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Friends First? The Peer Network Origins of Adolescent Dating

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Abstract

The proximity of dating partners in peer friendship networks has important implications for the diffusion of health-risk behaviors and adolescent social development. We derive two competing hypotheses for the friendship-romance association. The first predicts that daters are proximally positioned in friendship networks prior to dating and that opposite-gender friends are likely to transition to dating. The second predicts that dating typically crosses group boundaries and opposite-gender friends are unlikely to later date. We test these hypotheses with longitudinal friendship data for 626 9th grade PROSPER heterosexual dating couples. Results primarily support the second hypothesis: romantic partners are unlikely to be friends in the previous year or share the same cohesive subgroup, and opposite-gender friends are unlikely to transition into dating.

In less than a decade, dating and romance have moved from the periphery to the core of adolescence research (Collins, Welsh & Furman, 2009). Although our understanding of adolescent romance and its significance for developmental and public health outcomes is mounting (Connolly & McIsaac, 2010), less is known about how dating relationships emerge within adolescent friendship networks. For more than fifty years, scholars have understood the importance of peer contexts for the emergence of teen dating, but only recently has research begun to systematically address the topic with adequate data and methods. Additional research on the friendship-romance association is warranted not only because it bridges the burgeoning area of network science with traditional theories of social development, but also because it provides potentially important insights into how behaviors and attitudes—particularly risky ones—are diffused in adolescent peer networks. If dating partners were not close in their peer friendship network prior to dating, then it is more likely

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that their relationship opens a new conduit for the flow of behaviors and attitudes between peer groups (Kreager & Haynie, 2011; Kreager, Haynie, & Hopfer, 2013). If this were the case, prevention programs may become more effective by developing peer resistance strategies aimed at the friends of dating partners. This study therefore examines the diffusion potential of dating relationships by focusing on the friendship origins of adolescent romance.

Peers and Dating

Dunphy (1963) was among the first to document a connection between peer contexts and romantic relationships. Observing the friendships of 303 Australian adolescents of varying ages, he developed a sequential stage theory of adolescent peer structure and romantic development. His stages moved from the unisexual peer groups common to early adolescence, to the mixed-gender groups seen in middle adolescence, and ended with the disintegration of groups in favor of romantic dyads in later adolescence. Central to his argument were propositions that popular male and female group members crossed unisexual group boundaries to initiate cross-gender friendship and dating interactions, and that larger heterosexual groups (i.e., “crowds”) create the opportunities and contexts (e.g., parties and group activities) for romantic heterosexual contact.

Scholars have recently begun utilizing social network data to examine questions about the developmental contexts of romantic relationships. Connolly and colleagues have produced an impressive set of studies in this area. Their research (Connolly, Craig, Goldberg, & Pepler, 2004; Connolly, Furman, & Konarski, 2000; Connolly & Goldberg, 1999; Connolly & Johnson, 1996; Friedlander, Connolly, Pepler, & Craig, 2007; see Connolly & McIsaac 2011, for a review) correlates various friendship network measures with adolescent romantic involvement. Perhaps the strongest and most consistent finding from these studies is that adolescents embedded in mixed-gender friendship networks are more likely to initiate dating and romantic activities than those with exclusively same-gender network ties (Connolly & Johnson, 1996; Connolly et al., 2000; 2004). For example, Connolly, Furman, and Konarski (2000) found that the correlation ($r = .36, p < .01$) between belonging to a mixed-gender peer network and involvement in a romantic relationship was almost three times larger than the correlation ($r = .13, p > .05$) between belonging to a same-gender peer network and romantic involvement. This association supports Dunphy’s (1963) sequential model, as he argued that mixed-gender crowds provide the opportunities and partners for romance. There is also some evidence that popular adolescents are more likely to date than their less popular peers (Carlson & Rose, 2007; Connolly & Johnson, 1996; Kuttler & Greca, 2004; but see Zimmer-Gembeck, Siebenruner, & Collins, 2004). Again, this pattern is consistent with Dunphy’s (1963) original formulation and suggests that dating activities are likely to cluster in the central regions of peer social networks, at least during early adolescence. Indeed, Connolly and colleagues (Connolly et al., 2004; Connolly & McIsaac, 2011) developed a theory of adolescent romantic stages highly reminiscent of Dunphy. They outlined four stages (infatuation, affiliative, intimate, and committed) that situate romantic development in peer contexts and emphasize the progression from unisexual to mixed-gender peer groups led by socially skilled early daters.

Friends First?

Although informative, prior research on friendship networks and romance has yet to fully examine a number of issues. Of particular interest for this study is how pre-existing opposite-gender friendships potentially transition into dating relationships. Do dating couples emerge from proximal friendship ties, or do they tend to connect partners from distinct groups or distal network positions? The answer to this question has important implications for peer-network behavioral diffusion processes. As Kreager and Haynie (2011) recently argued, if adolescent romantic relationships occur across group boundaries with few existing friendship ties, then daters will likely be exposed to new sets of peers and group norms through their romantic partners (see also Kreager, Haynie, & Hopfer, 2013). Our paper tests an assumption of this argument (i.e., that daters are likely to bridge previously disconnected portions of friendship networks) by directly examining the friendship origins of romantic relationships. If dating partners are not friends before becoming dating partners, or if they are not proximally positioned in peer networks, then their role as network bridges becomes more likely.

