Adolescent Sexual Risk Behaviors and Out of School Relationships*

Kate Strully
University at Albany, State University of New York
kstrully@albany.edu

David Kennedy
RAND Corporation

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A handful of recent studies show that adolescents are less likely to use of condoms and other contraceptives when partners are discordant on selected characteristics. For instance, when adolescents date individuals who do not attend their school, they are more likely to engage in unprotected sex and school-discordant relationships are positively associated with STIs. However, we have little understanding of why risky sexual behaviors are more common when adolescent relationships are school-discordant. Using dyadic-level data from the first and second waves of the U.S. National Longitudinal Study of Adolescent Health, this study attempts to shed light on these issues by investigating two questions: First, to what extent are the associations between school discordance and riskier sexual behaviors driven by adolescents with higher likelihoods of engaging in unprotected sex differentially selecting out-of-school partners? And, second, what characteristics of out-of-school relationships mediate remaining associations between school discordance and riskier sexual behaviors?

Several measures of national adolescent reproductive health have shown promising trends: rates of sexually transmitted infections (STIs) and unintended pregnancies among adolescents are decreasing (Centers for Disease Control and Prevention 2009, Ventura et al. 2012). However, STIs and unintended pregnancies remain a significant public health problem and some adolescents have higher probability of exposure to risk than others (Gavin et al. 2009). Greater use of the male condom and other contraceptives would help prevent many of the sexual and reproductive health risks faced by adolescents (UNAIDS 2009; Seal and Ehrhardt 2004). However, rates of condom and contraceptive use are much lower than necessary to prevent the spread of infection and lower rates of unwanted pregnancies among adolescents.

Although many studies of adolescent condom and contraceptive use focus on individual characteristics as predictors, such as attitudes and knowledge about condoms or demographic characteristics, there is a growing concern about the social and relationship contexts of sexual behaviors (Aalsma et al. 2006, Afifi 1999). A handful of recent studies show that adolescents' use of condoms and other contraceptives differs according to partners' characteristics. Most notably, having a partner who is discordant from oneself on selected characteristics has been shown to be negatively associated with consistent use of condoms and other contraception. For example, using data from the National Longitudinal Study of Adolescent Health (Add Health), researchers have shown that when adolescents date individuals who do not attend their school or are older, their relationship is less likely to include consistent use of condoms or other contraceptives and is positively associated with self-reported STIs (Ford et al. 2001, Ford and Lepkowski 2004). Choices about condoms and contraceptives are made within the contexts of particular relationships and some relationships appear to pose greater risks to adolescents than others.

In interpreting these findings, researchers have speculated about the mechanisms connecting discordant relationships to riskier sexual behaviors (e.g., less familiarity with out-of-school partners or

power differentials between older and younger partners may make it harder to plan and communicate about sexual activity (Ford et al. 2001)). However, beyond this speculation, there has been little empirical investigation testing theories that may explain lower rates of condom and contraceptive use in discordant relationships. Without a specific understanding of the mechanisms connecting discordant relationships and low condom/contraceptive use, there is little basis for using this knowledge to develop interventions that may increase condom/contraceptive use within these relationships.

In this paper, we address the case of "school-discordant relationships" where an adolescent's relationship partner does not attend the adolescent's school, in an attempt to answer several questions. First, do adolescents who form out-of-school relationships have characteristics and attitudes that tend to lower the odds of condom or contraceptive use regardless of relationship type (e.g., less positive attitudes toward contraception, lower self-efficacy, etc.)? And, does controlling for these individual-level characteristics measured prior to relationship formation account for lower rates of condom and contraceptive use within school-discordant relationships? In other words, do school-discordant relationships appear riskier simply because they are more likely to be selected by adolescents with higher likelihood to engage in unprotected sex regardless of partner type? We also test whether any remaining associations between school-discordance and risk may be mediated by characteristics of these relationships, such as the fact that out-of-school relationships tend to be of shorter duration, less emotionally committed, and less socially-embedded (e.g. in school-discordant relationships, respondents are less likely to report strong feelings of commitment and are less likely to report that their friends know their partner). In other words, we also test for what characteristics of school-discordant relationships are associated with greater probability of risky behaviors.

To test for these multi-level processes, we present analyses of dyadic-level data from Waves I and II of the National Longitudinal Study of Adolescent Health (Add Health) (Bearman et al. 1997). We stratify all our models by gender since patterns of age discordance in out-of-school relationship are very

different for male and female adolescents. We employ a one-to-many dyadic design (Kenny et al. 2006b) that allows for modeling outcomes at the relationships level (e.g. condom use) adjusting for the non-independence of multiple relationships nested within the same respondents. Out-of-school relationships are very common: 54% of all the sexual relationships in this analysis were with individuals who did not attend the respondents' school. Given the prominence of these relationships and the evidence that STI risk is higher for out-of-school relationships, dynamics of school-discordant relationships may be an important factor for understanding adolescent risk-taking behavior and sexual health.

Condom and Other Contraceptive Use in Adolescent Relationships

Most of the research on risky sexual behavior has investigated risky sex as a characteristic of individuals (Afifi 1999). Some of the most commonly studied predictors of unprotected sex include positive or negative attitudes about condoms (Sheeran et al. 1999), perceived susceptibility of getting an STI (Snelling et al. 2007), and tendencies to use drugs and alcohol (Cooper 2002, Fromme et al. 1999, Macaluso et al. 2000, MacDonald et al. 2000). However, unprotected sex is an aspect of relationships and characteristics of these relationships influence condom and other contraceptive use. Also, individuals have a variety of numbers and types of relationships. To address these facts, several recent studies have examined sexual behavior and condom use as an outcome of relationships using a one-to-many dyadic design (Kenny et al. 2006a, Kennedy et al. 2010, Kennedy et al. 2012b, Kennedy et al. 2012a).

