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**Our Buddies, Ourselves: The Role of Sexual Homophily in Adolescent Friendship  
Networks**

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### **Abstract**

The present study tests the assumption that peers wield sufficient influence to induce sexual homophily (i.e., similarities in sexual experiences). Because girls face greater stigma for their sexual experiences than do boys, sexual homophily may be greater in girls' friendship networks than in boys'. Stochastic actor-based models were used to analyze network data (n=2,566; ages 14-18) from two high schools in the National Longitudinal Study of Adolescent to Adult Health. Sexual homophily was present in friendship networks. Girls and boys were equally susceptible to their friends' influence, but the former exhibited a stronger preference for befriending same sexual debut status peers than the latter. The findings suggest that adolescents – particularly girls – “curate” their networks to minimize peer ostracism.

### **Our buddies, ourselves: The role of sexual homophily in adolescent friendship networks**

Media, news, and policy each reflect ubiquitous assumptions that adolescents are sexually permissive, often as a result of their friends' undue influence. Yet, adolescent sexual homophily – the principle that adolescents' sexual experiences are similar to their peers' – is rarely subjected to rigorous empirical investigation. This oversight is surprising given the rich, multidisciplinary literature that consistently draws theoretical and empirical connections between social relationships and health across the lifespan (Umberson, Crosnoe, & Reczek, 2011). Links between peer relations and adolescent health behaviors have primarily emerged from studies on public behaviors (e.g., smoking) (Brown, Dolcini, & Leventhal, 1997). Sexual behaviors are typically private, and the extent to which private behaviors are susceptible to peer influences is unclear. The notion that private behaviors are subject to public influences is a fundamental assumption underlying countless media campaigns and programs dedicated to safeguarding adolescent sexual health. Recent evidence suggests that these endeavors would be more effective if they were tailored to meet the specific needs of subgroups (Bearinger, Sieving, Ferguson, & Sharma, 2007). For example, girls' endorsement of conventional gender expectations – i.e., prioritizing others over themselves – is associated with sexual risk-taking (Impett, Tolman, & Schooler, 2006). If subgroups can be identified, then health practitioners and educators could meet adolescents' needs with greater precision (Bearinger et al., 2007). Therefore, finding sexual homophily in adolescent friendship networks yields meaningful insights for health promotion.

The present study had two objectives. The first objective was to investigate the *presence* and *development* of sexual homophily in middle to late adolescence (ages 14-19). We compared the sexual debut – i.e., first sexual intercourse – statuses of adolescents and their friends to detect the presence of sexual homophily in friendship networks. We examined the contributions of selection and socialization towards the development of homophily. Selection is the process whereby individuals choose to associate with others who are already similar to them, and socialization is the process of individuals becoming similar to each other due to mutual influence (McPherson, Smith-Lovin, & Cook, 2001). The second objective was to test for the

*differentiation* of sexual homophily by gender by analyzing whether selection and socialization varied for girls and boys.

To meet these objectives we used stochastic actor-based models (Snijders, Bunt, & Steglich, 2010), which permit simultaneous examination of selection and socialization while accounting for endogenous processes that contribute to homophily (e.g., homophily based on demographic characteristics). These models use longitudinal social network data, and as a result, address limitations that were common in previous research on sexual homophily: cross-sectional data, limited network data, and rare use of friends' self-reported data (e.g., Jaccard, Dodge, & Blanton, 2005). Previous research has typically addressed the contributions of relational contexts at the individual level by surveying adolescents on their perceptions of and communications with their peers (e.g., Kapadia et al., 2012; Prinstein, Meade, & Cohen, 2003; van de Bongardt et al., 2017). In the present study, analyses are situated squarely on adolescent peer networks, and this rigorous design presents an opportunity to replicate previous research with greater credibility.

Our contributions are not limited to the methods that we use; meeting our objectives yields insights for our understanding of gender and peer processes regarding private behaviors. Identifying who influences whom substantiates what we assume yet rarely demonstrate. That is, girls' and boys' capacities to influence their peers likely differ. Gender – arguably the most essentialized social category – imbues health and social relations (Mehta & Strough, 2009). This simple fact has generated an expansive literature on gender differences. We extend this literature by considering how youth – who are inundated with messages about gender and sexuality (Kim et al., 2007) – respond to their peers' sexual debut statuses. Investigating peer relations regarding a private behavior also extends the literature on homophily in adolescent friendship networks, which typically focuses on public behaviors (e.g., Cheadle, Stevens, Williams, & Goosby, 2013). Finally, our study is not only a rigorous replication of previous research on sexual homophily – both its presence and development – it is also an investigation of the differentiation of sexual homophily by gender.