Findings that dating adolescents first have mixed-gender friendships appear contrary to the argument that dating helps to bridge peer groups, as opposite-gender friendships could be interpreted as subsequently transitioning into dating relationships. Indeed, among an undergraduate sample, Bleske-Rechek & Buss (2001) found that men commonly reported initiating opposite-sex friendships in the hopes that the friendship would transition into a short-term sexual or long-term romantic relationship. However, such friendship-to-romance transitions may be largely absent during adolescence for at least two reasons. First, the emergence of in-group romantic relationships may threaten adolescent group cohesion and unity (Shor & Simchai, 2009). Group members (who remain predominantly same-gender during adolescence) may become jealous or fear displacement should opposite-gender friends transition to dating. Supporting this reasoning, Hand and Furman (2009) found that jealousy associated with competition for romantic partners was the most common perceived risk of adolescent same-gender friendships. Such social threats may be minimized by seeking partners outside the immediate friendship group, not dating a friend's prior romantic partner (e.g., a "no seconds" rule [Bearman, Moody, & Stovel, 2004]) and ensuring that opposite-gender friendships remain platonic. The threat to group cohesion may be particularly pronounced when a couple dissolves, as group members would be forced to choose sides and further fracture the group.

A second obstacle for friend-to-romance transitions occurs at the dyadic level. From a social exchange perspective (Homans, 1950, 1958; Thibaut & Kelley, 1959), an adolescent's decision to aim a romantic gesture at a friend is likely made under conditions of uncertainty, with potential rejection being a substantial cost. Romantic rejection would not only elicit group sanctions and public embarrassment, but also threaten a valued opposite-gender friendship. The risks that accompany such a romantic solicitation likely outweigh its potential rewards, particularly in early adolescence when romantic experience is low (Carver, Joyner, & Udry, 2003) and group membership and peer influence peak (Brown, Bakken, Ameringer, & Mahon, 2008). When asked about the potential costs of other-sex friendships, the most common response in Hand and Furman's (2009) study was the

potential confusion resulting from one-sided romantic or sexual attraction (e.g., “They might like you, and could ruin the whole friendship”). Similar concerns were voiced by Canadian 9th and 12th graders asked about the challenges of other-sex friends (McDougall and Hymel 2007).

Given the potential pitfalls of intra-group dating, adolescents may primarily look outside their immediate friendships for dating partners. As Dunphy (1963) long ago articulated, the single-gender peer groups common to early adolescence *require* that daters look outside their immediate friendships for heterosexual dating partners. A similar process may occur throughout early and middle adolescence as friendship networks become increasingly mixed-gender. Risks inherent in initiating within-group romantic relationships may thus result in daters searching outside their friendship groups for romantic partners and prior cross-gender friendships rarely transitioning to dating relationships.

Similar Yet Set Apart?

Research that compares adolescent romantic partners’ pre-relationship characteristics commonly finds evidence of partner homophily, such that partners are similar across a broad range of social and behavioral characteristics prior to dating (e.g., popularity, physical attractiveness, grades, socioeconomic status, race, etc.) (Bearman, Moody, & Stovel, 2004; Simon, Aikins, & Prinstein, 2008). These findings are consistent with a broader assortative mating literature that finds spouses, newlyweds, and dating partners are likely to share a variety of sociodemographic characteristics at a relationship’s outset (Luo, 2009; Schwartz & Mare, 2012; Watson et al., 2004). Partner homophily would also be consistent with the hypothesis that partners are proximally located in peer friendship networks prior to dating because studies of peer networks commonly find that adolescents who share demographic and behavioral characteristics tend to be clustered in the same cohesive subgroups (Brechwald & Prinstein, 2011; Kreager, Rulison, & Moody, 2011). Extending this logic to romantic relationships implies that daters—who are likely to be similar on many characteristics—should begin as friends or emerge from the same friendship group.

Alternatively, partner homophily may occur because daters come from non-adjacent, but *structurally equivalent*, network positions. Network structural equivalence is defined as the degree of similarity between actors’ patterns of relations (e.g., similar levels of popularity, number of social ties, or leadership roles), without necessarily sharing direct or indirect ties (Burt 1976). Behavioral similarity between structurally equivalent actors may result both because certain behaviors helped the actors assume equivalent roles and because structurally equivalent actors monitor and model each other’s behavior (Burt, 1987; Burt & Uchiyama, 1989; Fujimoto & Valente, 2012). For example, the leaders of two peer groups may have no direct friendship tie – in fact they may be enemies – yet they are likely to be well-known to each other and share a variety of characteristics, including assertiveness, physical attractiveness, intelligence, and sociability. With regard to adolescent romantic relationships, opposite-gender peers who are distant in a peer friendship network, yet occupy similar structural positions, may share other attributes and be more attracted to one another than non-equivalent peers. A resulting romantic tie between non-adjacent yet structurally equivalent partners would then create a network bridge across distinct regions of the

friendship network (Kreager & Haynie, 2011). The resulting exposure to new peer contexts may then increase behavioral diffusion beyond the behavioral similarity associated with a shared structural position.