Studies that have examined out-of-school relationships among adolescents have found them to be negatively associated with condom and contraceptive use and positively associated with self-reported STIs. Ford et al. (2001) examined sexual relationships in Waves I and II of Add Health using dyadic data and found that having a partner who is not from the same school reduces the likelihood of ever using a condom or other contraceptive by about 25% for romantic relationships. Using the same Add Health sample, Ford and Lepkowski (2004) found the odds of self-reported STI infection is about

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37% higher if a partner does not attend the adolescent's school. Existing studies also show that the likelihood of forming an out-of-school relationship is higher for older adolescents compared to younger, females compared to males, and for white and black adolescents compared to Latino and other race adolescents (Ford et al. 2001, Ford et al. 2003).

While these existing studies suggest that in- and out-of-school relationships pose varying levels of risk for adolescents, we have little understanding of how individual characteristics beyond basic demographic factors (e.g., age and race/ethnicity) predict the formation of these types of relationships. We also have very limited insight into what it is about out-of-school relationships that may lower rates condom or other contraceptive use. Although findings in the literature are somewhat mixed, we know that condom-use and contraceptive-use among adolescents varies according to the characteristics of relationships (Gebhardt et al. 2003). For instance, condom-use within relationships varies according to how committed/serious the relationship is, how much communication there is between partners about STI risk (Kennedy et al. 2012a), how close the sexual partners are to family and friends (Aalsma et al. 2006), and whether the partner is a main or casual partner (Lescano et al. 2006). In the following analysis, we test whether these types of factors vary across in- and out-school relationship and whether they may help account for lower rates of condom/contraceptive-use in out-of-school relationships.

Research questions and hypothesized relationships

Figure 1 depicts the hypothesized relationships that we will test in the following analysis. The first panel in Figure 1 depicts the main relationship of interest for this study which is the negative association between being in an out-of-school sexual relationship and using a condom or other form of contraceptive in that relationship.

Panel 2 in Figure 1 depicts a potential cofounding explanation for this association. As depicted in panel 2, there may be individual-level characteristics that jointly determine the likelihood of forming an out-of-school relationship and condom/contraception-use within relationships in general. If respondent-

level characteristics that inhibit use of condoms and contraceptives—such as, lower perceptions of risk, self-efficacy, or cognitive ability—are positively associated with the formation of out-of-school relationships, lower rates of condom and contraceptive-use within school-discordant relationships may be partially or fully accounted for by the characteristics of respondents who form these types of relationships. In order to test this confounding scenario laid out in panel 2, we first use a regression model to test whether a series of respondent-level characteristics measured during the first wave of the Add Health predict the formation of school-discordant relationships reported in the second wave of the Add Health (i.e., testing the arrow labeled "b" in panel 2). We then use a second regression model to confirm that the same series of respondent-level characteristics measured during the first wave data predict condom-use and contraceptive-use in all relationships (both in- and out-of-school relationships) reported in the second wave of data (i.e., testing the arrow labeled "c" in panel 2). We then run a third model regressing condom- and contraceptive-use on school discordance, adjusting for relevant respondent-level characteristics measured in the prior wave of data. If the negative association between school-discordance and condom/contraceptive-use is significantly attenuated by this adjustment, it would seem that the variation in condom/contraceptive-use across in- and out-of-school relationships may be largely driven by the selection of individuals with particular risk profiles into different kinds of relationships. However, if the association between school-discordance and condom/contraceptive-use is relatively robust to the adjustment for respondent characteristics, we can be more confident that differences in behaviors across in- and out-of-school relationships reflect actual differences in the characteristics of relationships and we can begin to test the mediating pathways laid out in the third panel in Figure 1.

Dating an individual who differs from oneself on some characteristic—e.g., not attending one's school—should not in itself lower the likelihood of condom/contraceptive-use. Rather, discordance between relationship partners is likely to impact "downstream" characteristics of the relationship—e.g.,

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effecting the stability of the relationship or shaping how partners interact within the relationship—

which in turn may inhibit the use of condoms/contraceptives in the relationship. To test the mediating

pathways laid out in the third panel in Figure 1, we first run a series of models regressing relationship

characteristics on an indicator for school discordance (i.e., testing the arrow labeled "d" in panel 3). We

then run another series of models regressing condom/contraceptive-use on relationship characteristics

(i.e., testing the arrow labeled "e" in panel 3). After determining which relationship characteristics are

sensitive to school-discordance and predict condom/contraceptive-use, we finally regress

condom/contraceptive-use on school-discordance, adjusting in a stepwise fashion of each of the

relevant relationship characteristics. Significant attenuation of the negative association between school-

discordance and condom/contraceptive-use when adjusting for a particular relationship characteristic

will suggest that characteristic plays a mediating role in the association between school discordance and

condom/contraceptive-use.

Data and variables

Data for this analysis come from the first two waves of the National Longitudinal Study of

Adolescent Health (Add Health). The Add Health began in 1994-1995 with a nationally representative

clustered sample of 132 schools. A short in-school questionnaire was administered to all students who

were present at one of the sample schools on the day of the survey. Students where then sampled from

within each school for a more extensive in-home questionnaire. Students who participated in the first

in-home questionnaire were followed-up with a second-wave survey in 1996. In later years, respondents

to the in-home survey were followed up with additional waves of data collections. However, we limit

this analysis to only the first two waves of the Add Health when most respondents are still enrolled in

high school. By later waves, most respondents had completed high school and moved from adolescence

into young adulthood (Harris 2011).

