Female	.40 (0.31–0.52)*
White	.77 (0.62–0.95)*
IQ	1.00 (.99–1.01)
Socioeconomic	.99 (.95–1.03)
Sex education in school	1.11 (.88–1.40)
Characteristics of sexual activity	
Age at sexual debut	.90 (.74–1.08)
Age at most recent sex	.96 (.79–1.18)
Time between debut and recent sex	.99 (.97–1.01)
Oral contraceptive use at most recent sex	.98 (.75–1.29)
History of ever diagnosis of sexually transmitted disease	1.01 (.67–1.54)
Proximate factors	
Risk-taking behavior	
Drunk or high at most recent sex	.74 (.57–.96)*
Risk-taking scale	.90 (.80–1.01)
Attitudes	
Pregnancy now is bad	1.18 (1.08–1.29)*
If HIV+ = will suffer	.93 (.82–1.04)
Negative feelings scale	.92 (.71–1.20)
Perceived risk	
General risk of getting AIDS	.93 (.84–1.04)
General risk of getting sexually transmitted diseases	1.08 (.95–1.25)
Risk of AIDS if unprotected sex	1.05 (.96–1.15)
Risk of pregnancy if unprotected sex	1.08 (.98–1.19)
Self-efficacy	
With partner and birth control	1.32 (1.15–1.52)*
Motivation for birth control	1.44 (1.20–1.73)*
Maternal approval of birth control	.95 (.90–1.01)

*$P < 0.01$.

the adjusted effect; in this model, the odds ratio associated with using a condom at sexual debut was only slightly reduced (OR, 2.28; 95% CI, 1.91–2.73). The adjusted model also shows that being female, white, and drunk or high at most recent sex all decrease the likelihood of using a condom at most recent sex, whereas concern about unplanned pregnancy, high self-efficacy regarding birth control negotiation, and high personal motivation to use birth control all increase the likelihood of using a condom at most recent intercourse (Table 2).

Multivariate Logistic Regression Model of Partnership Subsample

For the subsample of adolescents for whom we identified partners, the adjusted model included the variables used in our analyses of the main sample, as well as measures of the age difference between partners at sexual debut and at most recent intercourse, duration of relationships before sexual debut and most recent intercourse, and whether the encounter was with the same partner at sexual debut and most recent sex (see Table 1 for descriptives). Table 3 reports the results of models estimated on our partnership subsample. The findings from these analyses are similar to those from the main sample. The raw odds ratio for condom use at first sex and most recent sex in the bivariate model was 2.25 (95% CI, 1.46–3.46), and this remained relatively unchanged after adjusting for confounders, including the partnership characteristics (OR, 2.18; 95% CI, 1.33–3.56). When controlling for condom use at sexual debut and other potentially influential factors, none of the partnership variables had a significant effect on the probability of using a condom at most recent sex.

Discussion

This study examined the association between condom use at sexual debut and subsequent condom use. We found that condom use at sexual debut increased the likelihood of condom use at most recent sex, and that this effect was largely independent of the influence of stable demographic and personal characteristics and proximate attitudinal, behavioral, and relationship factors. This finding is consistent with the idea that early condom use could help establish a pattern of condom use that carries forward to subsequent sexual activity.

As previously reported in the literature, we also find that having high self-efficacy in terms of birth control negotiation with a partner, personal motivation to use birth control, and concern about unplanned pregnancy all increase a teenager's ability to plan for and execute safe sexual practices.[29,35,38,40–42]

Our finding that being drunk or high at most recent sex decreases the likelihood of condom use is consistent with some other studies showing that being under the influence of inhibition-lowering substances such as alcohol or other illicit drugs affects judgment, decision-making, and planning and for the inexperienced adolescent likely has a negative impact on condom use.[37,38]

TABLE 3. Logistic Regression Models of Condom Use at Most Recent Sex With Partner Subsample (N = 698)

	Odds Ratio (95% confidence interval)
Model 1 (unadjusted)	
Condom use at sexual debut	2.25 (1.46–3.46)*
Model 2 (multivariate adjusted)	
Condom use at sexual debut	2.18 (1.33–3.56)*
Stable traits	
Female	.39 (.19–.80)*
White	.78 (.45–1.36)
IQ	.99 (.97–1.01)
Socioeconomic status	.96 (.86–1.07)
Sex education in school	2.09 (1.04–4.21)*
Characteristics of sexual activity	
Age at sexual debut	.80 (.48–1.34)
Age at most recent sex	1.12 (.66–1.90)
Time between debut and recent sex	.97 (.89–1.05)
Oral contraceptive use at most recent sex	.51 (.30–.86)*
History of ever diagnosis of sexually transmitted disease	1.49 (.49–4.53)
Proximate factors	
Risk-taking behavior	
Drunk or high at most recent sex	.56 (.22–1.44)
Risk-taking scale	1.04 (.74–1.46)
Attitudes	
Pregnancy now is bad	1.39 (1.10–1.76)*
If HIV+ = will suffer	.65 (.49–.88)*
Negative feelings scale	.65 (.30–1.42)
Perceived risk	
General risk of getting AIDS	.88 (.64–1.23)
General risk of getting sexually transmitted diseases	1.08 (.78–1.49)
Risk of AIDS if unprotected sex	1.10 (.88–1.38)
Risk of pregnancy if unprotected sex	.78 (.59–1.03)
Self-efficacy	
With partner and birth control	1.33 (.94–1.88)
Motivation for birth control	2.16 (1.26–3.71)*
Maternal approval of birth control	.88 (.73–1.07)
Partnership characteristics	
Partner age difference	
At sexual debut	1.06 (.80–1.40)
At most recent sex	.94 (.71–1.24)
Duration of relationship	
Before sexual debut	1.02 (.94–1.10)
Before most recent sex	1.00 (.93–1.07)
Same partner at sexual debut and most recent sex	1.19 (.41–3.45)