### **Peer networks: Critical sites for sexual socialization**

A small but rich literature on adolescent social networks in the United States yields similar findings of sexual homophily across contexts and diverse samples. Sexual homophily has been documented in junior high school (e.g., Billy, Rodgers, & Udry, 1984), high school (Suleiman & Deardorff, 2015), and college samples (e.g., Holman & Sillars, 2012) and in studies

across the U.S., including the Northeast (Prinstein et al., 2003) and the South (Wallace, Miller, & Forehand, 2008). Sexual homophily has also been found in schools with predominantly white student populations (Prinstein et al., 2003) and diverse student populations (Billy et al., 1984; Billy & Udry, 1985; Henry et al., 2007) as well as community- and clinic-based samples of black (e.g., Dolcini, Catania, Harper, Boyer, & Richards, 2012) and Latino youth (Kapadia et al., 2012). The prevalence of sexual homophily may reflect the salience of peer influence and selection during adolescence.

Adolescents are uniquely situated as sexual socialization agents because they serve in numerous roles: sex educators, relationship advisers, and matchmakers (Suleiman & Deardorff, 2015). Adolescents' sensitivity to their peers' opinions facilitates this intimate exchange of support. Not surprisingly, adolescents' sexual attitudes and behaviors are frequently aligned with what their peers think and do, regardless of whether peers express their explicit approval or their approval is presumed (Dolcini et al., 2012; Kapadia et al., 2012; Prinstein et al., 2003). Meta-analyses demonstrate that adolescents report more sexual partners, earlier sexual debut, and more frequent sex if they believe their friends are sexually active, approve of being sexually active, and/or pressure them to become sexually active (van de Bongardt, Reitz, Sandfort, & Deković, 2015). Because sexuality is so salient and so controversial, adolescents may feel particularly uneasy when their sexual experiences differ from their friends.

Previous research has documented the *presence* of sexual homophily in adolescents' friendship networks, yet the *development* of homophily and the *differentiation* of homophily by gender remain understudied. The former issue is a reflection of a well-noted challenge and source of tension in the literature on peer relations (Dishion, 2013). That is, homophily emerges from selection and socialization (Kandel, 1978; McPherson et al., 2001). An adolescent's sexual debut may be influenced by his or her friend's recent sexual debut, and this friendship may also be a consequence of shared sexual attitudes and beliefs (Suleiman & Deardorff, 2015). Another possibility is the differentiation of sexual homophily by gender; sexual homophily may differ between girls' and boys' friendship networks. A common assumption is that sexual homophily is greater among same-sex friends than other-sex friends, as evidenced by previous research's dominant focus on adolescents and their same-sex best friends (e.g., Jaccard et al., 2005; Lefkowitz, Boone, & Shearer, 2004). A model that comprehensively examines girls' and boys' friendship networks is necessary to examine these assumptions.

Our central argument is that sexual homophily likely differs between girls' and boys' friendship networks. Support for our argument is derived from theoretical and empirical work on the sexual double standard (Bordini & Sperb, 2012). According to the sexual double standard, boys who unabashedly pursue and enjoy sex are "just being boys," but girls who do the same are often believed to be troubled and immoral (Bamberg, 2004). Indeed, "good girls" show sexual restraint (Phillips, 2000; Tolman, 2002). Adolescents understand the sexual double standard and adeptly use it to evaluate others and anticipate others' evaluations of themselves (e.g., Daniels & Zurbriggen, 2016; Tolman, 2002). Girls report that female peers who are deemed promiscuous are ostracized (Tolman, 2002). Boys report that male peers who have many sexual partners are praised (Smiler & Heasley, 2016). Sociometric data support these perceptions: reporting more sexual partners is linked to receiving more friendship nominations for boys and receiving fewer friendship nominations for girls (Kreager & Staff, 2009). For girls, the inverse association between sexual experience and peer acceptance likely reflects the stigma against girls who appear to lack sufficient sexual restraint. Not surprisingly, girls may feel safer and more supported with similarly-experienced friends (Lyons, Giordano, Manning, & Longmore, 2011). Accordingly, we hypothesized that sexual homophily would be higher in girls' friendship networks than in boys'.

Adolescents – who are attuned to difference (Steinberg & Monahan, 2007) – may find it difficult to reconcile differences between their own sexual attitudes and experiences and those of their peers'. Indeed, the moral, religious, and gendered underpinnings of sexuality may magnify such differences (Hull, Hennessy, Bleakley, Fishbein, & Jordan, 2011). Yet gaining peer acceptance is a priority and a challenge for adolescents due to developmental reasons. Susceptibility to peer influence is highest in adolescence (Steinberg & Monahan, 2007). By scrutinizing and policing their peers, adolescents ensure that adherents and violators are praised and punished, respectively, which has implications for their socioemotional and behavioral development (Rose & Rudolph, 2006). For instance, adolescents may comply with said expectations to avoid backlash effects – social sanctions for counter-stereotypical behaviors (Conley, Ziegler, & Moors, 2012). For girls, backlash effects may be especially harmful, as their friendships tend to be more fragile than boys' (Benenson & Christakos, 2003). As balance theory suggests, adolescents may be motivated to reduce peer ostracism by maintaining their affiliations with like-minded others and by dissociating from dissimilar others (Davis, 1963). Not

surprisingly, conversations among friends typically reflect and reinforce shared sexual attitudes and similar sexual experiences (Lefkowitz et al., 2004). For adolescents – especially adolescent girls – being similar to one’s peers may provide them much-needed validation and support.