The relationships analyzed in this study are based on a series of "relationship roster" questions in which respondents are asked about up to six "special romantic" relationships that occurred in the past 18th months. Respondents are then asked a series of questions about each relationship, including whether the partner attended the respondent's school at the start of the relationship, the start and end dates of the relationship, activities and events, as well as sexual behaviors and contraceptive-use, within the relationship.[1] In our dyadic-level data file, each reported relationship is an observation. Because this analysis is concerned with condom and contraceptive-use, we limit our sample to relationships in which the respondent reported having sexual intercourse with the partner. In order to be able to adjust our estimates for respondents' attitudes and risk perceptions measured prior to the formation of relationships, we further limit our sample to only the relationships reported in the second wave of data collection. Questions about pregnancy and AIDS risk perceptions and self-efficacy regarding birth control were only asked of respondents who were age 15 or older. We, therefore, further limit our sample to respondents who were at least 15 at the first wave of data collection. Limiting our sample to romantic, sexual relationships reported in wave 2 by respondents who were at least 15 years of age at wave 1 yields 3,055 relationship observations with valid data on all the outcomes and covariates.[2] 1,759 of these relationships were reported by female respondents and 1,296 of these relationships were reported by male respondents.

Table 1 provides descriptive statistics for our sample, stratified by gender. School discordance is quite common in our sample—54% of the relationships in our sample are with out-of-school partners. School discordance is more common for female respondents than for male respondents. While 46% of the male respondents' relationships were school discordant, 60% of the female respondents'

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[1] The Add Health also asks respondents to list additional sexual, "non-romantic" relationships. We do not include these relationships in this analysis because the survey does not ask as extensive a series of questions about events and behaviors within non-romantic relationships and, therefore, we cannot test our hypotheses about mediating pathways for these non-romantic relationships.

[2] In this version of our analysis, we use listwise deletion to address missing data. However, before presenting these results at PAA, we would use multiple imputation to address missing data.

relationships were school discordant. Rates of condom- and contraception-use within relationship are also lower among the female respondents relative to the male respondents.

Dependent variables

Ever used condom: Our first dependent variable is a dichotomous indicator for whether the respondent reports ever using a condom with his/her partner in the relationship.

Always used birth control: Our second dependent is a dichotomous indicator for whether the respondent reports using any method of birth control (e.g., condom, birth control pills, etc.) every time s/he had sex with the partner in the relationship.[3]

Main covariate of interest

Out-of-school relationship: Our main covariate of interest is a dichotomous indicator coded one if the relationship partner did not attend the respondent's school at the start of the relationship and coded zero if the partner did attend the respondent's school when the relationship began.

Demographic controls

In all our models, we adjust for the following respondent-level demographic characteristics: *gender* (a dichotomous indicator for female), *race/ethnicity* (dichotomous indicators for non-Hispanic black, non-Hispanic other, and Hispanic; white is the reference category), and *age at the start of the relationship* (a continuous measure in years).[4]

Respondents' attitudes and prior behaviors (measured at wave 1)

Based on our reading of prior literature (e.g., Manlove, Ryan and Franzetta 2007; Ryan et al. 2007; Sheeran, Abraham and Orbell 1999), we identified a set of respondent-level characteristics that

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[3] Because of the way the Add Health asks questions about contraception, it is difficult to identify whether respondents always used condoms within a given relationships. We, therefore, rely on these two distinct measures capturing ever using condoms and always using at least some method of birth control.
[4] In earlier versions of our analysis, we also included a control for parental socioeconomic status. However, this was not significantly associated with either out-of-school relationships or condom/contraception-use.

could plausibly jointly determine both the likelihood of forming out-of-school relationships and the likelihood of condom/contraceptive-use.

Attitudes about pregnancy, AIDS, and protection: In the Add Health survey, respondents were given a series of statements about these issues as asked whether they strongly agreed, agreed, neither agreed nor disagree, disagreed, or strongly disagreed with the statement. To use these questions to capture attitudes that should be negatively associated with condom/contraceptive-use, we created three dichotomous indicators: (i) an indicator coded one if the respondent did not strongly agree with the statement that "Getting (someone) pregnant at this time in your life is one of the worst things that could happen to you;" (ii) an indicator coded one if the respondent did not strongly agree with the statement that "If you got the AIDS virus, you would suffer a great deal;" and (iii) an indicator coded one if the respondent either agreed or strong agreed with the statement that "It would be a big hassle to do the things necessary to completely protect yourself from getting a sexually transmitted disease."

Self-efficacy regarding contraception: Respondents to the Add Health were further asked a series of questions about their abilities and desires to use birth control. Presented with a six category answer scale that went from "very sure" to "very unsure," respondents were asked how sure they were that they could (i) plan ahead to have some form of birth control available, (ii) use birth control once they were highly aroused, and (iii) resist intercourse if their partner did not want to use birth control. We combined these three measures in to a single "low self-efficacy scale" (alpha=.67) in which higher values indicate less positive expectations regarding one's ability to use birth control.

Picture Vocabulary Test (PVT) Score: In the first wave of the Add Health respondents were administered an abridged version of the Peabody Picture Vocabulary Test to gauge verbal ability and scholastic aptitude. Adolescents with lower scores on this test may be more likely to form relationships outside of school and may be less likely to use contraceptives consistently. Because we are interested in

respondent characteristics that should be negatively associated with condom/contraceptive-use, we have reversed the coding of this variable so higher values indicated lower scores on the PVT.

