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Changes in Women's Condom Use over the First Year of College

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Abstract

Most college students are sexually active, engage in serially monogamous relationships, and use condoms inconsistently. Little is known about how condom use changes during college and even less about variables predicting changes in use. We used latent growth modeling (LGM) to examine changes in condom use during the first year of college among 279 women ($M_{age} = 18.0$, 74% White) who provided monthly reports on condom use frequency. At study entry, participants also reported on theoretically-suggested risk and protective factors. We examined predictors of changes in use after controlling for use of alternative contraception and partner type. LGMs showed that women decreased their condom use during the first year of college. Levels of condom use were lower initially among women with strong alcohol-sexual risk expectancies, women with more previous sexual partners, women who did not smoke marijuana, and African-American women. Decreases in condom use were greater among women with lower GPAs, women from lower SES families, and women who engaged in binge drinking. Reductions in condom use may place women at greater risk of unplanned pregnancy and sexually transmitted infections. Identification of factors associated with decreases in condom use will enable targeted educational and intervention efforts.

Condom use is an important method for reducing the risk of unplanned pregnancy and sexually transmitted disease (STD) transmission (CDC, 2010). However, most young people use condoms inconsistently, or not at all (Lewis, Malow, & Ireland, 1997). According to the CDC (2002), less than one third of young adults use condoms consistently. Additionally, young people are less likely to use condoms in the context of romantic relationships (Hammer, Fisher, Fitzgerald, & Fisher, 1996), even when they are unaware of their partners' level of risk. Although research has examined predictors of safer sex behavior (Sheeran, Abraham, & Orbell, 1999), we know little about how condom use changes over time during college or variables that predict changes in use. To address these gaps in the literature, we collected monthly condom use data with two aims: (a) to describe changes in condom use across the first year of college and (b) to identify variables that predicted change.

Changes in Condom Use During Late Adolescence and Early Adulthood

Few studies have examined longitudinal changes in condom use. Studies have suggested, however, that condom use both declines within relationships and becomes lower with succeeding relationships (Ku, Sonenstein, & Pleck, 1994), at least for young men. Additionally, research has found that decreases in condom use with age are steeper among women than among men (Elkington, Bauermeister, & Zimmerman, 2010). One study found that condom non-use increased among adolescent women (ages 14–17) over 27 months (Sayegh, Fortenberry, Shew, & Orr, 2006). Two studies focusing on young men found decreases in condom use between adolescence and young adulthood. These studies showed that the proportion of unprotected sex acts increased from 25% (ages 15–19) to 60% (ages 21–26; Dariotis et al., 2008), and that decreases in condom use occurred for men regardless of the age at which they initiated intercourse (Capaldi, Stoolmiller, Clark, & Owen, 2002). Decreases in condom use with age have been hypothesized to be the result of increasing access to contraception (Sayegh et al., 2006) or to the formation of more stable, monogamous sexual relationships in late adolescence and young adulthood (Dariotis et al., 2008).

To our knowledge, no studies have focused specifically on changes occurring during the college years. College represents a new social context for young people, one that provides increased access to potential sexual partners, and thus is an interesting period during which to investigate changes in sexual risk behavior. Studies have shown that sexual activity may increase in college (Cooper, 2002; Siegel, Klein, & Roghmann, 1999), with many students engaging in intercourse with multiple partners (Siegel et al., 1999). Additionally, behaviors associated with high HIV and STI risk, such as serial monogamy, low frequency of condom use, and binge drinking, are prevalent in college populations (Brigham et al., 2002).