Current Study

Two competing hypotheses motivate the current study. The first hypothesis is that dating partners emerge from proximal friendships and peer groups, while the second states that dating partners are unlikely to be friends or be in the same friendship group prior to dating, but are likely to occupy structurally equivalent positions in friendship networks. Testing these hypotheses requires a data source where both adolescent friendship and dating nominations were collected over time and in settings with clear network boundaries (e.g., schools) so that one can be reasonably certain that all romances and friendships within the targeted network are represented. Few data meet these requirements. Fortunately, the Promoting School-community-university Partnerships to Enhance Resilience (PROSPER) study (Spath, Redmond, Claire, Shin, Greenberg, & Feinberg, 2011), which collected friendship and romantic nominations for the same individuals in 8th and 9th grade within 54 Iowa and Pennsylvania schools, met the requisite conditions. Using this data, we identify romantic relationships based on student-reported 9th grade dating nominations. Then, within each dyad, we compare partners' friendship statuses, group membership, and structural equivalence at the prior (8th grade) wave. We first replicate prior research by examining the association between 8th grade mixed-gender friendships and 9th grade dating. To explore the friendship hypotheses, we next measure the proportion of romantic dyads who were friends in the year prior to their relationship. To put this percentage into context, we also examine how many 8th grade opposite-gender friendships did not transition to dating either because they remained friends or dissolved the relationship. We also estimate the average sociometric distance at 8th grade of 9th grade daters and compare this to distances between non-dating friendships. Finally, to test the structural equivalence hypothesis, we compare the 8th grade egocentric network properties (e.g., in-degree, centrality, peer-group centrality) of partners in 9th grade romantic relationships.

Method

Participants

The present study uses data from the PROSPER longitudinal study of substance use prevention (Spath, Greenberg, Bierman, & Redmond, 2004; Spath, Redmond, Clair, Shin, Greenberg, & Feinberg, 2011). PROSPER follows two successive cohorts of 6th grade students from 28 rural communities in Iowa ($n = 14$) and Pennsylvania ($n = 14$), with 1,300 to 5,200 enrolled public school students per community. The communities had an average population of 19,000 residents and the median household income was \$37,000. As is typical of most non-metropolitan communities in the midwestern and northeastern U.S., the communities in this sample were predominantly white (range: 97% to 61%). One of the Pennsylvania schools did not agree to participate in the network portion of the study; thus, the final sample included 27 rural communities, resulting in 54 unique community-cohorts and data from >11,000 youth at each wave. Students completed confidential pencil and

paper questionnaires administered during school hours in the Fall of 6th grade, Spring of 6th grade, and in the Spring of 7th, 8th, and 9th grades. Participation rates ranged from 86% to 90% for all eligible students with an average of 87.2%.

The present study uses data from the 8th and 9th grade waves (median age 13–15), when dating questions were introduced and peer network measures were available for analyses. These ages cover a period of rapid romantic involvement: by age 15, 40–50% of American adolescents report a current romantic relationship (Carver, Joyner, & Udry, 2003). Of the 8,334 PROSPER participants who completed 8th and 9th grade surveys, 51.8% were female, 81.3% Caucasian, and 22.3% reported receiving free lunch vouchers. Of these respondents, 4,326 (45%) reported dating someone while in the 9th grade. We then focused on the nominated dating partner's identity, and found that 1,631 (38%) named a partner who could be matched to a participant in the PROSPER sample. We lost 447 of these respondents because their partner was not surveyed at both waves. Additionally, forty-four percent ($n = 524$) of the remaining 1,184 daters were involved in a relationship where the partner reciprocated the nomination (i.e., if x nominated y , then y also nominated x). We removed one of the duplicate reciprocal couples, resulting in 922 unique dyads. It should be noted that we were unable to determine why dating nominations were unreciprocated. Kreager and Haynie (2011) suggest that potential explanations include (1) partner asymmetry in the definition of "romantic relationship" or (2) one of the partners in a couple wishes to deny or forget the romantic relationship. In PROSPER, respondents were also limited to one dating nomination, thus increasing the likelihood that a nomination would be unreciprocated because the relationship was not the nominated dater's most recent or most valued. We included reciprocated and unreciprocated couples in our analyses, but also restricted our sample to reciprocated nominations and found results virtually identical to those reported.

As our analytical method requires partners to be uniquely identified by gender, 24 couples were removed from the sample because they named a same-gender partner. Finally, because our interest is in the origins of dating relationships (i.e., we could not observe pre-relationship friendship ties for relationships that were also reported in the 8th grade), we focused only on newly formed couples. Thus, 272 couples were removed because one or both partners indicated they were already together in 8th grade. Our final sample of matched, newly formed couples where both partners are interviewed at both waves is 626 9th grade dating couples. Of our final couples sample, 86 daters nominated a romantic partner and were nominated by a third respondent as a partner, so that the sample of 626 couples consists of 1161 unique daters. As we are not estimating multivariate models where dependence would bias standard error estimates, it was unnecessary to exclude dyads with shared daters (e.g., x nominates y in one dyad and z nominates x in a second dyad). Including the non-independent dyads also avoids arbitrary decisions of which to exclude from analyses.

There were 3331 PROSPER daters who did not meet the criteria (i.e., were not matched, did not begin between 8th and 9th grade, nominated same-sex dating partners, or were not surveyed at both waves) for inclusion in the focal sample. As our sample selection strategy is clearly non-random, we compare the characteristics of our focal sample to other PROSPER daters, as well as to the characteristics of non-dating PROSPER students who completed

both waves ($n = 3842$). We return to potential issues of sample selectivity and generalizability in the Discussion.

