Structuring the Future: Anticipated Life Events, Peer Networks, and Adolescent Sexual Behavior

Brian Soller*
Dana L. Haynie

ABSTRACT: Research suggests anticipating positive life events and outcomes (like graduating from college) protects against risky sexual behavior. Research also suggests network structure impacts the performance of sex-related risk behavior. Little research, however, has focused on the association between peers' anticipation of life events and risk behavior. This paper examines whether peers' anticipation of future life events is associated with adolescent sexual behavior over and beyond that of individual perceptions of life events. Moreover, we examine whether network structure conditions the association between peers' anticipated events and adolescent sexual behavior using data from the Add Health Study. Findings indicate that relative to those who engage in non-romantic sex, adolescents who are more central in their social networks and who have friends who anticipate future success are more likely to abstain or engage in sex only within the context of a romantic relationship. Network density did not alter the association between peers' perception of future success the outcome. Possible explanations for significant and null associations are explored.

*Direct correspondence to Brian Soller, The Ohio State University, Department of Sociology, 238 Townshend Hall, 1885 Neil Ave Mall, Columbus, OH, 43210. Phone: (614) 292-6681 Fax: (614) 292-6687. Email: soller.16@osu.edu. Data for this article are drawn from the National Longitudinal Study of Adolescent Health (Add Health), a program project designed by J. Richard Udry and Peter Bearman, and funded by a grant from the National Institute of Child Health and Human Development (HD31921). This research was supported through a seed grant provided by the Initiative in Population Research at The Ohio State University

INTRODUCTION

Recent estimates indicate that 48% of new cases of sexually transmitted diseases occurred among persons aged 14-24 (Weinstock, Berman, and Cates 2004). In addition, while the teenage birthrate steadily declined from 1991 to 2005, recent estimates indicate a sharp increase of teenage childbearing among 15-19 year olds between the years of 2005 and 2007 (Hamilton, Martin, and Ventura 2009; Santelli and Melnikas 2010). These figures suggest that adolescents remain at risk for potential adverse effects of risky sexual behavior. Further insight into the antecedents of adolescent sexual risk behaviors may help alleviate poor health and other outcomes among teenagers and young adults.

One avenue of research has examined different relationship contexts in which sexual activity takes place. For instance, while the majority of teens are sexually active, estimates suggest roughly one-third of sexually active adolescents have had sex with a non-romantic partner (Manning, Longmore, and Giordano 2005). Others have identified variation in risk behavior between those engaging in romantic versus non-romantic intercourse. For example, compared to those who only engage in sex within a romantic relationship, adolescents who engage in non-romantic sex have reported more inconsistent condom use (Ford et al. 2001), higher levels of delinquency (McCarthy and Casey 2008), and poorer mental health (Meier 2007). Non-romantic sex in adolescence may also foster patterns of risky sexual behavior that remain past adolescence (Manning, Longmore, and Giordano 2000, 2005). Identifying determinants of adolescent non-romantic sexual behavior may elucidate the development of risky sexual practices, STD transmission, and other adverse outcomes that potentially accompany casual sex practices. Understanding the social antecedences of adolescent risky sexual behavior

may also foster the development of healthy sexual development in adolescence and into adulthood (Halpern 2010).

Prior research notes associations between future expectations of significant life events and risky sex behavior. In this context, future expectations refer to the anticipated likelihood of any number of outcomes or life-states occurring throughout the life course such college graduation, earning a middle class income, becoming a parent, or early death. Expectations of future events are thought to influence present actions by informing the level of risk and perceived long-term consequences associated with behavior. For example, a girl who anticipates graduating from college may think risky behavior unjustifiably jeopardizes her future. In this case, the saliency of risk and potential consequences inform risk calculation and subsequent behavior. While past research has demonstrated associations between future perceptions and risk behavior (Borowsky et al. 2009; Brezina, Tekin and Topalli 2009; Cubbin et al. 2010), little research has examined the association between peer groups' anticipation of the future events and individual risk behavior.

This paper extends existing research on future expectations and sexual risk behavior in three ways. First we examine the association between anticipation of college completion and subsequent non-romantic sexual behavior. We hypothesize that anticipating academic achievement increases the odds of both abstaining from intercourse and only engaging in intercourse with a romantic partner compared to engaging in non-romantic intercourse. This paper also considers how friends' anticipation of academic achievement relates to non-romantic sexuality. We test whether friends' anticipation of their own future success is associated with the formation of non-romantic sexual relationships after controlling for individual perceptions of future success. Finally we consider whether characteristics of adolescent friendship networks

condition the effect of friends' anticipated future success on sexual risk behavior by testing whether the risk reducing effect of peer future success is amplified when adolescents are in very dense networks or occupy very central positions. Understanding these network processes elucidates the mechanisms through which peer groups may affect adolescent risk behavior.

The remainder of paper proceeds as follows. We first review existent research on future expectations and risk behavior and outline the merits of the research, especially with regards to its explication of the mechanisms connecting risk perceptions and behavior. We then review studies that have employed social network analysis (SNA) to understand adolescent problem behavior and note SNA's potential for explaining the mechanisms through which peers affect future perceptions and present risk behavior. This paper takes an integrative approach that incorporates both network and psychological mechanisms to explain adolescent problem behavior.

FUTURE PERCEPTIONS AND RISK-TAKING BEHAVIOR

Ross and Hill's (2002) model of unpredictability and risk behavior maintains that exposure to instability and disadvantage throughout childhood fosters the development of an "unpredictability schema" that refers to "a pervasive belief that people are undependable and the world is chaotic" (Ross and Hill 2002:458). A number of psychological constructs appear to be associated with this schema, including decreased self-efficacy (Bandura 1982), locus of control (Sherer et al. 1982), and a lack of future orientation (Hill, Ross, and Low 1997). It is thought that unpredictability schemas manifest themselves in impulsive behavior and sensation seeking, particularly among adolescents.

Recent research highlights the association between the anticipation of dreary or uncertain futures and risk-taking behavior. Borowsky, Ireland, and Resnick (2009) found that adolescents

who had high perceived risk for early death were subsequently more likely to attempt suicide, experience a fight-related injury, practice unsafe sex, and contract HIV. Likewise Brezina, Tekin, and Topalli (2009) found adolescents who perceived a high likelihood of early death committed more violent and non-violent offenses. Given associations between individual anticipation for future events and perceptions of behavioral risk and consequences, we expect individuals' perceptions of future achievement will be positively associated with the odds of abstaining and engaging in romantic only sex, compared to having non-romantic intercourse. Accordingly, we hypothesize:

> H1. Anticipation for future success increases the odds of both abstaining from intercourse and having a romantic sexual relationship, compared to having non-romantic intercourse.

Focusing on one's own future expectations and risk calculations offers insight into the psychological mechanisms surrounding sexual risk behavior. However ignoring larger social environments, such as schools and peer contexts, precludes understanding how variation in future expectations across groups relates to risk behavior. This is a significant oversight if we seek to explain the etiology of individual behavior through risk calculation and future perceptions. Individuals' future orientations are likely rooted in salient experiences within overlapping adolescent contexts such as schools, families, neighborhoods, and friendship groups. Research focusing on characteristics of groups and individuals across significant contexts of interaction is needed to understand how future schemas develop and risk-taking behavior is enacted. If individual risk calculation and future expectations directly affect risk behaviors, and risk calculations are related to individual and group experiences, then fundamental causes of individual risk behaviors are most likely of social origin. As such we must then attempt to understand how contexts shape anticipation of future events and the associated risk behavior.

SOCIAL CONTEXTS, ANTICIPATED LIFE EVENTS, AND RISK BEHAVIOR

Neighborhood structural disadvantage has been shown to be positively associated with the odds of sexual initiation and condom non-use (Cubbin et al. 2005; Harding 2007). Research also demonstrates that neighborhood disadvantage accounts for some racial/ethnic variation in sexual behavior among adolescents (Browning, Leventhal, and Brooks-Gunn 2004, 2005). For example, Browning and colleagues (2004) found that neighborhood disadvantage explained residual variation in early sexual initiation among black and white adolescents aged 11 to 16 in Chicago. However, the effect of neighborhood disadvantage was not mediated by collective efficacy, or "social cohesion among neighbors combined with willingness to intervene on behalf of the common good" (Sampson, Raudenbush, and Earls 1997), suggesting its effect on sexual risk behavior operates somewhat independent of aggregate levels of social cohesion and control.