Predictors of Condom Use

Few studies have looked specifically at predictors of *changes* in condom use over time, but researchers have identified a number of factors that predict use in general. Problem Behavior Theory (Jessor, Donovan, & Costa, 1991; Jessor & Jessor, 1977) suggests that there are organized patterns of risk behavior among young people, such that problem behaviors such as alcohol use, cigarette smoking, and marijuana use covary with sexual risk taking. Substance use and sexual risk behavior are believed to serve common functions, such as asserting independence from parents (Jessor et al., 1991). Numerous studies have found support for this “problem behavior syndrome” (Ary, Duncan, Duncan, & Hops, 1999; Fergusson, Horwood, & Lynskey, 1994). Research has also suggested that certain demographic and family characteristics, including academic achievement, religiosity, and socioeconomic status (SES), may serve a protective function against risk taking (Costa, Jessor, & Turbin, 1999; Jessor, Van Den Bos, Vanderryn, Costa, & Turbin, 1995; Lammers, Ireland, Resnick, & Blum, 2000). In line with Problem Behavior Theory, we examined other risk behaviors, including substance use and number of sexual partners, and protective factors, including academic achievement, SES, and religiosity, as predictors of condom use during the first year of college. We also considered ethnicity, partner type, and use of alternative contraception as control variables.

Protective factors

Research has suggested that those from higher socioeconomic status groups (Abma, 2003) and those with higher high school grade point averages (GPAs; Bailey, Fleming, Henson, Catalano, & Haggerty, 2008) are more likely to use condoms. Although theory has commonly regarded religiosity as a protective factor against sexual activity in general (Schroder, Carey, & Vanable, 2003; Zaleski & Schiaffino, 2000), findings related to

religiosity and condom use are mixed, with some studies finding a positive association between the two (McCree, Wingood, DiClemente, Davies, & Harrington, 2003), some finding a negative association (Zaleski & Schiaffino, 2000), and some finding no association (Dunne, Edwards, Lucke, Donald, & Raphael, 1994).

Risk factor: Substance use

Findings related to alcohol use and condom use have been mixed, with many studies failing to find strong associations (Cooper, 2002; Leigh, 2002). However, some cross-sectional and event-level studies have found that alcohol use may decrease condom use under certain circumstances (Abbey, Parkhill, Buck, & Saenz, 2007; LaBrie, Earleywine, Schiffman, Pedersen, & Marriot, 2005). Even though evidence for a relationship between alcohol use and condom use has been mixed, consistent associations are found between alcohol-sex expectancies and condom use. Alcohol-sex expectancies are beliefs about alcohol's effects on sexual behavior, including beliefs that alcohol makes people less likely to use condoms during sex (LaBrie et al., 2005). Studies have found that those who perceive alcohol as leading to risky sexual behavior are less likely to use condoms (Corbin & Fromme, 2002; LaBrie et al., 2005; LaBrie, Schiffman, & Earleywine, 2002).

Most of the research on substance-related determinants of condom use has focused specifically on alcohol use or on composite measures of substance use. However, some studies have found that marijuana use is also associated with reduced condom use (Guo et al., 2002; Yan, Chiu, Stoesen, & Wang, 2007). Research has also associated cigarette smoking with higher levels of risky sexual behavior (Duncan, Strycker, & Duncan, 1999), although a conflicting study suggested that smoking in adolescence may be positively associated with consistent condom use in young adulthood (Guo et al., 2002).

Risk factor: Sexual history

Individuals who initiate intercourse earlier are likely to have more partners and to use condoms less frequently (Coker et al., 1994). Research with high school and college samples has also found that those reporting more sexual partners are less consistent in their use of condoms than those reporting fewer (Desiderato & Crawford, 1995; Richter, Valois, McKeown, & Vincent, 1993), although this finding is not consistent across all studies (Hébert, Bernard, De Man, & Farrar, 1989).

Control variables: Partner type and relationship length

Individuals in close sexual relationships are less likely to use condoms than those in more casual relationships (Misovich, Fisher, & Fisher, 1997; Noar, Zimmerman, & Atwood, 2004). This difference has been attributed to risk perceptions, because individuals in monogamous relationships may see their partners as posing little risk (Civic, 2000; Overby & Kegeles, 1994). Research has suggested that couples use condoms initially, but at some point decide that condoms are no longer necessary (Corbin & Fromme, 2002; Fortenberry, Tu, Harezlak, Katz, & Orr, 2002; Ku et al., 1994). One longitudinal study found that adult women ($M_{age} = 31$) with less involved or committed relationships were 11 times as likely as those in committed relationships to maintain safer sex behavior over a 3-month period (Morrill, Ickovics, Golubchikov, Beren, & Rodin, 1996). Thus, we controlled for having casual partners and length of time in the relationship in models predicting condom use.