Measures

Friendship nominations—Network data were collected using an open name generator. Students named up to seven friends in their own grade by writing the first and last names of each friend on the survey form which were then matched to student rosters. Names were matched 83% of the time. Note that friendship nominations were not categorized by gender, so that same or opposite-gender nominations could be listed in any order. Of the total matched nominations, 4% were across gender. As with dating nominations, we included friendships that were not reciprocated in our reported analyses (less than one-quarter of all friendship dyads were reciprocal) and estimated models with only reciprocated friendships and dating pairs and found results similar to those reported.

Dating nominations—Beginning in the 8th grade, students were asked to report the name of their “current or most recent boyfriend or girlfriend, if you had any within the last year.” Descriptive information for these nominations was presented in the Participants section above.

Group membership—Using the friendship nomination data described above, independent (i.e., non-overlapping) friendship groups were identified using a variant of Moody’s CROWDs routine, which is similar in form to other algorithms designed to search for groups by maximizing modularity scores (Kreager, Rulison, & Moody, 2011; Moody, 2001a). The modularity score (Guimera & Amaral, 2005) is a weighted function of within-group compared to cross-group friendship ties. A value of 1.0 is achieved if all ties fall within the group and zero ties between groups. We obtained starting values based on principal component analysis (PCA, see also Bagwell, Coie, Terry, & Lochman 2000; Gest et al., 2007), which yields a set of starting groups that are determined by the data values, rather than a pre-specified number determined by the investigator. The algorithm then evaluates whether reassigning each student to another friendship group would improve the modularity score (similar to Frank, 1995). After each student’s assignment is adjusted, the algorithm checks whether the modularity score would be improved by either merging any groups or splitting any group into two. This process was repeated until no new changes were made. This grouping procedure succeeded in assigning 93% of respondents ($n = 45,351$ across waves) to groups, yielding 902 groups in wave 4 and 899 groups in wave 5. In addition, groups were categorized according to their gender composition ratio: specifically, groups were classified as “mixed-gender” if the percentage of each gender was greater than 20% and less than 80%. Based on these thresholds, there must be at least two youth of each gender for groups with 5 to 9 members and at least 3 youth of each gender for groups with 10 to 14 members.

Group centrality—Network centrality scores at the group level were obtained using a mixing matrix that captures the volume of ties within and between groups identified using the CROWDs algorithm (see Kreager, Rulison, & Moody 2010). This matrix has a row and column for each group, and the values of the cells are the number of ties from the row group

to the column group. We then transform the simple number of ties to density (number of ties divided by number of possible ties), and treat this group-level matrix as a valued network. By calculating Bonacich centrality (Bonacich, 1987) for indegree (i.e., on the transposed mixing matrix), we get a weighted sum of nominations received by each group, with the weights proportional to the number of nominations received by the nominating group. Groups therefore have higher centrality if they receive nominations from other central groups. As the distribution of centrality scores was right skewed with extreme outliers, outliers with scores above 2.64 (<0.1% of sample and 3.7 *SD* above the mean) were recoded to 2.64 and a square root transformation was applied (Osgood et al., 2013).

Individual centrality—Friendship nominations were also used to compute individual-level network centrality measures. Indegree Centrality was calculated as the number of times each student was named as a friend, divided by the number of possible nominations that could have been received (i.e., to standardize centrality scores across schools). A square root transformation was then applied to reduce skewness and outliers (Osgood et al., 2013). Bonacich centrality is a weighted degree centrality score in the eigenvector family of centrality scores (similar to the PageRank algorithm used by Google) (Bonacich, 1987). Substantively, this gives higher weights to the ties received from other popular youth. Outliers with scores above 3.25 (<0.1% of sample and 4.3 *SD* above the mean) were recoded to 3.25, and again the square root was taken to reduce skewness (Osgood et al., 2013).

Geodesic distance—Geodesic distance is the shortest number of steps between two actors in a network. For our study, geodesic distance is the shortest path between two adolescent students in their 8th grade school friendship networks. This measure allows us to estimate the network social distance between new dating partners prior to the beginning of their relationships, and comparing these distances to those of other newly-formed friendship ties. Geodesic distances cannot be calculated for students who are not part of the same network component, meaning that dyads where one of the actors is an isolate (i.e., did not send or receive any nominations) or is disconnected due to a partition in the school network, will not have a geodesic distance value. Approximately 15% of the measured dyads fell into this category.

Table 1 lists variable descriptive statistics for our focal sample. To help understand the generalizability of our dating sample, we statistically compare it to other (non-sampled) PROSPER daters and non-dating PROSPER students. The focal sample is higher in Bonacich Centrality than other PROSPER daters and is less likely to nominate friends outside of school or grade level. The latter is intuitive given that our sample consists of couples where both partners were in the same school and grade. Many of the unexamined daters would have partners who were older or younger than themselves and therefore in a different grade or in another school. 9th grade adolescent girls may be particularly likely to date older boys (Carver, Joyner & Udry, 2003), which also helps to explain the greater number of girls outside the focal sample of daters. Our dating sample is also more conventional and advantaged than unexamined daters and non-daters. Our daters are less likely to receive free lunches and more likely to be religious than other students in their grade. They are closer to their parents, get better grades, and are less likely to be delinquent

than other daters. Finally, our daters are significantly more popular, centrally located in the peer network, and more likely to have opposite-gender friends than non-dating peers. These mean differences are consistent with prior research in the area (Carlson & Rose, 2007; Connolly et al., 2000; 2004; Kuttler & Greca, 2004).