Sexual debut is a salient marker of difference for adolescents. The significance of sexual debut partly stems from the fact that its precursor – virginity – is laden with symbolic meanings. Moreover, the endorsement and interpretation of these meanings frequently vary by gender. For example, girls typically see virginity as a valuable “gift” that is ideally “given” with serious thought (Carpenter, 2002). In contrast, boys typically report feeling “burdened” by their virginity and proud of their sexual debut (Cohan, 2009; Kimmel, 2009). Peers appear to reinforce the meanings that adolescents tie to sexual debut. Boys are usually congratulatory to their male peers regarding their sexual debut and sexual experiences, unless the veracity of such experiences comes into question (Vanden Abeele, Campbell, Eggermont, & Roe, 2014). Girls, however, are more discreet about their experiences and tend to express ambivalence regarding their own and their female peers’ experiences (Harper, Gannon, Watson, Catania, & Dolcini, 2004). Thus, the sexual double standard colors adolescents’ responses to their own sexual debut and to their peers’.

Investigating sexual homophily is challenging due to the fact that friendships develop for any number of reasons, including demographic homophily (e.g., race, gender), shared interests (e.g., clubs), and propinquity (e.g., team sports). Friendships also develop from having mutual friends (i.e., transitivity), being highly visible while having high status (i.e., popularity), and from liking peers who already consider the individual their friend (i.e., reciprocity) (Dijkstra, Cillessen, & Borch, 2013; Dishion, 2013). Adolescents also appear to be sensitive to differences in pubertal development; early-maturing adolescent girls tend to befriend older peers (Cavanagh, 2004). Pubertal development also has implications for sexual homophily. Physical maturation suggests sexual maturation, and as a result, adolescents who appear adult-like have more opportunities to enter sexual relationships than their younger-looking peers; this is especially true for girls (Baams, Dubas, Overbeek, & van Aken, 2015). The present study captures the multitude of social and developmental processes underlying friendship formation by utilizing stochastic actor-based models for network dynamics. This approach permits simultaneous examination of selection and socialization while taking into account endogenous processes based on demographic characteristics and shared interests.

## Hypotheses

Drawing from the multidisciplinary literature on peer relations and gendered sexual socialization, we developed two hypotheses. First, we hypothesized that an adolescent's sexual debut would be similar to his or her friends because homophily is frequently found across numerous characteristics – e.g., delinquency and drug use (Osgood et al., 2013) – and because adolescents' discussions about sex typically reflect shared values (Lefkowitz et al., 2004). To test this hypothesis, we examined the contributions of both selection and socialization to sexual homophily. Our second hypothesis was derived from previous research documenting adolescents' use of the sexual double standard (e.g., Bamberg, 2004; Eder, Evans, & Parker, 1995). That is, we hypothesized that sexual homophily would be greater among girls than among boys because girls are subjected to greater scrutiny and sanctions for their sexual attitudes and experiences than boys.

## Methods

### Description of Analysis Sample

We analyzed data from the National Longitudinal Study of Adolescent to Adult Health (Add Health) (Harris et al, 2009). Add Health is a school-based longitudinal survey of adolescents enrolled in grades 7 through 12 across 140 schools in the U.S., beginning in the 1994-1995 school year. Respondents repeatedly made friendship nominations across three waves: Wave 1 in-school surveys (September 1994-April 1995), Wave 1 in-home interviews (April-December 1995), and Wave 2 in-home interviews (April-August 1996). For clarity, we refer to Wave 1 in-school survey as Time 1, Wave 1 in-home interview as Time 2, and Wave 2 in-home interview as Time 3. Our analysis sample ( $n=2,566$ ) consisted of respondents in two large “saturated schools” – schools where network data were collected from nearly all adolescents. Studies on these two schools – “Jefferson High School” and “Sunshine High School” – are common due to their large size and complete network coverage (e.g., Haas & Schaefer, 2014).

Respondents were asked to nominate up to five female friends and five male friends at each time point. The measure of each respondent's friendship network consisted of all of their friendship nominations, regardless of whether or not they were reciprocated. Nominations of friends outside their school were excluded because individual self-reported data were unavailable



for those friends. To distinguish friends from romantic partners, all peers who were identified as friends and romantic partners were excluded.

### Measures

**Sexual debut.** Information for sexual debut was drawn from responses as to whether or not respondents have had sexual intercourse (yes=1, no=0). This question was asked in Times 2 and 3, but not in Time 1. For Time 1, we constructed the dichotomous indicator for sexual debut by utilizing responses from an in-home interview question on the timing of one's sexual debut ("In what month and year did you have sexual intercourse for the very first time?"). Sexual debut status was coded as 1 at Time 1 if the date for first sexual intercourse fell before or during the Wave 1 in-school survey period. In turn, we were able to present our dependent variable across all time points. Our sample includes all respondents who filled out at least one survey questionnaire from Time 2 or 3.