Control variable: Alternative contraception use

Use of hormonal contraception is one of the strongest predictors of condom use, with those who use hormonal contraception being less likely to use condoms (Cooper, Agocha, & Powers, 1999; Zimmerman et al., 2007). As romantic relationships progress, hormonal

contraception may replace condoms (Civic, 2000; Hammer et al., 1996; Ku et al., 1994). Thus, we chose to control for the use of hormonal contraception in predictive models.

Control variable: Race/ethnicity

Because prior research has suggested that there are racial/ethnic differences in condom use, we controlled for ethnicity here. These studies have suggested that African Americans are more likely than those in other racial/ethnic groups to use condoms (Abma, 2003; Grunbaum et al., 2002). Research on other racial/ethnic groups has yielded inconsistent findings (Hou & Basen-Engquist, 1997; Lee & Rotheram-Borus, 2009).

Research Questions

The current study aimed to answer two primary research questions. First, does the frequency of women's condom use change over the first year of college? Of the few studies that have examined changes in condom use over time, the majority have included only men. Based on empirical precedent from these studies, we predicted a gradual decline in use as women continued in or formed relationships, became more comfortable in these relationships, and perceived less risk. We expected this decline to be strongest in the context of romantic relationships. Second, what factors predict initial levels of and changes in condom use? With exploratory analyses, we investigated a variety of predictors suggested by the literature, including the potential protective factors of GPA, SES, and religiosity and the potential risk factors of substance use and sexual history.

Method

Participants

Participants were first-year female college students at a Northeastern university ($N = 483$) who participated in a larger, year-long study. The parent study explored a variety of health behaviors (e.g., substance use, exercise, sleep) as well as sexual behavior and psychosocial adjustment. Women included in the current study ($N = 279$, $M_{age} = 18.0$, $SD_{age} = 0.21$) reported vaginal intercourse with a romantic or casual partner during at least one month between September and May and constituted 58% of the total sample. Of women included in the current study, most were Caucasian (74%); other self-identified racial/ethnic identities included Asian (8%), African American (12%), and other (10%); 10% identified as Latina. The ethnic distribution of the sample was representative of the incoming first-year female students at the university in Fall 2009. Participants completed an average of 8.29 assessments (out of 9) between October and June ($SD = 1.54$); 71% of participants completed all nine assessments.

Procedures

This research was approved by the university's Institutional Review Board. The majority of participants were recruited via a mass mailing sent to incoming first-year female students. Campus fliers, word of mouth, and the psychology department subject pool were also used to bolster recruitment; women responding to these methods were screened to ensure eligibility. Interested students attended an orientation session, after which they provided informed consent and completed the initial survey. Subsequently, participants completed monthly online assessments for one year; surveys were completed during the first week of each month reporting on the previous month. For each survey, participants received \$10 to \$20, depending on its length.

Measures: Condom Use

The target behavior, condom use, was reported at the beginning of each month from October to June; women reported their frequency of condom use with romantic partners and with casual partners in the previous month (September to May) on a scale from 1 (“never”) to 5 (“always”). For analyses examining overall condom use, reports for romantic and casual partners were averaged when both were provided and used independently when women reported only one type of partner.

Measures: Covariates

Alternative contraception use—During each month that they reported sexual intercourse, participants also reported whether they had used each of 10 forms of birth control (e.g., male condom, withdrawal, nothing, injectable hormone). If participants reported use of the birth control pill, the patch, a vaginal ring, an injectable hormone, or an intrauterine device (IUD), they were coded as having used an alternative, reliable form of contraception (0 = no, 1 = yes).

Partner type—Participants reported on their condom use with both romantic and casual partners. For each month, participants were coded based on whether they reported any casual partners (0 = no, 1 = yes).

Relationship length—Each month that participants reported involvement with a romantic partner, they also reported the length of their relationship in months. These variables were highly positively skewed and were normalized using natural log transformations.

Race/ethnicity—Participants self-reported their race/ethnicity. Dummy variables were created indicating identification as African American, Asian, and Latina.