Procedure

We test our hypotheses in three steps. First, based on prior research, we examine if having a cross-gender friendship, or being a member of a mixed-gender peer group, increases the probability of dating at the next wave. To ease comparisons with prior research, we examine these associations for all PROSPER daters and non-daters, not just our sample of matched pairs. We expect that adolescents connected to opposite-gender peers will be at increased likelihood of dating in the future. Second, we examine the proportion of our focal 9th grade dating sample (i.e., newly-formed matched pairs) who were friends in the 8th grade. We compare this proportion to 8th grade cross-gender friendships that did not transition to dating, either because they were no longer friends or because they remained friends without dating. These comparisons will demonstrate if the friendship-to-dating transition is a common or rare occurrence. Next, for each sampled 9th grade romantic dyad, we calculate the proportion of partners who were in the same 8th grade friendship group and the between-partner geodesic distances in the 8th grade friendship network. To test the social proximity of daters relative to other friendship dyads, we compare these values to those of new cross-gender friendships and all new friendships that began between the 8th and 9th grade. As the geodesic distance measure is non-normally distributed (i.e., it has discrete values and is right skewed), we use the Mann-Whitney U non-parametric test for group comparisons. Lastly, to test whether dating partners hold structurally equivalent positions within their friendship networks, for the focal sample of couples, we calculated between-partner correlations on (transformed) measures of 8th grade indegree, Bonacich centrality, and group centrality and compared the strength of these associations to those for newly-formed 9th grade cross-gender friendships and all newly-formed friendships. If the structural equivalence hypothesis is accurate, dating partners should be located in similar network positions.

Results

Dating and Cross-Gender Friendships

Table 2 lists several mean comparisons between 8th grade friendship characteristics and 9th grade dating categories. We first compare all 9th grade daters (i.e., respondents who reported a dating partner regardless of whether or not that partner was in the PROSPER sample) to all non-daters on the proportion who had at least one cross-gender friendship at the prior wave. For all 9th grade daters, 35% had at least one 8th grade cross-gender friendship, whereas 22% of non-daters had any cross-gender friendships in that grade. This difference was highly significant (Pearson $\chi^2 = 160.43$, $p < .001$). We also examined whether daters and non-daters were likely to be members of mixed-gender 8th grade peer groups (i.e., at least 20% of the group was of the opposite gender). As with cross-gender friendships, 9th grade daters were significantly more likely than non-daters to be a member of mixed-gender friendship group in 8th grade (Pearson $\chi^2 = 20.19$, $p < .001$; 19% of daters, 15% of non-daters). Consistent with prior research (Connolly & Johnson, 1996; Connolly et al., 2000;

2004), we therefore find that prior affiliation with the opposite sex is a strong correlate of future adolescent dating.

Dating and Prior Friendship Status

We next calculated the proportion of dating relationships that began between the 8th and 9th grades where at least one of the partners reported the other partner as a friend at the 8th grade. There were 8% ($n = 52$) couples in this category, meaning that approximately 92% of new couples consisted of partners who did not report the other as a friend at the prior wave, providing preliminary support for the hypothesis that adolescent dating relationships are unlikely to begin as friendships. To help put this finding into context, we also looked at what happened to all 8th grade opposite-gender friendships. The 52 dating couples that were friends at 8th grade represent 2% of all 8th grade cross-gender friendships (2,378 dyads where both respondents were measured at 8th and 9th grades). Of the remaining 2,326 8th grade cross-gender friendships, 25% ($n = 579$) remained friends at 9th grade and 75% ($n = 1,747$) ceased being friends. It therefore appears that, rather than transition to dating, opposite-gender friendships are much more likely to remain in that status or dissolve over time.

A means of directly testing the hypothesis that dating creates a structural bridge across peer groups is to examine partner similarities in group membership prior to dating. If dating creates a structural bridge, we expect new dating partners to be located in different groups prior to their relationships. The top row of Table 3 suggests this is the case. Approximately 5% ($n = 33$) of newly-formed (i.e., reported as beginning between the 8th and 9th grades) couples in the 9th grade were in the same friendship group at 8th grade. New dating partners are over 75% less likely than new same-gender 9th grade friendships (22%; Pearson $\chi^2 = 105.91$, $p < .001$). Interestingly, new (non-dating) opposite-gender friendships are equally as likely as dating couples to originate from the same friendship group (7%; Pearson $\chi^2 = 3.27$, $p > .05$). This evidence suggests that creating either type of opposite-gender tie (friendship or dating) exposes adolescents to new peer groups compared to beginning a new same-gender friendship.

If dating partners are unlikely to first be friends, are they close to one another in a school's friendship network prior to dating? Row 2 of Table 3 shows that the average geodesic distance (i.e., shortest network path) between new 9th grade dating partners in the 8th grade friendship network is 3.21 steps. Contrary to expectations, this means that most couples were not friends-of-friends prior to dating: only 14.3% of daters were two steps apart in 8th grade. Indeed, over half (56%) of the connected partners were separated by three or four steps. Dating partners were also significantly further apart in the 8th grade friendship network than were newly-formed same-gender friendships ($M = 2.77$; Mann-Whitney Union statistic = 1399164, $p < .001$), but not new opposite-gender friendships ($M = 3.20$; Mann-Whitney Union statistic = 395404, $p > .05$). Once again, an implication of these findings is that the creation of opposite-gender ties, more than same-gender relationships, is likely to create structural bridges by connecting distant regions of an adolescent friendship network.