**Endogenous Network Processes.** To better determine if adolescents become friends with one another due to shared sexual debut status, we controlled for endogenous processes underlying friendship formation: reciprocity, popularity, and transitivity. Individuals tend to reciprocate friendship ties (reciprocity), nominate highly visible peers as friends (popularity), and befriend friends of friends (transitivity).

**Sociodemographic characteristics.** Because close friends tend to be similar to one another on demographic characteristics, we also included gender, race/ethnicity, religiosity, parental education, and age (McPherson et al., 2001; Mehta & Strough, 2009). Dummy coding was used for gender (male = 1) and racial groups (White = 1, non-White = 0). Frequent attendance of religious services – a common proxy for religiosity – is associated with later age of sexual debut (Hull et al., 2011). For religiosity, we used a 4-point scale that measured the frequency of religious service attendance: 0 = *never*, 1 = *less than once a month*, 2 = *once a month or more*, 3 = *once a week or more*. We used parental education as a proxy variable representing socioeconomic status with a dichotomous variable indicating whether at least one parent had earned at least a college degree (yes= 1; no =0).

**Developmental characteristics.** Although we considered age as a common factor of friendship similarity, it is also confounded with physical maturation (Baams, Dubas, Overbeek, & van Aken, 2015). For example, early pubertal development is associated with sexual debut; early-maturing adolescents, on average, enter romantic and sexual relationships earlier than their

on-time or late-maturing peers (Baams et al., 2015). We used perceived pubertal timing, or the degree to which one thinks his or her physical development is advanced in comparison to their same-age, same-sex peers. Perceived pubertal timing was dichotomized as on time or early (i.e., looking older or average; 1) versus late (i.e., looking younger; 0).

**Behavioral characteristics.** Adolescents and their friends tend to behave similarly across contexts (Dishion, 2013; Dishion, Ha, & Véronneau, 2012). For example, adolescents' underage drinking is, in part, a function of their susceptibility to peer influences and as source of friendship homophily (Cheadle et al., 2013). Drinking reduces inhibition and impulse control, and as a result, increases the likelihood of sexual behaviors, including sexual debut (Kreager & Haynie, 2011). Therefore, we controlled for binge drinking. Binge drinking in the past 12 months was coded as 0 = *never*, 1 = *once a month or less*, and 2 = *over once a month*. Academic performance is frequently similar among friends and is associated with later sexual debut (Shin & Ryan, 2014; Halpern, Joyner, Udry, & Suchindran, 2000). We calculated respondents' grade point average (GPA) at each time point from their reported grades in English/languages arts, mathematics, history/social studies, and science. Similarly, friendships may form from propinquity; being in close proximity to others increases the odds of interacting and befriending others. To account for friendships due to propinquity, we controlled for extracurricular activities, which present opportunities for adolescents to meet and befriend their peers. Adolescents reported their participation in up to 30 activities (e.g., sports, academic clubs, honor societies). We followed Haas and Schaefer's (2014) approach by constructing a "dyadic"-level variable, where number of shared activities was counted for each dyad.

### **Analysis Plan**

Our analytic goal was to simultaneously model both selection and influence on sexual debut status and to examine how gender complicates those processes. To that end, we used stochastic actor-based (SAB) models, a type of model that represents network dynamics by focusing on how each actor (i.e., adolescent) changes his or her ties to peers and how these actions collectively shape the evolution of the network (Snijders et al., 2010). This approach typically uses network panel data to explicitly take into account the complex dependency in network and behavioral changes. The SAB model also captures other "endogenous" patterns—e.g., reciprocity, popularity, and transitivity—that would confound homophilous associations. All analyses were conducted in the Simulation Investigation for Empirical Network Analysis

(SIENA) software, which implements simulations as a sequence of micro-steps. Each micro-step is an opportunity for an actor to change his or her ties or behaviors. The parameter estimates for selection and socialization express the correspondence between simulations and the observed pattern of change in data.

Our behavioral outcome, sexual debut, was a non-decreasing variable over time with values of 0 and 1. That is, adolescents cannot change their sexual debut status from 1 to 0. This feature of the behavioral outcome variable required a different model that is similar to an event history framework for “adoption” of behaviors over a given population. Behavioral “rate” functions in SIENA made it possible to model first sex by specifying the relative rate at which the event occurs on an individual level (Greenan, 2015). In this framework, “adoption” times follow a proportional hazard model while still predicting network formation with an SAB model. This analytic technique has been applied to other adolescent outcomes that have “onsets,” such as alcohol consumption and cannabis smoking (Light, Greenan, Rusby, Nies, & Snijders, 2013). Our primary predictor variable was the number of one’s friends who have had sexual intercourse at a prior wave.