One possible reason that disadvantaged contexts are associated with sexual initiation after accounting for aggregate levels of cohesion and informal social control is that chronic exposure to disadvantage leads to feelings of helpless and anticipation of dim futures. If this is the case, then the effects of contextual stressors on risky behavior are likely mediated by individual-level mechanisms, such as the internalization of objective probabilities of upward mobility (MacLeod 1995). Subcultural theorists (Cloward and Ohlin 1960) have proposed that individual members of disadvantaged groups who are bombarded with symbols of conventional success and social achievement, but are constantly reminded of their inability to achieve them, form delinquent and other deviant subcultures in response to their shared adversity. Members of subcultures behave in unconventional and often disruptive ways in order to "insulate themselves from…negative judgments and to provide a context in which some semblance of self-respect and dignity can be maintained" (MacLeod 1995:115). From this perspective subcultures provide alternative avenues for success and achievement that are attainable to those who perceived that they are not likely to

achieve conventional forms of success, like academic achievement or earning a high income through legitimate employment.

Macro-level quantitative research has revealed associations between local labor market conditions and adolescent and young adult delinquency, after controlling for neighborhood rates of poverty and other structural covariates. Krivo and Peterson (2004) found that the jobless rate and the percent of low-wage jobs in census tracts were positively associated with the number of young adult arrests for violent crimes in census tracts in Cleveland, Ohio. The authors suggest high prevalence of low wage jobs foreshadows dim economic futures for young adult residents. Internalization of limited opportunities for economic advancement may in turn increase strain and limit attachment to behavioral norms related conventional institutions, such as schools or legitimate work. Multilevel research on neighborhood level labor characteristics has also found associations between prevalence of low wage jobs and delinquency. Others (Bellair and Roscigno 2000; Bellair, Roscigno, and McNulty 2003) have found that the proportion of individuals employed in service sectors at the county level was positively associated with adolescent violence and drug use after controlling for individual covariates and school attachment. The authors propose adolescents may adjust their behavior according to perceived local employment and opportunity structures. Adolescents may be more likely to conform to conventional normative structures common to workplaces when they perceive that their future employment opportunities are bright. Conversely others may be less likely to adhere to mainstream values and goals when they anticipate dim futures. Strain may also accompany low economic prospects, increasing the risk of violence and other self-destructive behavior. These and other studies suggest that characteristics of labor markets are associated with risk behaviors, and that some of the association may be explained through individual processes, including

perceptions of one's own future.

Research also suggests that internalizing norms and behavioral models help explain associations between contextual stressors, anticipation of conventional success, and risk behavior. Jacobs and Wright (1999) suggest participation in a "street culture" that entailed the rejection of both conventional living and future orientation mediates and shapes the relationship between enduring disadvantage, criminal motivation, and performing armed robbery. Deficiencies in human and cultural capital limited respondents' employment prospects, while conspicuous consumption and adherence to "here and now" orientations led to increased financial desperation among respondents. At the same time respondents' present orientation increased motivation for quick and easy cash to fund a lifestyle that expressed a valued street social identity. Theft and robbery were quick and viable ways of obtaining cash when future prospects are dim.

Modes of behavior and systems of meanings found especially in disadvantaged contexts may also pertain to sexual behavior and family formation practices. Edin and Kefalas' (2006) study of low-income mothers highlights the relationship between future expectations and women's decisions to become mothers. They found respondents perceived fewer opportunity costs associated with having children at younger ages. Respondents were less likely to view early childbearing as hindering individual achievement because they perceived early childbearing does little to affect their labor market prospects. The absence of economically successful female role models helped make conventional avenues for gaining social esteem and personal satisfaction, such as career or scholastic achievement, "appear vague and tenuous" (Edin and Kefalas 2006:49). The dim economic prospects of those within the neighborhood contexts reinforced the

primacy of motherhood in the construction of identity among the respondents and negated much of the negative social and life consequences of early parenting.

Like social meanings of childbearing and sexual risk behavior, prospects for future achievement are rooted in shared experiences within significant contexts such as neighborhoods, schools, and peer groups. For example Plickert (2008) found that friends' academic orientation (as measured by grade point average and anticipation of college completion) was positively associated with adolescents' anticipation of college attendance. Furthermore, friends' academic orientation mediated the association between school dropout rates and college expectations. Perceptions of future success that circulate within peer contexts also likely affect individual risk behavior after taking into account one's own perception of his or her future. Haynie, Silver, and Teasdale (2006) found that peer's academic orientation was negatively associated with the odds of engaging in violence among adolescents after controlling for respondents' own academic orientation. If isolation from persons who have either achieved or anticipate achieving conventional success makes future prospects seem vague and unattainable, then friendships with individuals who anticipate future success likely decrease risky sexual behavior after taking into account one's own perceptions of the future. Accordingly, we hypothesize:

> H2. Friend's anticipation of college completion increases the odds of abstaining or engaging in romantic only intercourse, compared to non-romantic intercourse.

While research points to normative influences of contexts, structural features of relationships may influence which norms take hold in individuals and are expressed in action in risk taking or avoidance. Research that models the processes linking peer norms and perceptions of future prospects to individual risk behavior can better explain the process of peer influence. Social network analysis can help understand the mechanisms through which relationships shape sexual risk behavior.

NETWORK STURCTURE, LOCATION, AND TRANSMISSION OF NORMS

Social network analysts first and foremost look to patterns of social relations to explain individual and social outcomes. This orientation leads one to examine the structure of social relations, rather than individual or group attributes, to explain individual and group outcomes. This relational perspective explains variation in behavior through processes in which collectivities act "on one another" in ways that shape action and produce similar outcomes (Marin and Wellman *forthcoming*). Incorporating an understanding of network location and the configuration of ties into the study of future perceptions can help understand how individual lines of action are shaped by structural as well as normative constraints.

Network structure and position are associated with a number of adolescent outcomes including delinquency (Mangino 2009), substance use (Ennett and Bauman 1993; Ennett et al. 2006), suicide ideation (Bearman and Moody 2004; Baller and Richardson 2009), academic achievement (Goza and Ryabov 2009), sexual risk behavior (Kreager and Staff 2009), and self-reported health (Haas et al. 2010). Network structure in part refers to properties relating to the ties between actors within a network. For example, network density, which refers to the connectedness of members within the network, is at its maximum when all members are connected to one another. This network property likely entails higher levels of interaction and communication and facilitates social control, which in turn generates obligations and expectations for behavior (Coleman 1990). Dense networks are also characterized by strong ties (Granovetter 1973), which may increase interpersonal trust and limit malfeasance (Granovetter 1985), but may also decrease opportunities for interaction with those outside the network.

Ego network structure, which relates to the relationships surrounding a focal actor, has been associated with a number of adolescent outcomes including mental health and other health-

related outcomes (Falci and McNeely 2009). Network structure has also been found to modify the impact of peer characteristics on adolescent behavior and mental health. For example Haynie (2001) found that network density accentuates the association between delinquent peer friendships and individual delinquency. Falci and McNeely (2009) found that the association between network size and depressive symptoms to vary by gender and network density.

We test whether network structure modifies the association between peers' perceptions of future success and problem behaviors. While we hypothesize that peers' anticipation of future success impacts present risk taking behaviors after controlling for individual perceptions, the effect of peers' anticipation for achievement likely intensifies as network density increases if network density fosters obligations and expectations for behavior (Coleman 1990). Accordingly, we hypothesize:

> H3. Network density accentuates association between friends' anticipation of college completion and the odds of both abstaining and having intercourse exclusively within a romantic relationship compared to a non-romantic sexual relationship.