Measures: Predictors

Predictors of condom use were assessed in September.

Protective factors—Participants self-reported their *high school GPA* (on a 4-point scale). Participants also reported to what extent they considered themselves religious (from “not religious” to “very religious”) and their frequency of attending religious services (from “never” to “more than once a week”). These items were averaged, with higher scores indicating greater *religiosity* ($\alpha = .80$). Finally, participants reported on their mother’s and father’s highest level of education, from 1 (“some high school or less”) to 6 (“graduate or professional school after college”), as an indicator of *SES*. For participants reporting on two parents, these reports were averaged ($\alpha = .77$).

Risk factors—Women reported whether they had *smoked marijuana* and engaged in *binge drinking* (4 or more drinks on one occasion) during the month prior to college entry (August). They also reported on whether they had *smoked cigarettes* in the month prior to college entry; if they had, they reported the number of cigarettes they smoked each day in a typical week during that month. These daily reports were averaged, and women who reported smoking 1 or more cigarettes per day on average were classified as smokers. *Alcohol-sexual risk expectancies* were assessed using 3 items from the sexual risk subscale of Dermen and Cooper’s (1994) measure of sex-related alcohol expectancies. Participants reported their level of agreement with statements related to practicing safer sex after drinking (e.g., “After a few drinks of alcohol, I am less likely to use birth control”) on a scale from 1 (“strongly disagree”) to 6 (“strongly agree”). Items were averaged, with higher scores indicating stronger expectancies that alcohol consumption leads to unsafe sex ($\alpha = .$

86). Women reported the *number of partners* they had engaged in vaginal intercourse with prior to college. This variable was highly positively skewed and was normalized with a natural log transformation.

Data Management and Analysis

All variables were examined for univariate and multivariate outliers by inspecting box plots and examining Mahalanobis distance. Univariate outliers were recoded to three SDs from the mean. No multivariate outliers were identified. Because measures of condom use and time-varying covariates were taken over the course of 9 months, monthly reports were missing for between 2 and 15% of participants. Women with missing data were more religious, $t(277) = -3.43, p < .001$, and had lower high school GPAs, $t(276) = 2.81, p < .01$. However, there were no differences in other demographic variables (i.e., age, ethnicity, or SES), or in initial levels of condom use, pre-college substance use, or number of pre-college sexual partners. Table 1 provides descriptive statistics on response rate, condom use, hormonal contraception use, partner type, and relationship length over time.

Models were tested using latent growth modeling (LGM) in Mplus. A full-information maximum likelihood (FIML) estimator (MLR) was utilized to allow for unbiased coefficient estimates with missing data (Asparouhov & Muthen, 2005). The original models looked at change over time in overall condom use, condom use with romantic partners, and condom use with casual partners. We report the mean values of the intercepts (M_i) and slopes (M_s) for each model, as well as the variance of the intercepts (D_i) and slopes (D_s), along with 95% confidence intervals (CI). We then examined predictors of initial levels of and changes in condom use, controlling for time-varying covariates (use of alternative contraception, having casual partners, and relationship length). Model fit was assessed using standard indices including the comparative fit index (CFI), the Tucker-Lewis index (TLI), the standardized root mean square residual (SRMR), and the misfit measure known as the root-mean-square error of approximation (RMSEA; Hu & Bentler, 1999). Good fit is indicated by CFI and TLI values greater than .95, SRMR values less than .08, and RMSEA values less than .05 (Hu & Bentler, 1999). Because models were fit with the MLR estimator, the χ^2 values reported are Satorra-Bentler scaled (mean-adjusted) χ^2 values.

Results

Descriptive information on predictor variables is presented in Table 2.

Condom use

For overall condom use, a linear LGM (Figure 1) fit the data well, $\chi^2(44, N = 279) = 55.04, p = .12$, CFI = .98, TLI = .98, RMSEA = .03, SRMR = .07. Both the intercept ($M_i = 3.83, CI[3.65, 4.01], p < .001$) and the slope ($M_s = -.05, CI[-.08, -.02], p < .001$) differed significantly from 0. At the group level, participants showed moderate-to-high levels of condom use initially and decreased their use across the first year of college. There was significant variance in both the intercept ($D_i = 1.82, CI[1.48, 2.16], p < .001$) and the slope ($D_s = .03, CI[.02, .04], p < .001$), indicating that there were individual differences in both initial levels of condom use and the change in condom use across time. A quadratic term was tested, but did not improve the fit of the model, $\chi^2(4, N = 279) = 6.33, p = .18$.