Some features of friendship selection and influence are likely generalizable across contexts, whereas other features are context-specific. An example of a generalizable feature of friendship selection and influence is age homophily. Because grade levels and curricula are age-graded – e.g., ninth graders are typically 14-15 years old and are required to take specific courses – adolescents spend a significant amount of time with their same-age peers. As a result, adolescents are more likely to befriend same-age peers than older or younger peers, regardless of the high school they attend. Opportunities to befriend same-race peers, however, are constrained by the racial composition of the student population. In other words, same-race friendships are more common in schools that lack diversity. To consider potential variability at school settings, we tested for school-level differences by using the multigroup option in the RSiena package, which ran separate models for each school and helped determine significantly different school-level effects with t-tests (Ripley, Snijders, Boda, Voros, & Preciado, 2016). Network cohesiveness, racial and age homophily, and GPA popularity effects significantly differed between the two schools. Once school-level effects were identified, we allowed those effects to vary by including an interaction term with the respondent’s school. However, most parameters—including our main variables of sexual debut status and gender—did not differ significantly by

school. This multigroup model also gave separate parameters for network and behavioral change rates per period. We applied the SIENA framework for the two-school sample by treating schools as distinct networks by simultaneously assuming no network ties exist between them and allowing variability for parameters between them.

## Results

### Descriptive Overview of Network Characteristics

Table 1 provides descriptive information on our sample and friendship characteristics by each school. “Jefferson High School” (n=832) was in the Midwest and was predominantly White, whereas “Sunshine High School” (n=1734) was located in the West and was racially diverse. Networks in Jefferson High School are closer-knit and denser than networks in Sunshine High School, as indicated by higher density, average degree, and reciprocity for the former than the latter. The number of respondents who reported having sex increased and reached more than half by Time 2 for both schools (57.8%, 58.9%). Both schools had similar age distribution and gender composition. The data met the criterion for modeling social network changes, as the Jaccard Index, a measure of network stability between time points, was larger than 0.2 (Snijders, van de Bunt, & Steglich, 2010).

### Presence and Development of Sexual Homophily

We now turn to the results of the SAB model. Table 2 presents parameter estimates for friendship selection (upper half) and sexual behavior (lower half). In Table 2, Model 1 is our baseline and includes the main effects of sexual intercourse, whereas Model 2 adds interaction terms for examining the differentiation of sexual homophily by gender. To estimate how adolescents’ attributes influence the likelihood of friendship ties, the model specified three types of effects for each covariate: similarity, alter, and ego effects. For similarity effects, higher values indicate greater homophily between friends. For alter effects, positive values indicate more rapid increase of received friendship nominations. For ego effects, positive values indicate more rapid increase of friendship nominations. Table 2 was organized by subsections that display estimates corresponding to their respective type of effects. Omitting any of the aforementioned types of effects (e.g., binge drinking *ego*) would lead to over-estimating the remaining types of effects (e.g., binge drinking *alter* and binge drinking *similarity*). Accordingly, we specified our model in ways that included all three types of effects for each variable.

To test our first hypothesis regarding the presence and development of sexual homophily, we focused on the similarity effects of sexual debut on friendship and peer exposure on sexual intercourse. The similarity parameter of sexual intercourse was positive and significant, which indicates that adolescents tended to select friends whose sexual debut status matched their own. That is, adolescents who have had sex are more likely to have friends who also have had sex, and adolescents who have not had sex are more likely to have friends who also have not had sex. The parameter for the total exposure to sexually debuted friends was also significant and positive, which indicates that exposure to already-debuted friends positively predicted adolescents' sexual debut. Each addition of a debuted friend increased the hazard of having sex by approximately 40% ( $\exp(.334) = 1.40$ ). Thus, we found evidence that supports our hypothesis that sexual homophily is present in adolescent friendship networks and that socialization and selection contributes to this homophily.

Ego and alter effects further explicate the role of sexual debut in friendship selection. The ego effect estimate for sexual intercourse is negative, which suggests that adolescents who have had sex nominate fewer friends, relative to adolescents who have not had sex. The alter effect for sexual debut indicates how having sex contributes to popularity. The positive and significant alter effect for sexual debut suggests that adolescents who have had sex received more friendship nominations than did adolescents who did not have sex. Together, the ego and alter effects suggest that adolescents who have had sex are “choosier” about who their friends are, despite being highly sought after as friends by their peers.

The remaining effects in Table 2 – i.e., structural effects, school interactions, and rate effects – strengthened our findings on sexual homophily for three reasons. First, our model controls for endogenous network processes that could inflate estimates of sexual debut status on friend selection. Thus, we controlled for the fact that ties tended to be reciprocated (reciprocity); adolescents often befriended friends of friends (transitive triplets); and popular students received more future friendship nominations (indegree-popularity). In addition to the aforementioned structural effects, outdegree effect controlled for the overall probability of a tie, and outdegree-activity parameter tested whether adolescents who named more friends were more likely to add more friends at a later point. Outdegree-activity was the only estimate of structural effects that was not significant. Rate effects by school capture the volume of friendship change between each time point. Secondly, we also controlled for homophily based on demographic characteristics,

shared interests, and propinquity. Finally, our multi-group model addressed potential heterogeneity between the two-school population (Haas & Schaefer, 2014; Snijders & Baerveldt, 2003). We included a Sunshine school dummy as a special case in ego effects to take into account that school sample's lower average number of friend nominations (outdegree). We also interacted this school dummy variable with a few structural parameters and individual attributes of which parameters were different in separate models for each school. The results were reported in the school interactions subsection in Table 2. With these statistical controls, our estimates of sexual homophily are more reliable and more robust.