Impulsivity: To assess impulsivity, respondents were asked to rank their agreement with the statement: "When making decisions, you usually go with your "gut feeling" without thinking too much about the consequences of each alternative." We created a dichotomous indicator coded one if a respondent either agreed or strongly agreed with this statement. Respondents with more impulsive tendencies may be more tolerant of discordance in their intimate relationships and may have less ability to use condoms and contraceptives.

Number of sexual partners: We also include in our analysis a measure of a respondent's total number of prior sexual partners measured at the first wave of data collection. All else equal, adolescents who tend to have more sexual partners should be more likely to form relationships outside of the school. Adolescents who have more sexual partners may also tend to take more sexual risks and be less likely to use contraceptives or condoms.

<u>Relationship characteristics/Potential Mediators</u>

Respondents in the Add Health study answered several questions about behaviors, feelings, and events within each reported relationship. We use these questions to try to identify mediating pathways that may account for why rates of condom/contraceptive-use are lower in out-of-school relationships.

Short relationship duration: This is a dichotomous indicator for whether the time between first and last sexual intercourse in a relationship was one month or less. Out-of-school relationships may tend to dissolve more quickly, and shorter-term relationship may be less likely to involve regular use of condoms and contraceptives.

Casual relationship scale: Add Health respondents reported on whether a series of events occurred within their relationships including: (i) telling the partner s/he loved him/her, (ii) exchanging presents with the partner; (iii) telling others that oneself and the partner were a couple; and (iv) thinking

of oneself and the partner as a couple. We combined these indicators of relationship behaviors into a "causal relationship" scale (alpha=.76) in which higher values indicate that fewer of these behaviors occurred within the relationship. Because respondents will not have as many opportunities to interact with out-of-school partners and may share fewer friends and background characteristics with out-of-school partners, we expect that out-of-school relationships will tend to score higher on this casualness scale. Existing literature suggests that condom- and contraceptive-use varies according to whether relationships are more causal or more serious and committed (Lanksy, Thomas and Earp 1998; Manlove, Ryan and Franzetta 2007).

No discussions about STDs or contraception: This is a dichotomous indicator coded one if the respondent reported that s/he did not talk to the partner about STDs and/or contraceptives. Communication about such issues is a significant predictor of using condoms/contraceptives (Ryan et al. 2007), and some researchers have hypothesized that communication and planning about sexual behaviors may be more challenging in out-of-school relationships (Ford, Sohn, and Lepkowski 2001).

Lower social embedded-ness: To measure the social embedded-ness of respondents' relationships, we include in our model three separate dichotomous measures capturing lower levels of embedded-ness: (i) an indicator coded one if the respondent never met the partner's parents; (ii) an indicator coded one if the respondent reports that most of his/her friends did not know the partners; and (iii) an indicator coded one if the partner was a stranger to the respondent when the relationship began. Out-of-school relationships should be tend to be less socially embedded according to these indicators, and lower levels of familiarity and embedded-ness may make it more difficult for respondents to communicate about and plan for sexual behavior and contraceptive-use with out-of-school partners.

Models

As explained above, we use several regression models to test multiple different pathways that may link out-of-school relationships, condom/contraceptive-use, respondent characteristics, and relationship characteristics (i.e., we test each of the arrows in Figure 1 with a separate regression model). Depending on the particular pathway we are testing in each model, the dependent variables and covariates will differ. To illustrate the levels and timing of our measures, the final, complete model that we run for this analysis can written as

$$\ln\left(\frac{Y_{ir,t}}{1 - Y_{ir,t}}\right) = \alpha + \beta_1 outschool_{ir,t} + \beta_2 demog_i + \beta_3 attitudes_{i,t-1} + \beta_4 relat\ character_{ir,t} + e_{ir}$$

where the subscript *i* indicates respondents and the subscript *r* indicates relationships. Expressions with the subscript t were measured in the second wave of data collection and expressions with the subscript t-1 were measured in the first wave of data collect. In this final model, $Y_{ir,t}$ is a dichotomous indicator for condom-use or other contraceptive-use in a given relationship reported in the second wave of data. $Outschool_{ir,t}$ is a dichotomous indicator for whether the relevant relationship was with an out-of-school partner. $Demog_i$ is a set of demographic control variables for each respondent. $Attitudes_{i,t-1}$ is the set of variables capturing respondents' prior attitudes and characteristics measured in the first wave of data (e.g., attitudes about pregnancy and AIDS, self-efficacy, PVT scores, etc.). $Relat\ character_{ir,t}$ is the set of variables capturing relationship characteristics that may mediate associations between school discordance and condom/contraceptive-use. Finally, e_{ir} is an error term specific to each relationship.

To account for clustered error terms resulting from respondents reporting on multiple relationships, we use generalized estimating equations (GEE) with an exchangeable correlation structure

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(Hardin and Hibe, 2002).[5] In all the following models, we apply respondent-level sample weights supplied by the Add Health. The Add Health does supply relationship-level weights. We therefore follow the strategy of other authors (e.g., Ford et al. 2003) and apply to each relationship the weight of its reporting respondent, based on the assumption that the probability of selection of a relationship was determined in substantial part by the probability of selection of the respondent. All the following models are stratified by gender since patterns of age discordance and risk behaviors in out-of-school relationship may be very different for male and female adolescents.

Results

Table 2 presents odds ratios reflecting associations between school-discordance and our two dependent variables, stratified by gender and adjusted for respondents' demographic characteristics. For the total sample, having an out-of-school partner is associated with a 32% reduction in the odds of ever using a condom in the relationship and a 20% reduction in the odds of always using some form of birth control in the relationship. In the models for the total sample, being female is negatively associated with both condom- and contraceptive-use. Being older when a relationship began is negatively associated with ever using a condom in the relationship, but is not significantly associated with always using some method of birth control. This difference across the two outcomes may reflect the fact that older adolescents are more likely to take birth control pills or have partners who take birth control pills lowering reliance on condoms to prevent unwanted pregnancy.