*$P < 0.01$.

Whites have been found to use condoms less often than blacks,[22,27–30] which could reflect lower perceived risk, decreased parental communication about sexuality, or decreased education about and promotion of safe-sex practices. Adolescent females frequently report lower rates of condom use compared with their male counterparts.[27–30] This could reflect who their partners are, because teenage females often have partners many years older and these partners might not be included in adolescent study samples. Contrary to previous reports in the literature, we find little evidence that partnership characteristics influence the mean level of condom use at most recent sex, although this could be the result of complex within-partnership dynamics not well captured in our data.

This study has several limitations. First, the data concerning sexual activity, partnership characteristics, and condom use are provided by self-report and could include measurement error resulting from social desirability effects or concern about confidentiality from interviewer, parents, or peers. Second, our data on condom use are collected retrospectively and could contain recall error. Third, the subsample for which we have data on partnerships is a selective sample that differs in several respects from the main study sample. Finally, our model could be misspecified. Data limitations prevent us from precisely linking the timing of attitudes and behaviors to the first or most recent sexual encounter; more significantly, other unmeasured confounders could be associated with condom use generally, which could further reduce the magnitude of the direct effect. For example, we do not have data on condom availability, which could influence use patterns, and our information on family influence on condom use is limited to maternal approval of birth control as reported by the adolescent for which we found little influence on condom use in our study population despite previous reports in the literature to the opposite.[20]

However, our study has several advantages over previous studies of condom use among adolescents.[19–22] We use a large and nationally representative sample of adolescents; the data were collected by A-CASI, which some studies have shown to elicit more data about sensitive topics (eg, sexual behaviors) when

compared with data elicited through face-to-face interviews or self-administered questionnaires[45–47]; and we use precise measurement of condom use during particular sexual encounters rather than vague measures of use (eg, in the past 3 months, past 6 months, or more than 50% lifetime condom use).[20–22] Most significantly, we directly test the association of condom use at sexual debut with condom use at most recent sex by controlling for a multitude of potentially influential factors, allowing more accurate estimation of the magnitude of this effect.

This study contributes to our understanding of the dynamics of condom use among adolescents and has several important implications for public health. Our robust finding that using a condom at sexual debut doubles the odds of condom use at most recent sex, controlling for other factors, highlights the importance of early and comprehensive sexual education before the onset of sexual debut to develop safe sexual habits among all adolescents. There could indeed be a narrow window of opportunity, before sexual debut, during which it is crucial to provide adolescents with the knowledge and motivation to protect themselves and their partners. Specifically, these programs should provide adolescents with skills that will encourage them to use condoms from their very first sexual experience, because this could increase the likelihood that condom use becomes expected and routine for them over the long-term. At the societal level, educating adolescents before they become sexually active could have long-term benefits for preventing the significant morbidity and mortality associated with unplanned teen pregnancy and STD/HIV infection, reducing the associated social burden and economic costs.

New interventions should then be directed toward adolescents who are not yet sexually active and have not yet established their own patterns of sexual behavior. Exposing sexually inactive adolescents to abstinence-only messages could be particularly counterproductive for the subsequent development of healthy sexual practices. Because STDs and unplanned pregnancy are hyperendemic among U.S. teenagers, perhaps condom use promotion campaigns can borrow strategies from efforts to promote general hygiene in children (eg, daily teeth brushing) and injury prevention (eg, automobile seatbelt and bicycle helmet use).

Further research is needed to explore the lasting influence of condom use at sexual debut on subsequent use. We need improved conceptualization and measurement of factors that predispose some adolescents to use condoms to better assess possible selection effects. We also need to know more about the dynamics of adolescent sexual partnerships and the pattern of condom use within different relationship types. Most importantly, we need to understand how to encourage adolescents who have not yet become condom users to adopt this important practice. We recommend a comprehensive cost-effective sexual education intervention that is appealing to adolescents, nonthreatening to society, and yet oriented toward developing skills that will ensure the development of long-lasting healthy habits in our teenagers.

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