### **Differentiation of Sexual Homophily by Gender**

To test our second hypothesis regarding the differentiation of sexual homophily by gender, we focused on the interaction effects between gender and sexual debut status on friendship formation. To that end, we first defined the (non-centered) dichotomous variables for males and females. To obtain the estimates for sexual debut effects separately by gender, we created interaction terms with the gender dummy variables for ego, alter, and similarity effects with the sexual debut status variable. The same specification went for the behavioral predictors for sexual debut. For example, an interaction term of male and the number of sexually debuted friends allowed us to test whether female students were more likely than male students to follow their friends' sexual debut. The results are presented in Model 2 in Table 2. For more clarity on the differential effects of sexual homophily by gender, the coefficient estimates for the key gender-sexual debut interaction terms for friendship selection are depicted with 95% confidence intervals in Figure 1.

It appears that sexual debut shapes friendship very differently for girls and boys in school. First, girls' sexual homophily was more pronounced than boys'. For the similarity effects, the female ego  $\times$  sexual intercourse similarity (same=1) term directly compares the likelihood of a girl nominating a peer of same sexual debut status against a girl nominating a peer of different sexual debut status. The magnitude of the effects were plotted in the first panel of Figure 1. The coefficient estimate was positive and significant, indicating that girls tended to befriend peers whose sexual debut statuses matched their own than peers whose sexual debut statuses did not match their own. The estimate of the same term for boys was also positive and significant but substantially lower than girls'. In other words, boys' friendship composition was relatively heterogeneous in terms of their sexual debut statuses (See Appendix for a selection

table showing model-predicted propensities to select peers based on matched and unmatched sexual debut statuses).

The ego and alter effects of the gender-sexual debut interactions further reveal nuanced friendship selection processes emerging from the gendered meanings of sexual debut. Turning to the alter-type effects in Model 2 in Table 2 (also plotted in the second panel of Figure 1), the male ego  $\times$  sexual debut alter term was positive and significant, and the female ego  $\times$  sexual debut alter term was positive albeit not significant. In other words, boys who have had sex became more popular (i.e., received more friendship nominations) than boys who have not had sex; for girls, however, there was no difference in popularity between girls who have and have not had sex. Similarly, this gender differentiation appeared for the ego effects (see the third panel of Figure 1). The estimate for female ego  $\times$  sexual debut ego term was negative and significant, which suggests that sexually debuted girls nominated fewer peers as their friends than non-debuted girls did. The estimate for male ego  $\times$  sexual debut ego term was not significant, which indicates that boys who have had sex and boys who have not nominate a similar number of friends.

Given that girls were more likely to befriend peers who matched their sexual debut status, it broaches the question of whether girls' susceptibility to their friends' sexual debut is greater than boys'. We did not find a significant difference between girls' and boys' susceptibility to their friends' sexual debut. Although the number of debuted friends (total exposure) still significantly increased the hazard of first sex in Model 2, the estimate for its interaction term, male  $\times$  debuted peer (total exposure), was negative but not statistically significant. This suggests that there is no difference between the number of debuted friends associated with girls' and boys' transition to their sexual debut. This null finding does not necessarily conflict with our key results on the gender difference in sexual homophily in friendship selection; rather, it undergirds our predictions. That is, girls' tendency to be similar to their friends was not because they were more strongly influenced by their friends' behaviors than were boys (socialization); instead, girls exhibited greater preferential bias for peers who share their sexual debut status than boys did (selection). Consistent with our hypotheses, we found supporting evidence for 1) the presence of sexual homophily in adolescents' friendship networks; 2) the contributions of both selection and socialization to the development of sexual homophily in general; and finally 3) the differentiation of sexual homophily by gender.

### Discussion

The present study investigates commonplace assumptions that provoke unease and suspicions in adults; that is, friends have an undue influence on adolescents' sexual experiences. We found evidence that supports and complicates this dominant narrative that portrays peers as problematic sexual socialization agents. Our findings suggest that friends influenced girls' and boys' sexual debut. Having friends who already had sex increased the odds of adolescents' own sexual debut. However, sexual homophily did not stem solely from socialization. We found that adolescents were more likely to befriend peers whose sexual debut statuses were the same as their own than to befriend peers with different sexual debut statuses. We also found considerable support for our claim that sexual homophily would be greater among girls than among boys. Girls exhibited greater sensitivity to sexual debut status in their friendship selection than did boys. Moreover, girls tended to shrink their networks after their sexual debut by increasingly turning to others who matched their own sexual experiences, whereas boys were less sensitive about unmatched peers and became popular after their sexual debut. There was, however, no difference between girls' and boys' susceptibility to their friends' influences. This suggests that the gender difference in sexual homophily was shaped more by friendship selection processes that upheld the sexual double standard. This discovery – the balance of selection by gender – is novel and hints at the nuances in social network processes. Ultimately, the present study yielded mixed support for popular beliefs that peer pressure to “just do it” leads to “everyone is doing it,” and as a result, enriches our understanding of adolescent sexual homophily.