Individual position refers to location and embeddedness within the network. For example, individuals who are centrally located are connected to several others within the network. This persons' structural location is likely to have effects on individual outcomes that cannot be reduced to the density of ties the surrounding network. For example, someone who occupies a central position is likely to have greater communication frequency with others in his or her local network than someone who holds a peripheral position, regardless of ego network density (Haynie 2001). Thus centrality reflects varying levels of interaction with specific peers groups and likely affects the level of influence that members have over the actor (Ennett and Bauman 1993). As with ego network density, we hypothesize:

H4. Actor centrality accentuates association between friends' anticipation of college completion and the odds of both abstaining and having intercourse exclusively within a romantic relationship compared to a non-romantic sexual relationship.

METHODS

DATA AND SAMPLE

Our study uses data from the National Longitudinal Study of Adolescent Health (hereafter Add Health) to test hypotheses related to individuals and peers' anticipation of college completion, social network structure, and non-romantic sexual relationship formation. Add Health is a nationally representative longitudinal survey that explores the etiology of health-related behaviors and outcomes throughout adolescence and into young adulthood. All first wave respondents were nested within randomly selected high schools and feeder schools in the United States (respondents ranged from 7th to 12th graders). All US high schools that included an 11th grade and had at least 30 enrollees were eligible for participation (N = 26,666). A random sample of 80 high schools was compiled that was stratified by region, urbanicity, school type (i.e. public/private), ethnic makeup, and population size. The largest feeder school for each high school was also recruited when available, which resulted in a total of 134 schools, which ranged in size from fewer than 100 students to more that 3000 (Resnick et al. 1997).

All respondents in this analysis initially completed an in-school questionnaire between September 1994 and April 1995 and two subsequent in home surveys in 1995 and 1996. We exclude schools in which less than 50 percent of the student body completed the in-school questionnaire because those schools would yield unreliable network measures. We also dropped 13 schools that did not include respondents in the first two waves of the in home survey. Missing values on dependent variables were imputed using Stata's Ice (Imputation through Chained Equations) command (Royston 2004). Following von Hippel (2007), we created imputed

datasets that included respondents with missing data on the dependent variable, and dropped those respondents in our final statistical models as well as respondents who were missing sampling weights (Chantala and Tabor 1999). The final sample for this study sample consists of 8,873 respondents nested in 113 schools.

DEPENDENT VARIABLE

Our dependent variable was measured during the second wave in home survey, which was administered approximately a year and a half after the first in home interview. *Non-romantic sexual activity* is a nominal variable with 3 categories, and is measured with information from a number of questions. Respondents were first asked the date of their last sexual intercourse. If this date occurred before the date of the first wave interview, then respondents were coded as "1," or having abstained from sex since the first wave interview. Respondents were also coded as "1" if they indicated that they had never had sexual intercourse. Respondents were also asked a series of questions regarding their sexual activity in up to 3 romantic and 3 non-romantic relationships. Those who indicated that they engaged in vaginal or anal intercourse with a non-romantic partner after the date of the wave 1 survey were coded as "0," while those who only engaged in vaginal or anal intercourse within a romantic relationship were coded as "2" if the date of the last intercourse took place after the wave 1 survey. Finally, respondents who indicated that they exchanged sex for drugs or money since the wave 1 in home interview, or if they had non-romantic intercourse with someone other than the three identified non-romantic partners were coded as "0," having engaged in non-romantic sex, which serves as the reference category in our multinomial regression models.[1] This portion of the interview was conducted using Computer-Assisted Self-Interview (CASI), where questions are heard through headphones and read on a

computer screen and responses are entered directly into the computer. This method helps increase the accuracy of answers by limiting interviewer-induced biases.

ANTICIPATION OF ACADEMIC ACHIEVEMENT

Respondents' anticipation of future success is captured by a question that assesses respondents' perceived likelihood of college completion. Respondents' *anticipated college completion* is measured by the following question: "On a scale from 'No chance' to 'It will happen' what do you think are the chances you will graduate from college. Responses were ranged from 0 to 8 with greater values indicating higher anticipation of college completion.[2]

NETWORK MEASURES

As part of the initial in school survey, respondents nominated up to 5 male and 5 female friends from a roster that included individuals from the same school as well as students in sister or feeder schools. Data from these responses were used to construct a number of social network measures that capture the structure of ties between individuals as well as characteristics of friends. We use data from the send and receive network, meaning that for any given respondent, his or her friends include those whom he or she nominated, *as well as* those who nominated him or her. As a result, measures of peer characteristics potentially include data from individuals who were not nominated as a friend by the respondent.[3]

Friends' anticipation of college completion is measured by calculating the mean anticipation of college completion across respondents' friends in the ego send and receive network. Friends' anticipation of academic achievement is undefined for isolates, or those who did not nominate or were not nominated by other students in the school. As a result we dropped respondents with no sent or received nominations from our analysis.[4] For the sake of interpretation of the interaction between friends' anticipation for college completion and network

structure, we center friends' anticipation of college completion, density, and centrality at their grand means.

Ego network density represents the level of connectivity among alters of a focal respondent. The measure is calculated from the send and receive ego network. Density is calculated as follows:

$$DENSITY_i = \frac{\sum SR}{sr \bullet (sr-1)}$$

where ***SR*** is the total ego send- and receive-network and ***sr*** is the number of nodes in ***SR***. The measure can range from 0 to 1, with "0" indicating that none of the focal respondents' friends are themselves friends and "1" indicating that all of the friends within the ego send and receive network are friends (network is completely connected).

Whereas ego network density refers the connectivity of one's ego network, centrality indicates the degree to which an actor is connected to several others in the network. We use Bonacich's centrality (Bonacich 1987), which weighs respondent centrality by the centrality of the respondent's nominated alters. Bonacich's centrality is calculated as follows:

$$\text{Bonacich Centrality } 10X(\alpha,\beta)_i = \alpha(I - \beta X)^{-1} X1$$

where α is a scaling vector, β is a power weight (here = 0.1) indicating the degree in which an actors' centrality depends on the level of prestige of the actors to whom the ego sends ties, *I* is the identity matrix, *X* is the total friendship network, and *1* is a column of 1's. This measure differs from degree centrality, which only considers the number of incoming and outgoing ties across individuals. Higher values on the centrality measure indicate that the actor is more central in the network. Because β is positive, the measure weighs focal actors' centrality by the centrality of alters to whom the ego sends ties. Intuitively, this means that while two actors may

have an identical number of direct ties, one actor may be more central if he or she is connected to other actors who are themselves more central in the network.[5]

CONTROL VARIABLES

Finally, we include a number of measures to control for potential confounders. First, we include a measure of *family attachment* which is captured with a five-item scale that assesses the degree to which respondents feel close to their parents. The scale includes responses from 5 questions such as "How close do you feel to your mother," and "How much do you think your father cares about you?" (alpha = .843), with each question being asked for the mother and then the father, for a potential total of 10 questions indicating attachment. To account for respondents in single parent households, we took the maximum value from each paired response for each measure and constructed a 5 item scale. Family attachment is measured by a three level hierarchical linear Item Response Theory (IRT) model with attachment items at level one, individuals at level two, and schools at level three. In the first level, family attachment items are randomly varying as follows:

$$Y_{ijk} = \pi_{0jk} + \sum_{p=1}^{4} \alpha_p D_{ijk} + e_{ijk} \qquad e_{ijk} \sim \mathrm{N}(0, \sigma^2)$$

where π_{0jk} is the mean outcome for the *j*th item and e_{ijk} is normally distributed. The individual level intercepts are adjusted as follows:

$$\pi_{0jk} = \beta_{00k} + r_{0jk} \qquad r_{0jk} \sim \mathrm{N}(0, \tau_\pi)$$

where β_{00k} is the individual-specific grand mean of the perception of future achievement and r_{0jk} is a person-level random effect. Level three takes into account clustering at the school level in estimating individual-level intercepts. We calculate each individuals' level of family attachment by adding the Empirical Bayes (EB) residual score from the level-two model to the intercept

(Browning et al. 2005; Raudenbush and Bryk 2002). The resulting value represents each respondent's latent level of family attachment.