Condom use with romantic partners

For condom use with romantic partners, a linear LGM (Figure 2) fit the data well, $\chi^2(45, N = 222) = 68.60, p = .01$, CFI = .96, TLI = .97, RMSEA = .05, SRMR = .07. Both the intercept ($M_i = 3.64, CI[3.42, 3.87], p < .001$) and the slope ($M_s = -.05, CI[-.09, -.02], p = .001$) differed significantly from 0. At the group level, participants showed moderate-to-high

levels of condom use with romantic partners initially and decreased their use across the first year of college. There was significant variance in both the intercept ($D_i = 2.08$, $CI[1.69, 2.48]$, $p < .001$) and the slope ($D_s = .02$, $CI[.01, .04]$, $p = .001$), indicating that there were individual differences in both initial levels of condom use with romantic partners and the change in condom use across time. A quadratic term was tested, but did not improve the fit of the model, $\chi^2(4, N = 222) = 4.11$, $p = .39$.

Condom use with casual partners

There were insufficient data to fully test a LGM for condom use with casual partners—given that most women who engaged in casual sex ($N = 139$) did not have casual sex on a regular basis, fit statistics could not be generated due to low covariance coverage. However, the model (Figure 3) showed that the intercept ($M_i = 4.20$, $CI[3.94, 4.45]$, $p < .001$) was significantly different from zero, whereas the slope ($M_s = -.04$, $CI[-.08, .01]$, $p < .10$) was marginally different from 0. At the group level, participants showed high levels of condom use with casual partners initially and a trend toward decreasing their use across the first year of college. There was significant variance in the intercept ($D_i = 1.05$, $CI[.69, 1.41]$, $p < .001$), but not the slope (which needed to be constrained to 0 to achieve convergence), indicating that there were individual differences in initial levels of condom use with casual partners, but not in the change in condom use across time. Because of sparse data, we did not further examine casual condom use independently.

Time-varying covariates

Because the addition of each time-varying covariate involved the estimation of many additional parameters, individual covariates were tested for significance before their addition to the final model. Effects of time-varying covariates were constrained to be equal across time. These models showed that use of alternative contraception was negatively associated with overall condom use, $\beta = -.37$, $CI[-.69, -.04]$, $p < .05$, whereas having casual partners was positively associated with overall condom use, $\beta = .41$, $CI[.13, .68]$, $p < .01$. However, relationship length was not significantly associated with overall condom use, $\beta = -.05$, $CI[-.35, .25]$, $p = .75$.

Additionally, use of alternative contraception was negatively associated with condom use with romantic partners, $\beta = -.39$, $CI[-.76, -.02]$, $p < .05$. However, neither having casual partners ($\beta = .01$, $CI[-.34, .37]$, $p = .94$) nor relationship length ($\beta = .002$, $CI[-.42, .43]$, $p = .99$) was associated with condom use with romantic partners. Therefore, use of alternative contraception and casual partners were included as time-varying covariates in the overall model, and use of alternative contraception was included as a covariate in the romantic partners model.

Predictors of overall condom use

Models next examined predictors of initial levels of condom use and changes in condom use during the first year of college (Table 3). Predictors were measured in September. Controlling for use of alternative contraception use and having casual partners, women used condoms less frequently initially if they were African American, if they had stronger alcohol-sexual risk expectancies, and if they had more previous sexual partners. Women who reported smoking marijuana prior to college used condoms more frequently initially. Women decreased their condom use more over time if they reported binge drinking prior to college. They decreased their condom use less over time if they had higher high school GPAs and if they came from higher SES families.