Our stochastic actor-based models yielded insights that were not possible from more traditional approaches, and as a result, our study makes several unique contributions. We found that having friends who have had sex increases the likelihood of adolescents' own sexual debut, which has often been hypothesized but rarely rigorously tested (e.g., Brady, Dolcini, Harper, & Pollack, 2009; Lyons et al., 2011; Sieving, Eisenberg, Pettingell, & Skay, 2006; Wolff & Crockett, 2011). Adolescents' odds of sexual debut were elevated when their friends had already had sex, even after controlling for shared demographic characteristics, extracurricular activities, pubertal development, risk-taking behaviors (i.e., binge-drinking), and endogenous processes underlying friendships (e.g., transitive triplets, popularity, reciprocity). These statistical controls for similarities and processes were rarely possible in the past, which rendered less reliable peer effects (Jaccard et al., 2005). Moreover, friends' influence on adolescent sex is striking and



distinct in the adolescent peer relations literature, which has focused extensively on public behaviors such as smoking and drinking (Brechwald & Prinstein, 2011). Sex, on the other hand, is generally a private behavior. Homophily based on private behaviors demonstrate that peer influence processes are not dependent on social learning.

Asymmetrical patterns of friendship nominations suggest that adolescents evaluate their peers who have had sex more favorably than their peers who have not had sex. We found that the former – i.e., adolescents who have had sex – receive more friendship nominations than the latter. It is possible that adolescents may perceive their sexually experienced peers to be desirable and attractive. It is also possible that desirable and attractive adolescents may be more likely to have sex. Indeed, interviews with adolescents reveal that many see sexual and romantic relationships as status-enhancing (Suleiman & Deardorff, 2015). Further, this asymmetry aligns with previous work that documents adolescents' preference for befriending high-status adolescents over low-status adolescents (Dijkstra et al., 2013). Yet, not all adolescents have the same chance to enter into romantic and sexual relationships. Adolescents with many opposite-gender friends are more likely to date and have romantic relationships than their peers who have few opposite-gender friends (Kreager, Molloy, Moody, & Feinberg, 2015). Therefore, the link between sexual debut and peer acceptance may also reflect a network advantage. We also found that adolescents who have had sex nominate fewer peers as friends. According to Dijkstra et al. (2013), high-status adolescents' selectiveness may reflect a need to protect their status by distancing themselves from lower-status peers, but low-status adolescents may try to elevate their status by affiliating with high-status peers. These asymmetric patterns reinforce sexual homophily by reducing the odds of friendship formation between dissimilar others.

We found evidence supporting our hypothesis that friendship selection varied by gender in ways that were generally consistent with the sexual double standard. Compared to boys, girls were less likely to befriend other girls whose sexual debut status did not match their own; this avoidance may reflect fears of harsh judgment based on the sexual double standard (Phillips, 2000). Indeed, girls and women are well aware that any potential “mishap” – actual or perceived – may result in peer ostracism (Hamilton & Armstrong, 2009; Livingston, Bay-Cheng, Hequembourg, Testa, & Downs, 2012). Girls may seek other like-minded and similarly experienced girls for validation, which may explain why selection plays a stronger role for girls. Further, we found evidence that girls “curate” their networks more upon sexual debut given that

they nominated fewer friends. This shrinkage may be protective; girls who have had sex may fear judgment from their peers who have not had sex. Yet, it is important to note that alternative processes may be at work. For example, network reduction may be status-driven, as sexually debuted girls are nominated more by their peers as friends but nominate fewer peers themselves. Friendships also form across a broad range of experiences and shared interests, including extracurricular activities and media diets (Schaefer, Simpkins, Vest, & Price, 2011).

Our study illustrates that relative to girls, boys' friendship networks had lower levels of sexual homophily. Because boys are rewarded for accumulating sexual partners and experiences, and are sanctioned for far fewer "transgressions" than their female peers, they have more "leeway" (Kimmel, 2009; Tolman, 2002). As a result of this "leeway," boys' concerns about their own level of sexual experience and their peers' levels may be qualitatively different from girls' concerns. That is, boys may place less importance on sexual experience as a basis for friendship formation. Instead, boys may see sexual experience as a function of popularity. Indeed, qualitative, survey, and social network data provide convergent evidence that boys' popularity rises and falls with their actual – or perceived – levels of sexual experiences (Flood, 2009; Kimmel, 2009; Kreager & Staff, 2009).