We include two other family-related measures. Following Dittus and Jaccard (2000), we measure *parental control* with a scale that assesses the degree to which parents maintain control over respondents' activities. The 6-item scale indicates whether parents let respondents make their own decisions regarding their curfew, the people they hang out with, and other activities (yes = 0, no = 1; alpha = .568). We use the EB residual score from a three-level Rasch model (items nested in individuals nested in schools) added to the individual level intercept to estimate parental control. *Parents' expectations for college completion* indicates the degree to which a respondent feels his or her mother and/or father would be disappointed if her or she did not graduate college. We took the maximum value between each parent for respondents in two-parent households to calculate the measure.

We control for *religiosity* as it has been previously demonstrated to be associated with adolescent sexual behavior (Rostosky, Regnerus, and Wright 2003; Rostosky et al. 2004). We measure religiosity with a four-item scale that assesses the frequency of prayer, religious service attendance, youth group participation, and importance of religion for the respondent (alpha = .842). Our religiosity measure represents the mean of the four standardized items. We also include a binary measure that indicates whether the respondent had taken a pledge to remain a virgin until he or she is married prior to the wave 1 interview.

A measure of *pubertal development* includes responses to four sex-relevant items (e.g. facial hair growth for boys, breast development for girls), calculated separately for boys and then girls (girls' alpha = 0.675, boys' alpha = 0.649). The measure represents the mean of the standardized items. A three-item scale of *attractiveness* includes measures of physical and

personality attractiveness, and level of grooming of the respondent (interviewer-assessed, alpha = .772). Respondent attractiveness represents the respondent level EB residual scores from a three-level IRT model added to individual-level intercepts. We also control for *age*, *race* (binary indicators for black, Latino, and other [white as reference]), and *family structure* (1 = single parent household), and parental education. Finally, we include a control for prior sexual activity on our final models. This measure indicates whether the respondent had a sexual relationship prior to the wave 1 interview.

ANALYTIC STRATEGY

Because our outcome is nominal with three categories, we use multinomial logistic regression to estimate independent variables' effects on the log odds of abstaining or only having intercourse in a romantic relationship, compared to having non-romantic intercourse. Because non-romantic intercourse serves as our reference category, a positive coefficient for variable *X* in our statistical model indicates that an *n* unit increase in *X* would result in an *n* unit increase in the log odds of *Y* occurring, which may be abstaining or having romantic only intercourse (depending which portion of the model is being examined). All statistical models are weighted with wave 2 sampling weights to make results representative of the U.S. population of in-school adolescents and adjusted for variation in the probabilities of selection and response rates (Chantala and Tabor 1999). Our models were estimated using Stata's mi estimate command, which allows for the analysis of imputed data with complex survey design.

RESULTS

Our modeling strategy is as follows. Model 1 measures the association between respondents' anticipation of college completion and the odds of abstaining or having romantic only intercourse, controlling for age, gender (female as reference), race/ethnicity (white as reference),

living in a single parent household, parental education, parental attachment, parental control, parental expectations for college completion, religiosity, an indicator of whether the respondent has taken an abstinence pledge, pubertal development, and attractiveness. Model 2 introduces peer's anticipation of college completion and model 3 introduces a control for prior sexual activity. Models 1 through 3 are displayed in table 2. Model 4 assess the main effect of network density after controlling for the covariates in model 2. Model 5 introduces an interaction between network density and peer's anticipation of future success and model 6 controls prior sexual activity. Models 4 through 6 are displayed in table 3 (below). Model 7 tests the association between actor centrality and the outcome after including the covariates from model 2. Model 8 introduces an interaction between centrality and peer's anticipation of college completion and model 9 controls for prior sexual activity. Models 7 through 9 are displayed in table 4 (below).

< INSERT TABLE 2 AROUND HERE >

Model 1 (Table 2) indicates age and pubertal development are negatively associated with the odds of abstaining, while parental education, family attachment, and religiosity are positively associated with the odds of abstaining between wave 1 and 2, compared to engaging in non-romantic intercourse. Males have lower odds of abstaining, as do blacks (compared to whites) and adolescents from single parent households. Those who have taken an abstinence pledge and members of "other" race or ethnic groups (compared to whites) are more likely to have abstained from non-romantic sex. Surprisingly, parental control is negatively, although only marginally, associated with the odds of abstaining compared to engaging in non-romantic intercourse. As hypothesized, respondents' anticipation of academic achievement is positively associated with the odds of abstaining relative to the odds of engaging in non-romantic sexual intercourse.

Comparatively few coefficients are significantly associated with the odds of engaging in romantic only versus non-romantic intercourse. Males have lower odds of only engaging in romantic intercourse, as do blacks (compared to whites), although the difference is marginally significant. Age is positively associated with the odds of engaging in romantic only intercourse. We find no evidence supporting our hypothesis that the anticipation of success increases odds of engaging in romantic only sex, compared to non-romantic sex.

Model 2 (Table 2) introduces the measure of friends' anticipation of academic achievement. We find support for our hypothesis that having friends with high expectations for academic achievement increases the likelihood that individuals will abstain from sex. The positive and significant coefficient indicates that a 1 standard deviation increase in friends' anticipation of academic achievement is associated with a 27% increase in the odds of abstaining compared to engaging in non-romantic sex ($e^{(1.31*.18)} = 1.27$). Interestingly, introducing the measure of friends' anticipated success decreases the magnitude of one's own anticipation of academic achievement to a marginally-significant level, suggesting that peers may have a stronger impact on the odds of abstaining from non-romantic sexual activity than one's own anticipation of academic achievement. The measure does little to affect the magnitude of the other coefficients from model 1. Conversely, we find no evidence that friends' anticipation for academic achievement is associated with the odds of engaging in romantic only intercourse, relative to engaging in non-romantic sexual intercourse.

The robustness of the association between friends' anticipation of future success and the odds of abstaining relative to engaging in non-romantic intercourse is illustrated in model 3, which introduces prior sexual activity. Controlling for prior sexual activity, which is negative and strongly associated with the outcome, does little to affect the magnitude of the association

between friends' anticipation of academic achievement and the outcome from model 2. Conversely the effects of most of the significant control variables in model 2 decrease in magnitude, except for single parent household, religiosity, and parental control, the latter of which increases in magnitude and becomes negatively and significantly associated with the outcome. Surprisingly, prior sexual activity is not associated with the odds of having romantic only sex after controlling of the other covariates. Introducing prior sexual activity in model 3 has little effect on the magnitude of the significant associations between the predictors and the odds of engaging in romantic only sex from model 2.

Models 4 through 6 (table 3) test the direct and interactive effects of network density on the odds of abstaining and engaging in romantic only intercourse. Model 4 indicates that ego network density is significantly and positively associated with the odds of abstaining relative to engaging in non-romantic intercourse. Conversely, ego friendship density is not associated the odds of engaging in romantic only intercourse compared to non-romantic intercourse. Model 5 introduces an interaction between friendship network density and friends' anticipation for academic achievement. We find no evidence that the effect of friends' anticipation of future success on the odds of either abstaining or engaging in romantic only intercourse varies by friendship density. Model 6 controls for prior sexual activity, which decreases the main effect of friendship density to a non-significant level.

< INSERT TABLE 3 AROUND HERE >

Finally, models 7 through 9 (results displayed in table 4) test the interactive and direct effects of respondent centrality on the outcome. The null effects in model 7 indicate that centrality is not associated with the log odds of either abstaining or engaging in romantic only sexual intercourse. The interaction term in model 8 assesses whether the association between

friends' anticipation of college completion varies by individual centrality. The significant effects of the interaction coefficients for both abstaining and engaging in romantic sex support our hypotheses that the positive association between peer's anticipation of academic achievement and both abstaining and only engaging in romantic intercourse is stronger among those who are centrally located in their friendship network. Finally, model 9 introduces a measure of prior sexual activity. Including the measure in the model decreases the magnitude of the interaction coefficient for abstaining to a marginally significant level. However, the interaction between network centrality and friends' anticipation for college completion observed for romantic only intercourse in model 8 remains significant after controlling for prior sexual activity, attesting to the effects' robustness.