Predictors of condom use with romantic partners

Controlling for use of alternative contraception, women used condoms with romantic partners less frequently early in college if they had stronger alcohol-sexual risk expectancies and if they had engaged in intercourse with more partners prior to college (Table 4). They used condoms with romantic partners more frequently initially if they were Latina and if they reported smoking marijuana prior to college. Women decreased their frequency of condom use more rapidly if they reported binge drinking prior to college; they decreased their condom use less rapidly if they had higher high school GPAs.

Discussion

To our knowledge, this study is the first to focus on changes in condom use during the first year of college among a large sample of women. As predicted, women reduced their frequency of condom use over the course of their first year of college. This was true for condom use with all partners and for condom use with romantic partners specifically. The decrease in condom use corroborates other studies noting decreases in condom use across adolescence and young adulthood (Capaldi et al., 2002; Dariotis et al., 2008; Ku et al., 1994; Sayegh et al., 2006). Although the decreases in condom use across one academic year were small in magnitude (approximately 10% on our frequency scale), they increase risk for unplanned pregnancy or STDs. College women often engage in serial monogamy, resulting in multiple partners during the college years (MacDonald et al., 1990); they are also often unaware of their partners' risk (Drumright, Gorbach, & Holmes, 2004). These features make continued condom use important for women's health.

In line with expectations, overall condom use early in college was predicted by risk factors such as alcohol-sexual risk expectancies and previous sexual experience. In accordance with previous research (Abbey et al., 2007; Corbin & Fromme, 2002; LaBrie et al., 2005; LaBrie et al., 2002), we found that women with stronger alcohol-sexual risk expectancies reported lower levels of condom use early in college. Drinking was prevalent during the first month of the school year, with 67% of women reporting some binge drinking. Women with expectations that this drinking would lead to unsafe sex used condoms less frequently. Additionally, women with more previous sexual partners reported lower levels of condom use at the beginning of college, consistent with previous research (Desiderato & Crawford, 1995).

In addition to these anticipated findings, our study identified several unexpected predictors of initial levels of condom use. First, in contrast to previous research (Guo et al., 2002; Yan et al., 2007) and Problem Behavior Theory (Jessor et al., 1991; Jessor & Jessor, 1977), marijuana users reported *more* frequent condom use. This finding may be due to our accounting for other substance use and sexual history, both of which are associated with marijuana use. The majority of women who smoked marijuana in our sample (85%) also engaged in binge drinking, and women who smoked marijuana also reported more past sexual partners than those who did not (2.49 vs. .97). These other risk factors may relate more closely to condom use than does marijuana use alone.

Also at odds with previous research (Abma, 2003; Grunbaum et al., 2002), we found that African American women reported less frequent condom use early in college. To understand this apparent inconsistency, we offer two possible explanations. First, much of the prior research finding higher levels of condom use among African Americans has been conducted with high school samples, whereas our research was conducted with students at a private university. Thus, sampling differences (e.g., developmental status and perhaps SES) may explain these inconsistent results. Second, prior research has rarely controlled for use of alternative contraception. Controlling for use of alternative contraception may have led us to

observe a negative association between African American ethnicity and initial levels of condom use. Future research might seek to explore whether this finding is reliable.

The current study also identified predictors of changes in condom use over the first year of college, something not examined in previous studies. In line with Problem Behavior Theory (Jessor & Jessor, 1977), reductions in condom use were greater for women who engaged in binge drinking early in college. Research on binge drinking and condom use has yielded mixed results (Cooper, 2002; Leigh, 2002). This study suggests that although levels of condom use early in college did not differ between women who did and did not binge drink, women who binge drank reported greater decreases in condom use during the academic year. Women who binge drink prior to entering college may maintain or escalate their drinking (Sher & Rutledge, 2007), contributing to sexual risk behavior. Women who engage in substance use may also be higher in personality traits such as impulsivity or sensation-seeking (Zuckerman & Kuhlman, 2000) that forecast greater risk behavior. Future research might investigate mechanisms by which binge drinking is related to changes in condom use.