Stratifying these estimates by gender, it becomes apparent that out-of-school relationships are associated with reduced condom- and contraceptive-use for female adolescents, but not for male adolescents. For female adolescents, having an out-of-school partner is associated with a 43% reduction in the odds of ever using a condom and a 27% reduction in the odds of always using some form of birth

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[5] We replicated several of the key models in this analysis using both an exchangeable and independent working correlation structure. Using the "qic" command in stata, we found that the quasi-likelihood values were lower for an exchangeable structure indicating better model fit (Cui 2007).

control. However, for male respondents, associations between school-discordance and condom- and contraceptive-use are non-significant. Given that differences in condom- and contraceptive-use across in- and out-school relationships are found primarily among female respondents, we limit the remaining models testing confounding explanations and mechanisms to only female respondents.

In Table 3, we test the confounding explanation laid out in the second panel of Figure 1 for female respondents. The first model in Table 3 documents associations between female respondents' attitudes and characteristics in wave 1 and the formation of out-of-school relationships in wave 2 (i.e., testing the arrow labeled "b" in Figure 1). Having more positive attitudes toward pregnancy during adolescents (i.e., not strongly agreeing that pregnancy is one of the worst things that could happen at this stage of life) is associated with an approximately 60% increase in the odds that a given relationship is with an out-of-school partner. However, the other indicators of attitudes toward AIDS and using protection are not significantly associated with forming out-of-school relationships. There is similarly no evidence that having a lower score on the self-efficacy scale or having a more impulsive approach to problem solving is associated with having an out-of-school partner. On the other hand, having a lower PVT test score and having had more sexual partners at wave one is positively associated with forming out of school relationships.

Models 2 and 3 in Table 3 document associations between female respondents' attitudes and characteristics in wave 1 and condom-use and contraceptive-use in wave 2 relationships (i.e., testing the arrow labeled "c" in Figure 1). Having more positive attitudes toward pregnancy in adolescents is associated with about a 30% reduction in the odds of ever using condoms in model 2 and always using some form of birth control in model 3. Having a lower self-efficacy score is also negatively associated with ever using condoms in model 2 and always using birth control in model 3. A more impulsive approach to problem solving is negatively associated with condom-use in model 2 and having more sexual partners is negatively association with always using birth control in model 3. However, stepping

back and considering which predictors may jointly determine both the formation of out-of-school relationships and condom/contraceptive-use within relationships, we see that only two variables are likely candidates (i.e., are significant predictors of out-of-school relationships as well as condom or contraceptive use). Having more positive attitudes toward pregnancy is positively associated with out-of-school relationships in model 1 and is negatively associated with condom and contraceptive-use in models 2 and 3. Having more sexual partners is positively associated with out-of-school relationships in model 1 and is negatively associated with always using birth control in model 3.

In models 4 and 5, we regress condom- and contraceptive-use on school-discordance adjusting for all the wave 1 attitudes and behaviors. After adjusting for a fuller range of respondent characteristics, having an out-of-school partner is still associated with a 43% reduction in the odds of ever using a condom in the relationship. This is very similar to the association between school-discordance and condom-use displayed earlier in Table 2 and suggests that very little of the differences in condom-use across in and out-of-school relationship can be accounted for by respondent-level selection. On the other hand, the association between school discordance and always using some method of birth control is substantially attenuated and rendered non-significant once we adjust for a fuller range of respondent characteristics. In contrast to the results for condom-use, it appears that differences in the characteristics of respondents who form out-of-school relationships (most likely, attitudes about pregnancy and higher numbers of sexual partners) can largely account for lower rates of consistent contraception-use within out-of-school relationships. Since the association between school discordance and always using birth control has been largely accounted for by the respondent characteristics in Table 3, we conduct our next tests of potential mediators only for the condom-use outcome.

To test potential mediators that may link school discordance to lower condom-use, we first assess which relationship characteristics vary across in- and out-of-school relationships and which

relationship characteristics predict condom-use. Panel A in Table 4 shows how having an out-of-school partner predicts each relationship characteristics (i.e., testing the arrow labeled "d" in panel 3 of Figure 1). Panel B in Table 4 shows how each of the relationship characteristics predict ever using a condom in a relationship (i.e., testing the arrow labeled "e" in panel 3 of Figure 1). All of the models presented in this table include the controls for respondents' demographic characteristics, behaviors, and attitudes; however they are not shown for efficiency of space. According to the odds ratios in Panel A, having an out-of-school partner is significantly and positively associated with a shorter duration of relationship, a more causal relationship, not discussing STDs or contraception with one's partner, not meeting one's partner's parents, having a partner that most of one's friends do not know, and having a partner that was a stranger when the relationship began. According to the odds ratios in Panel B, having a shorter duration of relationship, a more causal relationship, not discussing STDs or contraception with one's partner, and not meeting one's partner's parents are each negatively associated with ever using a condom in the relationship. However, having a partner that most of one's friends do not know and having a partner that was stranger are not significantly associated with condom-use.

We now take each of the potential mediating variables that were significantly associated with both school discordance and condom-use and add them in a step-wise fashion to our model regressing condom-use on school discordance. These results are presented in Table 5. The addition of each relationship characteristics modestly attenuates the negative association between school discordance and ever using a condom in the relationship. In the first model including none of the relationship characteristics, having an out-of-school partner is associated with a 44% reduction in the odds of ever using a condom in the relationship. By model 5, when all of the relationship characteristics have been included, having an out-of-school partner is associated with a 34% reduction in the odds of ever using a condom in the relationship. While adjusting for these potential mediating factors does attenuate the association between school discordance and condom-use, much of the association remains unexplained.