Dating and Structural Equivalence

Findings thus far suggest that daters are unlikely to 1) begin as friends, 2) originate in the same friendship group, or 3) be close in the friendship network prior to dating. However, daters may still occupy similar structural positions in friendship networks, even if those positions are not proximal in the network. We tested this by assessing the correlations of dating partners' (transformed) 8th grade indegree values ($r = .39, p < .001$) and Bonacich centrality values ($r = .18, p < .001$) (bottom of Table 3). We also assessed similarity in the centrality of the friendship *groups* that dating partners belonged to prior to dating. As partners' scores on group centrality are identical for partners in the same group, couples in the same 8th grade friendship group ($n = 33$ couples, 5%) were excluded from these analyses. Again, centrality scores were significantly correlated ($r = .19, p < .001$). We see that, as hypothesized, partners have similar values (i.e., the correlations are positive and significant) across all three centrality measures. This indicates that adolescents are likely to date partners in similar positions in the school's informal status hierarchy. However, it should also be noted that the between-partner Bonacich centrality correlations (at the group and individual-levels) were not strong in magnitude. The results therefore provide qualified evidence that daters are likely to select partners in similar structural positions.

We also compared the strength of the association between dating partners' centrality scores to the same association for new opposite-gender and same-gender friendship pairs. To make these comparisons, we estimated OLS regressions predicting individuals' 8th grade centrality values from partners' (i.e., new same-gender friend, new opposite-gender friend, or new dating partner) centrality values, for all unique dating and friendship dyads, and included an interaction of partners' centrality values by relationship type (i.e., dater and opposite-gender friend in one regression and dater and all friendships in another). The unstandardized coefficient for the interactions tests the difference in the association across the two comparisons. For in-degree and group-level centrality, new dating partners are as similar to one another as are new friendships, regardless of gender. This suggests that similarly popular adolescents, or adolescents from similarly central groups, are just as likely to begin dating as they are to begin a new friendship. A different pattern of results arose when comparing Bonacich centrality across new dating dyads and new friendships. For Bonacich centrality, dating partners are significantly less correlated to one another than are friends. The difference in results for indegree and Bonacich centrality similarity likely stems from the latter being a composite score that weights ego's value by ego's friends' values. Friends are thus more likely than romantic partners to have highly correlated scores because they share direct ties to common third persons and daters have fewer shared friendships. Indeed, we were able to directly assess this hypothesis by comparing the number of overlapping 8th grade friendship nominations across the dating and friendship categories. The number of overlapping friends of dating partners ($M = .29$) was 35% smaller than new opposite-gender friendships ($M = .46$) and 65% smaller than same-gender friendships ($M = .82$).

A final analytical consideration is that, in the United States, the 8th and 9th grade years commonly straddle the middle to high school transition, and school transfers may differentially impact romantic and friendship ties. In our sample of 54 school cohorts, 40 (74%) were in communities where the transition from middle to high school occurred

between the 8th and 9th grades and the sampled middle school was the only feeder into the high school, 8 (15%) were in communities where the transition from middle to high school occurred between the 8th and 9th grades and more than one middle school fed into the high school, and 6 (11%) were in communities without a school transition between the 8th and 9th grades. To understand if school mergers and transitions impacted our results, in supplemental analyses (available upon request) we compared results from Tables 2 and 3 across the three school categories. Perhaps not surprisingly, there was evidence that friendships were less stable across 8th and 9th grades when students transferred schools. School transitions are likely to shuffle at least some prior friendships. However, differences between dating, opposite-gender, and all friendship ties were consistent across the school categories, suggesting that any disruptions were equally likely to affect the prior friendships of 9th grade friends and daters. The reported results thus appear robust to the school transitions common to the sampled grade levels.

Discussion

Understanding the friendship origins of adolescent heterosexual romantic relationships is important for both the diffusion of health-related behaviors and the dynamics of adolescent social development. We proposed two competing perspectives for the friendship-romance association. One proposition holds that romantic relationships develop from opposite-gender friendships in adolescents' intimate peer groups. If accurate, this perspective suggests that opposite-gender friendships transition into romantic involvements and changes in friendship structures are likely to precede rather than follow romantic ties. The second proposition holds that romantic relationships typically occur across group boundaries between partners loosely connected in friendship networks prior to dating. This view suggests that dating relationships create bridges in friendship networks that potentially expose partners to new sets of peers and behavioral norms. Accordingly, the latter perspective suggests that romantic ties would be important engines for network change and foster the transition from same-gender to mixed-gender peer groups.