< INSERT TABLE 4 AROUND HERE >

DISCUSSION

Understanding the social antecedents of adolescent sexual risk behavior is an important step in alleviating the negative social and health-related consequences that may accompany sexual activity throughout the life course. While past research suggests that young peoples' perceptions of their futures are associated with their odds of partaking in risk behavior, empirical attention has overlooked the association between individuals' anticipation of academic achievement and sexual risk behavior. Similarly, few have examined how network structure and individual embeddedness interact with characteristics of friends to affect individual sexual risk behavior. This study sought to expand on prior research on individual future expectations by testing whether individuals' anticipation of academic achievement is associated with sexual behavior in adolescence, and whether friends' anticipation of academic achievement interacts with network

density and centrality to differentially impact subsequent sexual risk behavior using longitudinal data from a representative sample of youth in the United States.

We first tested whether individuals' anticipation of future success was associated with abstaining or only having intercourse with a romantic partner compared to intercourse with a non-romantic partner. We found initially that respondents' anticipation of academic achievement was positively associated with the odds of abstaining, but not engaging in romantic only intercourse, compared to having intercourse with a non-romantic partner. However, the association between one's own anticipation of academic achievement and the odds of abstaining dropped to a marginally significant level after including friends' perceptions of future academic achievement in model 2, and became statistically non-different from zero after controlling for prior sexual activity. We acknowledge that the statistical controls in Models 2 and 3 may have masked the association between abstinence and anticipated success. However it is also likely that the null effect was observed in the multivariate analyses because the effect of anticipation of future success on sexual behavior varies across certain groups and types of individuals. A recent study using Add Health data (Cubbin et al. 2010) found that high college aspirations and perceiving a high likelihood of going to college *increased* the likelihood of sexual initiation for girls living in disadvantaged neighborhoods. The reverse was true for girls living in neighborhoods with low disadvantage. Harris, Duncan, and Boisjoly (2002) found that expectations of graduating college were negatively associated with the odds of sexual initiation among adolescent boys but not girls. Whatever the cause of the null effects in the multivariate models observed in the present study, the relationship between individual perceptions of future success and adolescent sexual behavior is complicated and merits further study.

The second major objective of this study was to understand how characteristics of friends and ego networks factor into non-romantic sexual relationship formation. Results indicate friendships with those who anticipate graduating from college may increase the likelihood of abstaining compared to engaging in non-romantic sex. This finding is notable given the marginal significance in the association between one's one anticipation of success in model 2. Individuals may engage in less risky sexual behavior regardless of their own perceptions of their future when they are surrounded by others with high expectations for academic achievement. In this case, it may be that high expectations within the peer groups lead to restrictive sexual norms for the entire group, regardless of any individual's perceptions of future academic achievement. If this is true, it suggests that friends' anticipation of success may be more important than one's own perception of the future. Alternatively, at least in the case of sexual relationship formation, the effect of peers' future perceptions on individual risk behavior is more invariant across individuals than the effect of one's own perceptions.

We also found that the effect of friends' anticipation of academic achievement varied by network location. The likelihood of both abstaining from sex and engaging in romantic sex only was greater among more central adolescents whose friends who had high expectations of future success. While the main effect of network density on the odds of abstaining was positive and significant, the effect of friends' anticipation of future success did not vary by ego network density. These results support the assertion that the actions of more central individuals are more constrained by group norms and behavioral standards. Future research may help account for the psychological mechanisms explaining variation in the effect of group norms across network embeddedness.

The findings from our study underscore the value of incorporating social network processes into an understanding of adolescent sexual behavior, and more generally, risk behaviors. Our results suggest that the behavior of more central adolescents may be more strongly influenced by their peers than more peripheral network members. This association mirrors findings from past research that indicate the association between peer and individual delinquency is stronger among those centrally located in their friendship network (Haynie 2001). Such an association challenges the assertion that high status individuals are more impervious to the influence of others and calls into question the processes through which individuals achieve status or central positions. It may be that individuals are more centrally located because they adhere to the standards of their friends as well as those from larger contexts such as schools or neighborhoods. This may entail increased adherence to behavioral norms as centrality increases. The developmental consequences of such an association between norms and network structure most likely depends on the characteristics of actors to whom one is connected; adhering to group standards is developmentally advantageous when one is embedded in a network of pro-social others. Conversely, network embeddedness may impede development when it entails increased interaction with delinquent others. Whatever the direction of the effect, understanding the interactive effects of network structure and peer behavior, norms, and future perceptions is important and merits future study.

Though this study adds to the understanding of the risky sexual behavior among adolescents, it is not without its limitations. While we use two waves of data to test our hypotheses, we only measure friend characteristics and network structure in the first wave. Thus our models do not assess whether sexual activity or anticipation for future academic achievement affect ego network structure. Recent research (Haas et al. 2010; Kreager and Staff 2009) suggests

that individual characteristics, like health and sexual permissiveness affect features of ego networks such as popularity and centrality. Dynamic longitudinal network modeling techniques such as SIENA (Simulation Investigation for Empirical Network Analysis; see Steglich et al. 2010), which allow for simultaneous examination of selection and influence processes, may be used to provide more insight into the processes through which network structure is realized and how it and the behavior of others affect individual behavioral outcomes.

We also did not assess whether anticipation for academic achievement among non-school friends is associated with sexual behavior. While Add Health gathered some information on characteristics of individuals who do not attend the sampled school or its sister school, those persons were not interviewed. As a result, we are unable to determine how embeddedness in non-school networks affects sexual activity. This is unfortunate given the association between neighborhood disadvantage and sexual risk behavior observed in prior qualitative (Harding 2010) and quantitative research (Browning et al. 2004, 2005; Harding 2007). Further research examining the relationship between features of non-school social networks will likely shed more light onto adolescent sexual developmental outcomes.

Prior research has found mixed results regarding the association between individuals' own anticipation of future achievement and their risk behavior. This study provides one of the first attempts to examine the effect of friends' perceptions of future success on sexual behavior. Findings from the present study suggest that friends' matter more than one's own perceptions in shaping sexual behavior among adolescents. Alternatively, one's own perceptions may matter, however only under certain circumstances. Regardless, this paper's findings challenge future researchers to identify the instances in which individual perceptions affect sexual risk behaviors. This paper also opens multiple avenues of research that may shed light on the processes through

which friends' anticipation for future success affect individuals risk calculations and associated behavior. We should take seriously the notion that adolescent's friends' perceptions of their futures may be central to developmentally significant outcomes for youth, including sexual behavior.

CITATIONS

Baller, Robert D., and Kelly K. Richardson. 2009. “The "Dark Side" of the Strength of Weak Ties: The Diffusion of Suicidal Thoughts.” *Journal of Health and Social Behavior* 50:261-276.

Bandura, Albert. 1982. “Self-efficacy mechanism in human agency.” *American Psychologist* 37:122-147.

Bearman, Peter S, and James Moody. 2004. “Suicide and Friendships Among American Adolescents.” *American Journal of Public Health* 94:89-95.

Bellair, Paul E., and Vincent J. Roscigno. 2000. “Local Labor-Market Opportunity and Adolescent Delinquency.” *Social Forces* 78(4):1509-1538.

Bellair, Paul E., Vincent J. Roscigno, and Thomas L. Mcnulty. 2003. “Linking Local Labor Market Opportunity To Violent Adolescent Delinquency.” *Journal of Research in Crime and Delinquency* 40(1):6 -33.

Bonacich, Phillip. 1987. “Power and Centrality: A Family of Measures.” *The American Journal of Sociology* 92:1170-1182.

Borowsky, Iris Wagman, Marjorie Ireland, and Michael D. Resnick. 2009. “Health status and behavioral outcomes for youth who anticipate a high likelihood of early death.” *Pediatrics* 124:81-88.