In addition to associations between binge drinking and changes in condom use, our study found that women with higher high school GPAs and women from higher SES families reduced their condom use less during their first year of college; this result is consistent with research suggesting academic achievement and high SES as protective factors (Abma, 2003; Bailey et al., 2008). When examining changes in condom use, our analyses also controlled for use of alternative contraception; as in previous research, use of alternative contraception was negatively associated with condom use (Cooper et al., 1999; Zimmerman et al., 2007). Although hormonal contraception does protect against pregnancy when used correctly, it does not protect against STDs, which are a concern in a population known for practicing serial monogamy (Corbin & Fromme, 2002). Reductions in condom use may put women at greater risk for unplanned pregnancy and STDs, and these results suggest that certain women may be more at risk.

The strengths and weaknesses of this study suggest directions for future research. Strengths of our study included measuring changes in condom use across the first year of college using monthly reports. Few previous studies have collected longitudinal data at nine separate time points or made use of latent growth modeling to assess changes in safe sex behavior. Additionally, the frequency of these reports limited the reference interval, which enhances recall (Noar, Cole, & Carlyle, 2006). The high retention rate (with an average of 92% of the sample reporting each month) is also a strength of our study. Additionally, our analyses controlled for use of alternative contraception, in line with recommendations in the literature (Noar et al., 2006).

Several weaknesses of our research should be mentioned. First, our data on casual partners did not allow us to examine predictors of condom use with these partners separately—the average sexually-active woman provided only 1.4 monthly reports on casual partners. Additionally, in our assessments of condom use with romantic partners, we were unable to determine whether the partners reported on were the same partners across time. There may be differences in changes in condom use between women who remain with the same romantic partners and those who begin relationships with new partners that we could not investigate. The use of nine assessment occasions, although generally a strength, did result in some missing data. However, through the use of FIML, we were able to make use of all available data and retain all sexually active women in our analyses, increasing the representativeness of our findings. Additionally, although similar frequency measures of condom use are common in the literature (Noar et al., 2006), future research could make use of a more precise measure of condom use (e.g., count data on number or proportion of unprotected sex events; Schroder et al., 2003). Finally, our study assessed one sample of

college women, who do not actually wear male condoms themselves, and examined a limited number of predictors. These results may not generalize to other samples of women or to men. Future studies should assess patterns of use among college men and consider additional predictors, including psychological predictors such as condom attitudes, norms, and self-efficacy.

In conclusion, the current study showed that women reduced their overall condom use and their condom use with romantic partners over the first year of college. These changes in condom use were predicted by SES, high school GPA, and substance use. Reductions in condom use may place women at greater risk of STDs. Identification of the demographic and behavioral factors associated with decreases in condom use will allow educational and intervention efforts to be targeted to women who are at greater risk for engaging in unprotected sex.

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Figure 1. Changes in relative frequency of overall condom use over the first year of college. Women ($N = 279$) significantly decreased their frequency of condom use over the school year ($M_s = -.05$, $CI[-.08, -.02]$, $p < .001$).

Figure 2.

Changes in relative frequency of condom use with romantic partners over the first year of college. Women ($N = 222$) significantly decreased their frequency of condom use with romantic partners over the school year ($M_s = -.05$, $CI[-.09, -.02]$, $p = .001$).

Figure 3.

Changes in relative frequency of condom use with casual partners over the first year of college. Women ($N = 139$) marginally decreased their frequency of condom use with casual partners over the school year ($M_s = -.04$, $CI[-.08, .01]$, $p < .10$).

Table 1

Response Rates and Descriptive Information on Time-Varying Variables

	% Completing	Overall ^b	Frequency of Condom Use ^d				% with Casual Partners	Relationship Length (Months) ^d
			Romantic Partners Only	Casual Partners Only	% Using Alternative Contraception ^c			
September (T2)	98%	3.59 (1.66)	3.37 (1.68)	4.23 (1.41)	49%	15%	14.84 (11.95)	
October (T3)	96%	3.68 (1.60)	3.34 (1.70)	4.23 (1.24)	50%	22%	14.37 (12.16)	
November (T4)	96%	3.58 (1.64)	3.48 (1.68)	3.96 (1.58)	50%	17%	14.31 (11.80)	
December (T5)	90%	3.39 (1.70)	3.23 (1.74)	3.86 (1.55)	56%	18%	13.87 (11.95)	
January (T6)	94%	3.40 (1.69)	3.25 (1.74)	3.90 (1.52)	58%	15%	14.05 (12.61)	
February (T7)	93%	3.23 (1.75)	3.09 (1.72)	3.78 (1.79)	62%	13%	14.83 (12.71)	
March (T8)	89%	3.28 (1.74)	3.13 (1.73)	3.98 (1.59)	58%	16%	15.83 (13.10)	
April (T9)	87%	3.58 (1.60)	3.34 (1.63)	4.29 (1.29)	54%	19%	14.71 (13.32)	
May (T10)	85%	3.38 (1.73)	3.25 (1.76)	3.85 (1.62)	53%	20%	15.08 (13.88)	