For the most part, evidence from our study supported the second hypothesis over the first. Less than one-in-ten newly-formed dating relationships in the 9th grade were found to be friends at the prior wave. This pattern is striking especially given that students with opposite-gender friends in the 8th grade were significantly more likely to date in the 9th grade than students with no opposite-gender friends. Together, our findings suggest that dating is unlikely to originate from opposite-gender friendships that subsequently transition into romantic relationships, but that non-romantic association with opposite-gender peers continues to be an important precursor to dating. Indeed, the majority of 9th grade daters were more than three steps away from their partners in 8th grade friendship networks, significantly farther apart than same-gender friendships. Interestingly, however, we also found that new opposite-gender friendships were similar to daters in their bridging potential (i.e., they were unlikely to arise within the same friendship group and were distant in the friendship network prior to becoming friends). This suggests that both types of opposite-gender ties are likely to expose adolescents to new peer contexts.

Findings that opposite-gender friendships predict future dating, but that such friendships rarely transition into romantic relationships, is in line with arguments that opposite-sex friendships provide environments for “perspective taking, a chance to learn about or figure out the other gender” (McDougall and Hymel 2007:375), which in turn translate into greater competency and confidence in establishing future romantic relationships (Connolly et al. 1999; Leaper & Anderson 1997; Monsour 2002). Opposite-gender friendships as training grounds for romantic relationships may be particularly important for boys, whose intimacy skills may be less developed than girls’ while both groups are embedded in the same-sex friendship networks endemic of childhood (Monsour 2002).

The study’s findings are also consistent with a social cohesion and inbreeding aversion hypothesis where in-group sexual and romantic activity is unlikely to occur due to potential social sanctions and threats to group unity (Shor & Simchai 2009). Our findings of out-group dating (i.e., exogamy) support this argument. Shor and Simchai (2009) also argued that in-group sexual prohibitions do not preclude sexual attraction, so at least one member of an opposite-gender friendship pair may harbor unexpressed physical attraction. Although our data preclude analyses of sexual feelings, future studies should examine if such feelings exist between opposite-gender friends in the same peer group.

There was also evidence that dating is likely to bridge cohesive subgroups. Compared to new non-romantic friendships, new daters were significantly less likely to be in the same cohesive subgroup at the prior wave. Additionally, daters were more likely than opposite-gender friends to remain in different groups after a tie was formed. Consistent with Kreager and Haynie’s (2011; Kreager, Haynie, & Hopfer, 2012) expectations, our findings suggest that adolescent romantic relationships bridge peer groups and thus expose partners to new peer settings and potentially different behavioral norms. The bridging associated with dating thus has important implications for the network diffusion of health-related behaviors, such as substance use and delinquency.

Finally, our analyses suggest that, even though daters are unlikely to be adjacent in friendship networks prior to their relationships, they are likely to occupy similar structural positions in broader peer networks. Dating partners had correlated measures of network in-degree, network centrality, and group centrality, suggesting that they are similarly situated in a school’s status hierarchy. Indeed, the between-partner correlation on group centrality is consistent with Coleman’s (1961) idea of gendered “leading crowds” and the romantic ties connecting them. These findings are also consistent with Dunphy’s (1963) original contention that early dating is likely to occur between popular members of unisexual peer groups. What our findings add to this argument is that dating is also likely to occur between *less* popular students in a school’s friendship network.

Although suggestive, our findings are not without limitations. Perhaps the most important limitation relates to the generalizability of our findings due to the characteristics of the sample. The PROSPER friendship and romantic nominations were limited to within-grade and within-school peers. For romantic relationships, our study thus omits relationships with older, younger, and out-of-school partners and therefore our findings may not generalize to the population of dating adolescents. For example, one might argue that the friend-to-dating

transition occurs more frequently in out-of-grade than in-grade romantic relationships. Multiple-cohort studies find that the majority of adolescent friendships occur within grade (Goodreau, Kitts & Morris, 2009), suggesting that out-of-grade romantic relationships are likely to cross peer group boundaries, but it remains possible that our findings do not extend to other dating relationships. Future research that widens friendship and romantic nominations beyond the grade and school are needed to replicate our findings. PROSPER's focus on rural schools may also limit the generalizability of our results. For example, the relative racial homogeneity of our sample reduces network partitioning commonly observed in racially heterogeneous schools (Moody, 2001b). However, given that our hypotheses stem from developmental theories whose mechanisms are assumed to operate across adolescent populations, the PROSPER school sample may not be highly limiting. The expectation for mixed-gender peer affiliations to precede dating relationships or for friendships to transition to romance should be equal in racially homogenous and heterogeneous schools. That Kreager and colleagues (Kreager & Haynie, 2011; Kreager, Haynie, & Hopfer, 2012) observed similar dating and drinking patterns in both PROSPER and the National Longitudinal of Adolescent Health (Add Health) further reduces fears of this study's non-generalizability due to school contexts.

Another limitation relates to the yearly time interval between network surveys. Many adolescent friendships and dating relationships are likely to be fleeting, and yearly data do not adequately capture their fluidity. Indeed, our analyses of 8th grade opposite-gender friendships suggested that the overwhelming majority of these relationships not only fail to transition to romance, but do not persist into the next grade. This churning of (particularly opposite-gender) friendships over time complicates the temporal ordering of friendship and romantic ties and has implications for behavioral diffusion processes. Without finer-grained data, we are unable to rule out the possibility that romantic relationships observed in 9th grade were not immediately preceded by unobserved friendships. We find strong evidence that 9th grade romantic ties were unlikely to originate from longstanding friendships (i.e., covering at least one year), but the possibility remains that daters had briefer periods of non-romantic friendship. It was also beyond the scope of this study to examine same-gender romantic relationships. Only 2% of PROSPER's daters reported a same-gender partner, making it impossible to obtain reliable estimates for this population. It is unclear if this study's findings extend to homosexual adolescents, warranting future studies with adequate representations of homosexual and heterosexual romantic relationships.