Brezina, Timothy, Erdal Tekin, and Volkan Topalli. 2009. “"Might Not Be a Tomorrow": A Multi-Methods Approach to Anticipated Early Death and Youth Crime.” *Criminology* 47:1091-1129.

Browning, Christopher R., Tama Leventhal, and Jeanne Brooks-Gunn. 2004. “Neighborhood context and racial differences in early adolescent sexual activity.” *Demography* 41:697-720.

Browning, Christopher R., Tama Leventhal, and Jeanne Brooks-Gunn. 2005. “Sexual Initiation in Early Adolescence: The Nexus of Parental and Community Control.” *American Sociological Review* 70:758-778.

Chantala, Kim, and Joyce Tabor. 1999. “Strategies to perform a design-based analysis using the Add Health data.” http://www.cpc.unc.edu/projects/addhealth/faqs/aboutdata/weight1.pdf (Accessed June 5, 2010).

Cloward, Richard A., and Lloyd E. Ohlin. 1960. *Delinquency and Opportunity: A Theory of Delinquent Gangs*. Glencoe: Free Press.

Coleman, James S. 1990. *Foundations of Social Theory*. Boston: Harvard University Press.

Cubbin, Catherine, Claire D. Brindis, Sonia Jain, John Santelli, and Paula Braveman. 2010. "Neighborhood Poverty, Aspirations and Expectations, and Initiation of Sex." *Journal of Adolescent Health* 47:399-106.

Dittus, Patricia J., and James Jaccard. 2000. "Adolescents' perceptions of maternal disapproval of sex: relationship to sexual outcomes." *Journal of Adolescent Health* 26:268-278.

Edin, Katherine, and Mary Kefalas. 2006. *Promises I can keep: Why poor women put motherhood before marriage.* Berkeley, CA: University of California Press.

Ennett, Susan T et al. 2006. "The Peer Context of Adolescent Substance Use: Findings from Social Network Analysis." *Journal of Research on Adolescence* 16:159-186.

Ennett, Susan T., and Karl E. Bauman. 1993. "Peer Group Structure and Adolescent Cigarette Smoking: A Social Network Analysis." *Journal of Health and Social Behavior* 34:226-236.

Falci, Christina., and Clea. McNeely. 2009. "Too Many Friends: Social Integration, Network Cohesion and Adolescent Depressive Symptoms." *Social Forces* 87:2031-2061.

Ford, Kathleen, Woosung Sohn, and James Lepkowski. 2001. "Characteristics of Adolescents' Sexual Partners and Their Association with Use of Condoms and Other Contraceptive Methods." *Family Planning Perspectives* 33:100-132.

Goza, Franklin, and Igor Ryabov. 2009. "Adolescents' Educational Outcomes: Racial and Ethnic Variations in Peer Network Importance." *Journal of Youth and Adolescence* 38:1264-1279.

Granovetter, Mark. 1985. "Economic Action and Social Structure: The Problem of Embeddedness." *American Journal of Sociology* 91:481-510.

Granovetter, Mark S. 1973. "The Strength of Weak Ties." *American Journal of Sociology* 78:1360-1380.

Haas, Steven A, David R Schaefer, and Olga Kornienko. 2010. "Health and the Structure of Adolescent Social Networks." *Journal of Health and Social Behavior* 51(4):424-439.

Halpern, Carolyn Tucker. 2010. "Reframing Research on Adolescent Sexuality: Healthy Sexual Development as Part of the Life Course." *Perspectives on Sexual and Reproductive Health* 42(1):6-7.

Hamilton, Brady E., Joyce A. Martin, and Sharon J. Ventura. 2009. "Births: Preliminary data for 2007." *National Vital Statistics Report* 57:1-23.

Harris, Kathleen Mullan, Greg J. Duncan, and Johanne Boisjoly. 2002. "Evaluating the Role of

"Nothing to Lose" Attitudes on Risky Behavior in Adolescence." *Social Forces* 80:1005-1039.

Haynie, Dana L. 2001. "Delinquent Peers Revisited: Does Network Structure Matter?." *American Journal of Sociology* 106:1013-1057.

Haynie, Dana L, Eric Silver, and Brent Teasdale. 2006. "Neighborhood characteristics, peer networks, and adolescent violence." *Journal of Quantitative Criminology* 22(2):147-169.

Hill, Elizabeth M., Lisa T. Ross, and Bobbi S. Low. 1997. "The role of future unpredictability in human risk-taking." *Human Nature* 8:287-325.

Jacobs, Bruce A., and Richard Wright. 1999. "Stick-Up, Street Culture, and Offender Motivation." *Criminology* 37:149-174.

Krivo, Lauren J., and Ruth D. Peterson. 2004. "Labor Market Conditions and Violent Crime among Youth and Adults." *Sociological Perspectives* 47(4):485-505.

Kreager, Derek A., and Jeremy Staff. 2009. "The Sexual Double Standard and Adolescent Peer Acceptance." *Social Psychology Quarterly* 72:143-164.

MacLeod, Jay. 1995. *Ain't no makin'it: Aspirations and Attainment in a Low-Income Neighborhood*. 2nd ed. Boulder, CO: Westview Press.

Mangino, William. 2009. "The Downside of Social Closure: Brokerage, Parental Influence, and Delinquency Among African American Boys." *Sociology of Education* 82:147-172.

Manning, Wendy D., Monica A. Longmore, and Peggy C. Giordano. 2000. "The Relationship Context of Contraceptive Use at First Intercourse." *Family Planning Perspectives* 32:104-110.

Manning, Wendy D., Monica A. Longmore, and Peggy C. Giordano. 2005. "Adolescents' involvement in non-romantic sexual activity." *Social Science Research* 34:384-407.

Marin, Alexandra, and Barry Wellman. "Social Network Analysis: An Introduction." in *Handbook of Social Network Analysis, Peter Carrington and John Scott*. London: Sage.

McCarthy, Bill, and Teresa Casey. 2008. "Love, Sex, and Crime: Adolescent Romantic Relationships and Offending." *American Sociological Review* 73:944-969.

Meier, Ann M. 2007. "Adolescent First Sex and Subsequent Mental Health." *American Journal of Sociology* 112:1811-1847.

Raudenbush, Stephen W., and Anthony S. Bryk. 2002. *Hierarchical linear models: Applications and data analysis methods*. Sage Publications.

Resnick, Michael D et al. 1997. “Protecting Adolescents From Harm: Findings From the National Longitudinal Study on Adolescent Health.” *The Journal of the American Medical Association* 278:823-832.

Ross, Lisa Thomson, and Elizabeth M. Hill. 2002. “Childhood Unpredictability, Schemas for Unpredictability, and Risk Taking.” *Social Behavior & Personality: An International Journal* 30:453-473.

Rostosky, Sharon Scales, Mark D. Regnerus, and Margaret Laurie Comer Wright. 2003. “Coital Debut: The Role of Religiosity and Sex Attitudes in the Add Health Survey.” *Journal of Sex Research* 40:358-367.

Rostosky, Sharon Scales, Brian L. Wilcox, Margaret Laurie Comer Wright, and Brandy A. Randall. 2004. “The impact of religiosity on adolescent sexual behavior: A review of the evidence.” *Journal of Adolescent Research* 19:677-697.

Royston, Patrick. 2004. “Multiple imputation of missing values.” *Stata Journal* 4(3):227-241.

Sampson, Robert J, Stephen W Raudenbush, and Felton Earls. 1997. “Neighborhoods and Violent Crime: A Multilevel Study of Collective Efficacy.” *Science* 277:918-924.

Santelli, John S., and Andrea J. Melnikas. 2010. “Teen Fertility in Transition: Recent and Historic Trends in the United States.” *Annual Review of Public Health* 31:371-383.

Sherer, M. et al. 1982. “The self-efficacy scale: Construction and validation.” *Psychological reports* 51:663-671.