Conclusion

Prior studies have shown that when adolescents date individuals who do not attend their school, their relationship is less likely to include consistent use of condoms or other contraceptives and is positively associated with self-reported STIs (Ford et al. 2001, Ford and Lepkowski 2004). However, we have little understanding of why unprotected sex is more common when adolescent relationships are school-discordant. Since out-of-school relationships are very common, dynamics of school discordant relationships may be an important factor for understanding adolescent risk-taking behavior and sexual health. Stratifying all the analyses by gender, this study sought to shed light on these issues by investigating two questions: First, to what extent are the associations between school discordance and riskier sexual behaviors driven by adolescents with higher likelihoods of engaging in unprotected sex differentially selecting out-of-school partners? And, second, what characteristics of out-of-school relationships mediate the remaining associations between school discordance and riskier sexual behaviors?

First, our analyses revealed that out-of-school relationships are associated with reduced condom- and contraceptive-use for female adolescents, but not for male adolescents. Prior studies examining associations between school discordance and risky sexual behaviors (Ford et al. 2001, Ford and Lepkowski 2004) did not stratify their analyses by gender, so this important gender difference was obscured. We suspect that the higher rates of unprotected sex in school discordant relationships reported by female adolescents may be related to the fact that, for females, out-of-school relationships are more likely to be with older male partners. Existing literature shows that young women are less likely to use condoms or other contraceptives with older male partners (Kaestle, Morisky, and Wiley 2002). Because of multicollinarity issues, we were not able to adjust the previous estimates for age

differences between respondents and their partners.[6] In next version of this analysis (which will be complete before we would present these results at PAA), we will create a more refined multi-category school-discordance measure that distinguishes between out-of-school partners who are similar ages as respondents and out-of-school partners who are older than respondents in order to assess whether riskier behaviors in females' out-of-school relationships are limited primarily to older out-of-school partners.

Second, our analyses suggested that the negative association between school discordance and always using contraception in a relationship could be largely accounted for by the attitudes and characteristics of female adolescents who reported out-of-school relationships. When adjusting for respondents' attitudes and characteristics measured at wave one, the negative association between school discordance and consistent contraception use was attenuated to the point of statistical insignificance, suggesting that variation in consistent contraception-use across relationships may be driven in large part the selection of individuals with varying characteristics into different types of relationships. On the other hand, the negative association between school discordance and ever using a condom in a relationship was highly robust to adjustments for respondents' attitudes and characteristics, suggesting that variation in ever using condoms across relationships likely has more do with the characteristics of relationships themselves. These different results across our two outcomes may be related to the fact that female respondents have less ability to control the use of male condoms relative to other forms of contraception (e.g., birth control pills) so that condom-use reported by female respondents may be more dependent on the characteristics of their relationship partners.

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[6] Because the risk perception and self-efficacy questions were only asked of Add Health respondents who were 15 years old at wave one, our sample is limited to adolescents who are at least 15 years old. Partners who are more than a few years older than the respondents in our sample are, therefore, old enough that they are typically an out-of-school partner (i.e., these partners are typically too old to be in high school). On the flip side, the age boundaries of high school are such that the ages of in-school partners are almost always within a few years of the respondent's age. Because certain parts of the age difference distribution are mechanically related to out-school status in this way, it is not possible to partial out age and school discordance by simply adding age discordance control variables to the models.

Third, our results suggested that out-of-school relationships are more likely to have several

characteristics that inhibit condom-use—most notably, a shorter duration, being more casual, not

discussing STDs/contraception with the partner, and not meeting the partner's parents. However,

adjusting for all of these relationship characteristics in our final mediation analysis accounted for a

relatively small share of the variation in condom-use across relationship types. Therefore, there is still

substantial ambiguity as to the particular reasons why out-of-school relationships are associated with

unprotected sex.

Focusing on the case of school discordance, this analysis has provided deeper insight into

associations between relationship characteristics and adolescents' sexual behaviors and risk taking.

Most notably, we uncovered important gender differences and showed that female's individual-level

characteristics are less significant for relationship-level differences in condom-use relative to other

forms of contraceptives. On the other hand, the reasons why female adolescents are less likely to ever

use condoms with out-of-school partners still remains unclear. Perhaps when exploring respondent and

partner age differences in the next version of this analysis we will gain greater insight into these reasons.

We also intend in future versions of the project (which would be complete before we would present the

results at PAA) to use a structural equation model to test the hypothesized relationships laid out in

Figure 1.

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Table 1: Sample means and standard deviations in parentheses

	Total		Females		Males	
Ever used condom	.819		.795		.853	
Always used contraception	.606		.573		.650	
Out-of-school relationship	.542		.606		.455	
Demographic Controls						
Non-Hispanic black	.230		.240		.217	
Non-Hispanic other	.0589		.062		.054	
Hispanic	.169		.152		.192	
Age at start of relationship	16.592	(1.389)	16.434	(1.370)	16.807	(1.387)
Respondents Attitudes and Prior Behaviors (W1)						
Pregnancy worst thing (do not strongly agree)	.439		.466		.402	
If had AIDS, suffer a lot (do not strongly agree)	.375		.380		.368	
Protection is a big hassle (agree/strongly agree)	.230		.201		.270	
Low self-efficacy scale	1.849	(.929)	1.746	(.933)	1.989	(.906)
PVT test score (from low to high)	51.511	(13.607)	52.577	(12.818)	50.065	(14.491)
Go with guts to solve problems	.398		.362		.447	
# sexual partners	3.205	(17.410)	2.272	(3.288)	4.472	(26.408)
Relationship characteristics						
Duration <1m	.242		.220		.273	
Casual scale	1.249	(.353)	1.221	(.336)	1.287	(.371)
No talk STD/Contraception	.406		.353		.478	
Did not meet partner's parents	.242		.233		.255	
Most friends don't know partner	438		.436		.442	
Did not know partner at start of relationship	.063		.065		.060	
N	3,055		1,759		1,296	