Means and standard deviations are reported, based on those providing data at each time point.

^aFrequency of condom use is reported on a scale from 1 ("never") to 5 ("always").

^bAverage of reports for romantic and casual partners if both types of partners were reported.

^cReports are based only on those engaging in intercourse during each month.

^dReports are based only on those reporting a romantic relationship each month.

Table 2

Descriptive Information on Predictor Variables

		M (SD) or %	Observed Range
Demographic	Asian	8%	--
	Black	12%	--
	Latina	10%	--
	Religiosity	.96 (.75)	0–3
	Socioeconomic Status	4.50 (1.30)	1–6
	High School GPA	3.62 (.29)	2.80–4.00
Substance Use	Binge Drinking (Pre-College)	62%	--
	Smoking (Pre-College)	18%	--
	Marijuana Use (Pre-College)	37%	--
	Alcohol-Sex Expectancy: Sexual Risk	2.22 (1.39)	1–6
Other	Vaginal Sex Partners (Pre-College)	2.20 (2.70)	0–20

Table 3

Predictors of Overall Condom Use ($N = 279$)

Intercept			Slope	
	<i>B</i>	95% CI	<i>B</i>	95% CI
Demographic				
Asian				
Black	-.14 [*]	-.28, -.002		
Latina				
Religiosity				
Socioeconomic Status			.19 [*]	.01, .37
High School GPA			.19 [*]	.03, .34
Substance Use				
Binge Drinking (Pre-College)			-.19 [*]	-.38, -.003
Smoking (Pre-College)			.16 ⁺	-.02, .35
Marijuana Use (Pre-College)	.13 [*]	.002, .26		
Alcohol-Sex Expectancy: Sexual Risk	-.20 ^{***}	-.32, -.09		
Other				
Sexual Partners (Pre-College)	-.15 ^{**}	-.27, -.04		
<i>R</i> ²	.11 ^{**}	.03, .19	.17 [*]	.02, .32

Note. *B* = standardized regression coefficients; *CI* = confidence interval. Only significant coefficients are reported. Analyses control for use of alternative contraception and having casual partners. $\chi^2(290, N = 279) = 497.16, p < .001$. CFI = .84, TLI = .83, RMSEA = .05, SRMR = .04.

⁺ $p < .10$

* $p < .05$

** $p < .01$.

*** $p < .001$.

Table 4

Predictors of Condom Use with Romantic Partners ($N = 222$)

	Intercept			Slope	
	B	95% CI	B	95% CI	
Demographic					
Asian					
Black					
Latina	.16*	.01, .31	-.22+	-.45, .02	
Religiosity					
Socioeconomic Status					
High School GPA			.22*	.03, .40	
Substance Use					
Binge Drinking (Pre-College)			-.21*	-.42, -.003	
Smoking (Pre-College)					
Marijuana Use (Pre-College)	.17*	.03, .30			
Alcohol-Sex Expectancy: Sexual Risk	-.25***	-.40, -.10			
Other					
Sexual Partners (Pre-College)	-.23***	-.35, -.11			
R^2	.15**	.05, .26	.20*	.01, .39	

Note. B = standardized regression coefficients, CI = confidence interval. Only significant coefficients are reported. Analyses control for use of alternative contraception. $\chi^2(213, N = 222) = 347.54, p < .001$. CFI = .88, TLI = .88, RMSEA = .05, SRMR = .05.

+ $p < .10$

* $p < .05$

** $p < .01$.

*** $p < .001$