Steglich, Christian, Tom A. B. Snijders, and Michael Pearson. 2010. “Dynamic networks and behavior: Separating selection from influence.” *Sociological Methodology* 40:329-393.

von Hippel, Paul T. 2007. “Regression with missing Ys: An improved strategy for analyzing multiply inputed data.” *Sociological Methodology* 37(1):83-117.

Weinstock, Hillard, Stuart Berman, and Willard Cates. 2004. “Sexually Transmitted Diseases among American Youth: Incidence and Prevalence Estimates, 2000.” *Perspectives on Sexual and Reproductive Health* 36:6-10.

Table 1. Descriptive Statistics

	Total Sample		Abstained		Romantic Intercourse		Non-Romantic Intercourse	
	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Abstained	0.60		-		-		-	
Romantic Intercourse Only	0.31		-		-		-	
Non-Romantic Intercourse	0.09		-		-		-	
Prior Sexual Activity	0.36		0.14		0.69		0.68	
Age	15.43	(1.54)	14.94	(1.50)	16.24	(1.34)	15.89	(1.45)
Male	0.48		0.49	(0.50)	0.43	(0.50)	0.55	(0.50)
White	0.70		0.73	(0.49)	0.66	(0.50)	0.63	(0.50)
Black	0.15		0.11	(0.37)	0.21	(0.44)	0.25	(0.47)
Latino	0.09		0.09	(0.34)	0.09	(0.36)	0.09	(0.35)
Other	0.06		0.07	(0.32)	0.04	(0.25)	0.03	(0.22)
Parental Education	5.65	(1.80)	5.84	(1.77)	5.38	(1.82)	5.39	(1.77)
Single Parent Household	0.26	(0.45)	0.20	(0.41)	0.34	(0.48)	0.34	(0.48)
Parental Attachment	4.65	(0.46)	4.72	(0.41)	4.54	(0.50)	4.57	(0.53)
Parental Control	0.80	(0.41)	0.88	(0.43)	0.65	(0.36)	0.74	(0.40)
Parent's Expectation for College Completion	4.14	(0.49)	4.17	(0.48)	4.09	(0.50)	4.10	(0.52)
Religiosity	2.72	(0.97)	2.86	(0.96)	2.52	(0.96)	2.47	(0.97)
Abstinence Pledge	0.15	(0.35)	0.19	(0.40)	0.09	(0.26)	0.08	(0.26)
Physical Development	3.07	(0.82)	2.93	(0.80)	3.30	(0.81)	3.17	(0.85)
Attractiveness	3.59	(0.53)	3.60	(0.53)	3.59	(0.53)	3.53	(0.51)
Anticipation of College Completion	6.39	(2.24)	6.66	(2.04)	5.94	(2.42)	6.09	(2.44)
Peer Anticipation of College Completion[a]	6.44	(1.31)	6.60	(1.24)	6.21	(1.37)	6.16	(1.36)
Density[a]	0.29	(0.64)	0.30	(0.65)	0.28	(0.63)	0.28	(0.61)
Centrality[a]	0.88	(0.14)	0.91	(0.15)	0.83	(0.14)	0.78	(0.14)
N	8873		5138		2911		824	

[a]Means and Standard Deviations from variables left in their raw (non-mean centered) metric

Table 2. Multinomial Models of Sexual Activity Regressed on Respondent and Friends' Anticipation of College Completion

	Model 1		Model 2		Model 3	
	Abstainer	Romantic	Abstainer	Romantic	Abstainer	Romantic
Age	-0.41***	0.12**	-0.40***	0.12**	-0.26***	0.13**
	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)	(0.04)
Male	-0.32*	-0.45***	-0.32*	-0.45***	-0.20	-0.43***
	(0.13)	(0.11)	(0.13)	(0.11)	(0.13)	(0.11)
Black	-1.05***	-0.21+	-1.09***	-0.23+	-0.88***	-0.19
	(0.14)	(0.12)	(0.14)	(0.12)	(0.15)	(0.12)
Latino	-0.01	0.04	0.04	0.05	-0.01	0.08
	(0.22)	(0.23)	(0.22)	(0.23)	(0.24)	(0.23)
Other	0.91***	0.38	0.87**	0.37	0.57*	0.39
	(0.25)	(0.31)	(0.24)	(0.31)	(0.26)	(0.30)
Parental Education	0.10**	0.00	0.08*	0.00	0.09*	0.00
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Single Parent Household	-0.36**	0.08	-0.36**	0.09	-0.34*	0.08
	(0.13)	(0.12)	(0.13)	(0.12)	(0.13)	(0.11)
Parental Attachment	0.45***	-0.01	0.44***	-0.01	0.25+	-0.01
	(0.11)	(0.12)	(0.11)	(0.13)	(0.13)	(0.13)
Parental Control	-0.28+	-0.24+	-0.29+	-0.24+	-0.41*	-0.24+
	(0.16)	(0.14)	(0.16)	(0.14)	(0.18)	(0.14)
Parent's Expectation for	0.07	-0.03	0.05	-0.03	0.06	-0.04
College Completion	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
Religiosity	0.31***	0.06	0.30***	0.06	0.27***	0.06
	(0.07)	(0.06)	(0.07)	(0.06)	(0.07)	(0.06)
Abstinence Pledge	0.77***	0.13	0.75***	0.12	0.42+	0.13
	(0.21)	(0.21)	(0.21)	(0.20)	(0.23)	(0.21)
Physical Development	-0.38***	0.08	-0.39***	0.08	-0.25**	0.08
	(0.08)	(0.08)	(0.08)	(0.09)	(0.08)	(0.08)
Attractiveness	-0.03	0.15	-0.07	0.13	0.02	0.13
	(0.10)	(0.10)	(0.10)	(0.10)	(0.11)	(0.10)
Anticipation of College	0.07*	-0.03	0.05+	-0.03	0.02	-0.04
Completion	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Peer Anticipation of College			0.18***	0.06	0.17***	0.06
Completion			(0.04)	(0.04)	(0.05)	(0.04)
Prior Sexual Activity					-2.17***	-0.04
					(0.14)	(0.13)
Intercept	5.85***	-0.96	6.24***	-0.83	5.25***	-0.84
	(1.04)	(1.00)	(1.05)	(1.01)	(1.09)	(1.01)

Notes: Survey corrected standard errors in parentheses. Estimates based on 10 imputed datasets. School N=113, Respondent N=8,873. ***p < .001, **p < .01, *p < .05, + p < .10 (two-tailed tests).

Table 3. Multinomial Models of Sexual Activity Regressed on Peer Anticipation of Academic Achievement and Network Density