Table 2: Odds ratios from GEE models documenting associations between school-discordance and condom and contraceptive use, adjusted for respondent demographic characteristics and stratified by gender

	Ever used condom in relationship				Always used some method of birth control in relationship		
	Total	Female	Male		Total	Female	Male
	(1)	(2)	(3)		(4)	(5)	(6)
Out-school Relationship	0.676**	0.569**	0.900		0.794*	0.735*	0.900
	(0.095)	(0.107)	(0.198)		(0.087)	(0.107)	(0.153)
Demographic controls							
Female	0.695*				0.733**		
	(0.098)				(0.084)		
Non-Hispanic black	1.012	1.132	0.845		0.928	0.891	1.000
	(0.180)	(0.257)	(0.242)		(0.124)	(0.152)	(0.215)
Non-Hispanic other	0.690	0.856	0.489		0.671	0.712	0.588
	(0.199)	(0.328)	(0.219)		(0.163)	(0.238)	(0.203)
Hispanic	0.704	0.671	0.758		0.777	0.634*	0.973
	(0.146)	(0.190)	(0.232)		(0.128)	(0.146)	0.239
Age at start of relationship	0.828***	0.833**	0.826*		0.993	0.974	1.027
	(0.043)	(0.053)	(0.072)		(0.039)	(0.048)	(0.064)
N	3055	1759	1296		3055	1759	1296

Notes: * p <.05; ** p < .01; *** p <.001

Robust standard errors in parentheses

Table 3: Odds ratios from GEE models documenting associations between respondent characteristics, out-of-school relationships, and condom and contraceptive use for female respondents *(testing selection explanation)*

	Out-school Relationship (1)	Ever used Condom (2)	Always used birth control (3)	Ever used Condom (4)	Always used birth control (5)
Out-school relationship				0.565** (0.111)	0.788 (0.118)
Respondents' Attitudes and Prior Behaviors (W1)					
Pregnancy worst thing (do not strongly agree)	1.590** (0.237)	0.699* (0.125)	0.702* (0.105)	0.741 (0.134)	0.719* (0.107)
If had AIDS, suffer a lot (do not strongly agree)	0.952 (0.142)	0.954 (0.173)	1.061 (0.159)	0.945 (0.170)	1.058 (0.158)
Protection is a big hassle (agree or strongly agree)	1.032 (0.199)	0.679 (0.151)	0.973 (0.186)	0.671 (0.147)	0.973 (0.186)
Low self-efficacy scale	0.926 (0.067)	0.747*** (0.060)	0.723*** (0.065)	0.734*** (0.059)	0.718*** (0.064)
PVT test score (from low to high)	1.020*** (0.006)	1.002 (0.008)	0.996 (0.006)	1.004 (0.008)	0.997 (0.006)
Go with guts to solve problems	1.069 (0.159)	0.683* (0.121)	0.759 (0.115)	0.697* (0.122)	0.763 (0.116)
# sexual partners	1.079** (0.028)	0.975 (0.020)	0.950* (0.021)	0.982 (0.020)	0.953* (0.021)
Demographic controls					
Non-Hispanic black	1.001 (0.164)	1.298 (0.309)	1.025 (0.194)	1.327 (0.317)	1.024 (0.195)
Non-Hispanic other	0.678 (0.229)	0.970 (0.402)	0.740 (0.267)	0.945 (0.381)	0.722 (0.254)
Hispanic	1.376 (0.333)	0.740 (0.232)	0.695 (0.173)	0.773 (0.245)	0.705 (0.117)
Age at start of relationship	1.278*** (0.070)	0.801*** (0.053)	0.964 (0.050)	0.826** (0.054)	0.976 (0.051)
N	1759	1759	1759	1759 `	1795

Notes: * p <.05; ** p < .01; *** p <.001

Robust standard errors in parentheses

Table 4: Odds ratios from GEE models documenting associations between out-of-school relationships, relationship characteristics, and condom-use for female respondents (*testing potential mechanisms*)

Panel A: Odds ratios for out-of-school relationships predicting relationship characteristics

	(1) Duration < 1m	(2) Casual scale	(3) No talk STD/Contr	(4) No meet parents	(5) No know most frnds	(6) Did not know at start
Out-school Relationship	1.707** (0.310)	1.071** (0.023)	1.358* (0.207)	1.932*** (0.382)	3.932*** (0.605)	6.355*** (2.674)
N	1759	1759	1759	1759	1759	1759

Panel B: Odds ratios for relationship characteristics predicting condom-use[a]

	(1) Condom-use	(2) Condom-use	(3) Condom-use	(4) Condom-use	(5) Condom-use	(6) Condom-use
Duration < 1m	0.451*** (0.082)					
Casual scale		0.824*** (0.036)				
No talk STD/Contr			0.344*** (0.059)			
No meet parents				0.437*** (0.083)		
No know most frnds					0.878 (0.156)	
Did not know at start						0.575 (0.164)
N	1759	1759	1759	1759	1759	1759

Notes: * p <.05; ** p < .01; *** p <.001; Robust standard errors in parentheses

All models include control variables for demographic characteristics and respondent characteristics at wave 1. Odds ratios for these control variables are not shown for efficiency of space.