A final limitation of our data is the lack of longitudinal friendship and relationship information in the late adolescent years. It is unclear from our analyses if the association between friendship and romance changes as adolescents age. Indeed, increasing cross-gender friendship ties and the eventual disintegration of larger peer groups in late adolescence were predicted in Dunphy's (1963) original developmental theory. Friendship and romantic data for grades 10–12 were collected as part of PROSPER, but have not yet been coded. Once this task has been completed, we will be able to explore the origins of dating throughout adolescence.

Discussion of additional waves of network data also raises the question of why Stochastic Actor-Based (SAB) network methods (e.g., SIENA) were not used in this study when two

waves of friendship and dating data were available. SIENA is a popular tool for analyzing the co-evolution of network structure and behavior (Veenstra, Dijkstra, Steglich & Van Zalk 2013) and allows for comparisons of multiple networks (i.e., friendship and dating; Snijders, Lomi & Torlo 2012). However, there are two primary reasons we chose not to use SIENA in this project. First, our hypotheses are largely descriptive and not focused on disentangling the contributions to selection and influence processes from network structure, actor attributes, and peer attributes, which are the foci of SAB methods. Second, the scarcity of dating ties in each school (average = 12 dating couples per school network) would make SIENA convergence unlikely and estimates unreliable. In future work, SAB methods would be useful for testing related dating and friendship hypotheses. For example, operationalizing dating as a time-varying dyadic covariate in SIENA analyses of friendship allows the exploration of partner influence and behavioral diffusion hypotheses. We intend to pursue such opportunities in future PROSPER analyses.

In conclusion, results of this study suggest that adolescent opposite-gender friendships facilitate youth capacity for romantic involvement, but such friendships rarely transition to dating status. Rather, adolescents tend to seek romantic partners outside of their immediate friendship contexts, often at substantial distances in school-based friendship networks. This evidence that romantic relationships create bridges in friendship networks heightens their importance for the diffusion of health-risk behaviors, and should spark future research focused on the social contexts of adolescent romance and behavioral change.

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Table 1

Mean Comparisons Across PROSPER Dating Statuses

Variable Name	Focal Daters (N=1161)		Other PROSPER Daters (N=3331)		Non-Daters (N=3842)	
	Mean(%)		Mean(%)	t-test	Mean(%)	t-test
<i>Structural Characteristics (8th Grade)</i>						
In-degree (School Standardized)	0.03		0.03	NS	0.02	***
Bonachich Centrality	1.09		1.04	**	0.84	***
Opposite-Gender Friendship	34%		35%	NS	22%	***
Friends Outside of School or Grade	10.01		11.09	***	8.39	***
<i>Personal Characteristics (8th Grade)</i>						
Female	50%		63%	***	44%	***
White	82%		82%	NS	80%	NS
Free Lunch Recipient	20%		28%	***	24%	**
Two-Parent Family	80%		77%	*	81%	NS
Family Attachment	-.07		-.13	***	-.05	NS
Grades	4.13		4.00	***	4.15	NS
Delinquency (IRT Scale)	.30		.41	***	.21	***
Religious Attendance	4.98		4.66	***	4.79	*

* p<.05,

** p<.01,

*** p<.001,

NS=not significant (two-tailed)

NOTE: Reference group for t-tests is the focal daters (column 1).

Table 2
Comparisons Across 8th Grade Friendships and 9th Grade Friendship/Dating Categories

8th Grade Variable	9th Grade Categories		χ^2 test
	All Daters (N=4492)	Non-Daters (N=3842)	
Any Opposite-Gender Friendships	Mean(%) 35%	Mean(%) 22%	***
Member of Mixed-Sex Group	19%	15%	***

* p<.05,

** p<.01,

*** p<.001,

NS=not significant (two-tailed)

NOTE: Reference group for Pearson χ^2 tests are column 1 dating categories.

Table 3

Between-Partner Comparisons, 9th Grade Dating and Friendship Dyads

8th Grade Variable	Focal Couples (N=626)		New Opposite-Gender Friendships (N=1804)		New Same-Gender Friendships (N=8353)	
	Mean(%)		Mean(%)	test ^d	Mean(%)	test ^d
Same Friendship Group	5%		7%	NS	22%	***
Geodesic Distance ^b	3.21		3.20	NS	2.77	***
<i>Between-Partner Correlations</i>						
In-Degree (School Standardized)	.39 ***	Correlation	.39 ***	test (regression)	Correlation	test (regression)
Bonacich Centrality	.18 ***		.26 ***	NS	.38 ***	NS
Group-Level Centrality ^c	.19 ***		.22 ***	*	.28 ***	**
				NS	.24 ***	NS

* p<.05,

** p<.01,

*** p<.001,

NS=not significant (two-tailed)

^a Pearson χ^2 test for Same Friendship Group, Mann-Whitney U test for Geodesic Distance^b Values cannot be calculated for disconnected dyads (new dating couples=5[1%], new opposite-gender friends=30[2%], new same-gender friends=185[2%])^c Values not calculated when both actors in the same group

NOTE: Reference group for tests is column 1 Focal Couples