	Model 4		Model 5		Model 6	
	Abstainer	Romantic	Abstainer	Romantic	Abstainer	Romantic
Age	-0.41***	0.13***	-0.41***	0.13***	-0.26***	0.13***
	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)	(0.04)
Male	-0.31*	-0.45***	-0.31*	-0.45***	-0.20	-0.43***
	(0.13)	(0.11)	(0.13)	(0.11)	(0.13)	(0.11)
Black	-1.08***	-0.23+	-1.08***	-0.23+	-0.88***	-0.19
	(0.13)	(0.12)	(0.13)	(0.12)	(0.15)	(0.12)
Latino	0.02	0.06	0.02	0.05	-0.01	0.08
	(0.22)	(0.23)	(0.23)	(0.24)	(0.25)	(0.23)
Other	0.85**	0.37	0.85**	0.37	0.55*	0.39
	(0.24)	(0.30)	(0.24)	(0.31)	(0.26)	(0.30)
Parental Education	0.08*	0.00	0.08*	0.00	0.09*	0.00
	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)
Single Parent Household	-0.35**	0.08	-0.35*	0.08	-0.34*	0.08
	(0.13)	(0.12)	(0.13)	(0.12)	(0.14)	(0.11)
Parental Attachment	0.44***	-0.01	0.44***	-0.01	0.25+	-0.01
	(0.11)	(0.13)	(0.11)	(0.13)	(0.13)	(0.13)
Parental Control	-0.32*	-0.23+	-0.32*	-0.23	-0.42*	-0.23
	(0.16)	(0.14)	(0.16)	(0.14)	(0.18)	(0.14)
Parent's Expectation for	0.05	-0.03	0.05	-0.04	0.05	-0.04
College Completion	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
Religiosity	0.31***	0.06	0.31***	0.06	0.28***	0.06
	(0.07)	(0.06)	(0.07)	(0.06)	(0.07)	(0.06)
Abstinence Pledge	0.75***	0.12	0.75***	0.12	0.43+	0.13
	(0.20)	(0.20)	(0.20)	(0.20)	(0.23)	(0.21)
Physical Development	-0.38***	0.08	-0.38***	0.08	-0.24**	0.09
	(0.08)	(0.09)	(0.08)	(0.08)	(0.08)	(0.08)
Attractiveness	-0.04	0.13	-0.05	0.13	0.03	0.13
	(0.10)	(0.10)	(0.10)	(0.10)	(0.11)	(0.10)
Anticipation of College	0.05*	-0.04	0.05*	-0.03	0.03	-0.04
Completion	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Peer Anticipation of College	0.17***	0.06	0.18***	0.05	0.17**	0.05
Completion	(0.04)	(0.04)	(0.05)	(0.04)	(0.05)	(0.04)
Network Density	1.13*	-0.22	1.16**	-0.16	0.65	-0.16
	(0.43)	(0.45)	(0.41)	(0.43)	(0.42)	(0.43)
Density*Peer Anticipation of			-0.15	0.20	-0.03	0.19
College Completion			(0.27)	(0.28)	(0.26)	(0.26)
Prior Sexual Activity					-2.16***	-0.04
					(0.14)	(0.13)
Intercept	6.25***	-0.87	6.25***	-0.90	5.26***	-0.89
	(1.06)	(1.02)	(1.06)	(1.02)	(1.10)	(1.02)

Notes: Survey corrected standard errors in parentheses. Estimates based on 10 imputed datasets. School N=113, Respondent N=8,873. ***p < .001, **p < .01, *p < .05, + p < .10 (two-tailed tests).

Table 4. Multinomial Models of Sexual Activity Regressed on Peer Anticipation of Academic Achievement and Centrality

	Model 7		Model 8		Model 9	
	Abstainer	Romantic	Abstainer	Romantic	Abstainer	Romantic
Age	-0.40***	0.13***	-0.40***	0.13***	-0.25***	0.13***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Male	-0.32*	-0.44***	-0.33*	-0.46***	-0.20	-0.44***
	(0.13)	(0.11)	(0.13)	(0.11)	(0.13)	(0.11)
Black	-1.08***	-0.21+	-1.07***	-0.19	-0.85***	-0.16
	(0.14)	(0.12)	(0.14)	(0.12)	(0.16)	(0.12)
Latino	0.04	0.06	0.04	0.07	0.01	0.10
	(0.22)	(0.23)	(0.22)	(0.23)	(0.24)	(0.23)
Other	0.87**	0.37	0.86**	0.35	0.56*	0.39
	(0.24)	(0.31)	(0.25)	(0.31)	(0.26)	(0.31)
Parental Education	0.08*	-0.01	0.07*	-0.01	0.08*	-0.01
	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)
Single Parent Household	-0.36**	0.09	-0.35**	0.09	-0.34*	0.08
	(0.13)	(0.12)	(0.13)	(0.12)	(0.14)	(0.12)
Parental Attachment	0.43***	-0.02	0.43***	-0.02	0.24+	-0.02
	(0.11)	(0.13)	(0.11)	(0.13)	(0.13)	(0.13)
Parental Control	-0.29+	-0.23	-0.29+	-0.23	-0.39*	-0.22
	(0.16)	(0.14)	(0.16)	(0.14)	(0.18)	(0.14)
Parent's Expectation for College Completion	0.05	-0.04	0.05	-0.03	0.06	-0.03
	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
Religiosity	0.30***	0.06	0.30***	0.06	0.27***	0.06
	(0.07)	(0.06)	(0.07)	(0.06)	(0.07)	(0.06)
Abstinence Pledge	0.75***	0.13	0.76***	0.13	0.44+	0.15
	(0.21)	(0.21)	(0.21)	(0.20)	(0.23)	(0.21)
Physical Development	-0.39***	0.08	-0.39***	0.08	-0.25**	0.08
	(0.08)	(0.09)	(0.08)	(0.09)	(0.08)	(0.08)
Attractiveness	-0.07	0.12	-0.07	0.12	0.01	0.12
	(0.10)	(0.10)	(0.10)	(0.10)	(0.11)	(0.10)
Anticipation of College Completion	0.05+	-0.04	0.05+	-0.04	0.02	-0.04
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Peer Anticipation of College Completion	0.17***	0.05	0.24***	0.11*	0.21***	0.12*
	(0.04)	(0.04)	(0.05)	(0.05)	(0.06)	(0.05)
Network Centrality	0.03	0.12	0.02	0.11	0.10	0.10
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
Centrality*Peer Anticipation of College Completion			0.20*	0.19*	0.16+	0.19*
			(0.08)	(0.08)	(0.08)	(0.08)
Prior Sexual Activity					-2.17***	-0.03
					(0.14)	(0.13)
Intercept	6.23***	-0.83	6.32***	-0.74	5.31***	-0.76
	(1.05)	(1.01)	(1.05)	(1.02)	(1.09)	(1.01)

Notes: Survey corrected standard errors in parentheses. Estimates based on 10 imputed datasets. School N=113, Respondent N=8,873. ***p < .001, **p < .01, *p < .05, + p < .10 (two-tailed tests).

[1] This coding strategy allows us to run multinomial logistic regression to estimate the odds of

[2] We tried an alternative specification of the anticipation for future success measure that included respondents' perceived likelihood of earning a middle class income by age 30. The measure used in this study was more highly correlated with the outcome than the combined measure. This finding reflects past research that found a stronger correlation between parental education and adolescent sexual risk behavior than parental income (Cubbin et al. 2005). Furthermore, a number of respondents in Add Health anticipated earning a middle class income but did not anticipate graduating college. This may in part be due to respondents' variation in the estimation of middle class incomes across respondents. Accordingly, perceived likelihood of college completion is likely a better measure for anticipation of future achievement as it relates to a specific outcome rather than a potentially vague condition whose meaning varies across individuals.

[3] Others using Add Health (see McGloin 2009) have utilized information from only the send friendship network to construct measures of peer characteristics with the assumption that unreciprocated ties indicate that the sender is not a friend of the non-reciprocating receiver. While we took this under consideration in our analyses, the limited number of possible gender-specific sending ties (up to 5 for each gender) may result in an overestimation of unreciprocated friendships. Furthermore, centrality, a key variable in our analysis, is estimated using a symmetric matrix, in which ties between actors are undirected. We thus used the send and receive network to construct peer measures, and rely on the send and receive network density and centrality measures constructed by Add Health researchers.

[4] An alternative approach to dealing with data that are not missing at random is to recode isolates' friends' anticipation of academic achievement to 0 and included a binary control variable indicating whether the respondent is an isolate. Taking this approach would result in a larger sample size. We ran models in which isolates' for peer's anticipation for college completion and network density were recoded to 0 and included a dummy variable indicating that the respondent is an isolate. Those models netted similar results as the models we present in this paper. However because we do not wish to make inferences on the effect of peer characteristics for isolates, we exclude them from the present analysis.

[5] Parameterizing β as positive is appropriate given our hypotheses regarding the interactive effects of centrality and peers' anticipation of college completion. For example, Bonacich (1987) proposes that in a communication network, a positive β value is appropriate because the amount of information that is available to an actor is a function of the information exposure (or centrality) of others to whom he or she is connected. Because we argue peer norms will have greater effects on behavior when there is greater communication frequency between an individual and his or her peers, a positive value is appropriate. We also limit the magnitude of the β because larger weights entail placing greater weight into account the centrality of more distant actors when calculating a respondents' centrality (Bonacich 1987). Because we are more interested in the level of interaction within the local network, we set β =0.1.