Table 5: Odds ratios from GEE models documenting associations between out-of-school relationships and condom-use for female respondents, adjusting in step-wise fashion for relationship characteristics (*testing potential mechanism)*[a]

|	(1)	(2)	(3)	(4)	(5)
Out-school relationship	0.565** (0.111)	0.602** (0.115)	0.622* (0.119)	0.630* (0.121)	0.641* (0.123)
Relationship Characteristics					
Duration <1m		0.473*** (0.086)	0.569** (0.105)	0.596** (0.110)	0.604** (0.111)
Casual scale			0.441*** (0.096)	0.643 (0.149)	0.776 (0.229)
No talk STD/Contr				0.408*** (0.073)	0.417*** (0.075)
No meet parents					0.761 (0.186)
N	1759	1759	1759	1759	1759

Notes: * p <.05; ** p < .01; *** p <.001; Robust standard errors in parentheses

All models include control variables for demographic characteristics and respondent characteristics at wave 1. Odds ratios for these control variables are not shown for efficiency of space.
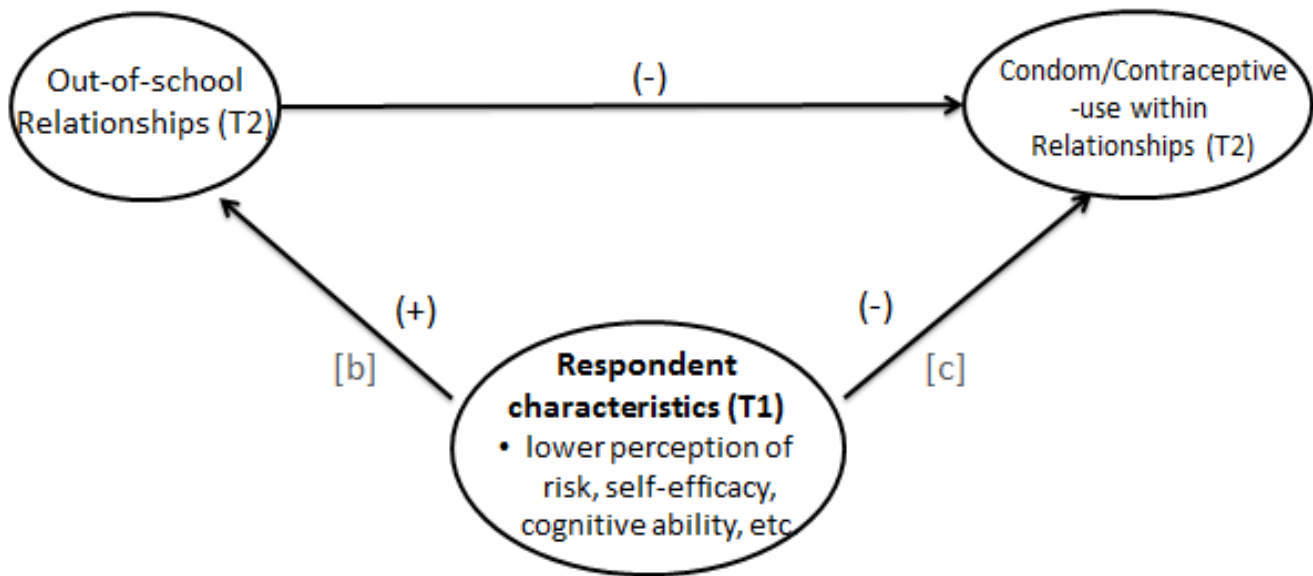
Figure 1

PANEL 1
The association of interest: Use of condoms and other contraceptives is lower in out-of-school relationships

Out-of-school Relationships →(-)→ Condom/Contraceptive-use within Relationships
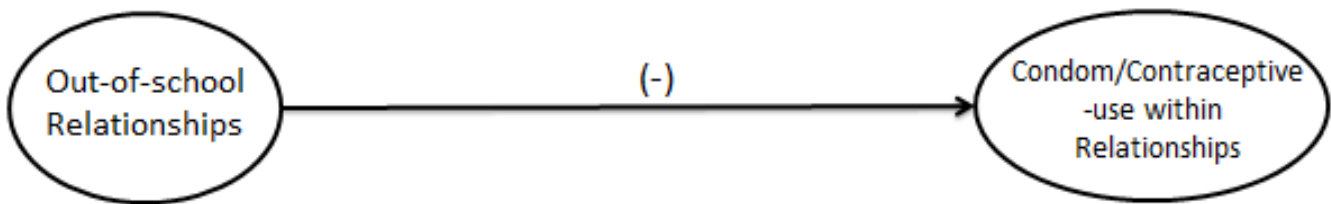
PANEL 2
Selection explanation: To what extent is the association driven by individuals with lower likelihoods of condom/contraceptive-use differentially selecting into out-of-school relationships?

Out-of-school Relationships (T2) →(-)→ Condom/Contraceptive-use within Relationships (T2)

(+) [b]   (-) [c]

Respondent characteristics (T1)
- lower perception of risk, self-efficacy, cognitive ability, etc.

PANEL 3
Potential Mechanisms: What are the characteristics of out-of-school relationships that help account for lower use of condoms and other contraceptives?

Out-of-school Relationships (T2) →(+) [d]→ **Relationship characteristics (T2)**
- Short duration, less commitment, less communication, lower social embeddedness
→(-) [e]→ Condom/Contraceptive-use within Relationships (T2)

(+)   (-)

Respondent characteristics (T1)
- lower perception of risk, self-efficacy, cognitive ability, etc.

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