Our study contributes an integrated and dynamic model that predicted both friendship selection and friends' influence on sex with explicit control parameters, yet there are still some limitations. First, the stochastic actor-oriented approach makes many assumptions about the data when estimating model parameters. For example, it is assumed that the opportunities for behavioral and network changes are random and that there are no unobserved factors, other than the specified forms of the model affecting the interdependencies among the actors. Little is known about how violations of such assumptions would affect the results. Second, the fact that our longitudinal network analysis simulates concurrently interlocking causal processes should not be translated into a proof of causation. Instead, our results highlight the interdependent nature of sexual behavior and peer selection by investigating a large set of selection- and influence-related factors and thereby addressing competing explanations.

Our findings must be interpreted with caution by considering the contexts and limitations of the data. It is unclear if results would differ across schools. Schools are diverse and vary by type (e.g., public, private, charter), size, and student population (e.g., demographics). Replication across diverse school contexts is necessary to determine the generalizability of our findings.

Moreover, newer data are needed to determine if our findings, which were derived from data collected in the mid-1990s, is pertinent to today's youth. Cohort differences in sexual behaviors and attitudes may emerge because sexual mores in the 1990s may be different from current mores. Analyses of birth cohorts since 1960 demonstrate that the median age of sexual debut has hovered steadily between 17-18 years old (Finer & Philbin, 2014). Yet, in recent years, fewer adolescents are initiating sex early (Guttmacher Institute, 2016). Similarly, there is evidence to suggest that endorsement of sexual double standards is steady, overall, but varies a bit across situational factors (Bordini & Sperb, 2012). Although secular and historical trends are rarely brought to the fore, doing so would enrich our understanding and examination of adolescent development.

The findings of the present study evoke several questions that can guide future research. It is unclear whether sexual homophily persists in later life. In late adolescence and emerging adulthood, sexual debut wanes in importance because the majority of young people are sexually active. Yet, the sexual double standard persists, and late adolescent and emerging adult women still report reputational concerns (Hamilton & Armstrong, 2009). Do young women continue to select friends whose sexual experiences are similar to their own, and if so, which index or indices of sexual experience serve as the basis for such comparisons? The stability of sexual homophily is also unclear, especially given that diverse sexual trajectories have been found in the U.S. (Halpern & Haydon, 2012). This diversity stems, in part, from group (e.g., race, culture) and individual (e.g., formative sexual socialization experiences) differences. The ways in which adolescents influence and police their peers is indubitably informed by and informs their cultural values and social identities. Our understanding of adolescent friendship networks and sexual homophily will be enriched by expanding our work to include understudied populations.

Research on sexual homophily in adolescent friendship networks can serve as a promising resource for educators and health practitioners who are dedicated to promoting adolescent health. Evidence of sexual homophily suggests that adolescents are attuned to and influenced by their friends' experiences and attitudes. Because sexual beliefs may differ between friendship groups, each group may encounter different risks (Brown et al., 1997). Therefore, tailoring content to adolescents and their friends is likely more effective than delivering resources and information to adolescents en masse. For example, adolescents who endorse traditional gendered sex roles – i.e., boys are sex-driven and girls are passive partner-pleasers –

report more experiences of unwanted sex and risky sex (Sinoéan et al., 2002; Teitelman, Tennille, Bobinski, Jemmott, & Jemmott, 2011). Comprehensive sexuality education that focuses on gender, power, and rights has been shown to reduce unintended pregnancies and sexually transmitted infections (Haberland & Rogow, 2015). Relative to adolescents who do not believe in abstinence until marriage, adolescents who intend to abstain from premarital sex are less likely to practice safe sex once they become sexually active (Bearman & Brückner, 2001). For these adolescents, emphasis on harm reduction may be especially important. Although working with smaller groups is undoubtedly more laborious, the payoff may be worthwhile. Bay-Cheng, Livingston, and Fava (2013) argue that giving adolescents space to speak moves talk about sex from the black-and-white hypothetical scenarios and truisms to the messy, gray realities that adolescents actually encounter.

Peers serve as problematic sexual socialization agents (e.g., Best & Bogle, 2014), but the reality is far more complex; adolescents and their friends fulfill numerous and multifaceted roles, including de facto sex educators, matchmakers, and arbiters of propriety (e.g., Suleiman & Deardorff, 2015). By testing widespread albeit anecdotal assumptions – i.e., sexual homophily – the present study provided nuanced insights into peer networks as sites for sexual socialization. Moreover, the present study was buttressed by the analysis of complete, longitudinal network data, a methodological strength that is still rare in the literature (Dishion, 2013). By continuing to address methodological challenges, empirical studies of peer relationships will begin to rival the theoretical advances in the literature. Ultimately, continual consideration of how peers, individually and collectively, wield influence and power will provide insights into the complexities that underscore peer social network processes.

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Table 1. Descriptive statistics for two-school sample

	Jefferson (n=832)			Sunshine (n=1734)		
Waves	1	2	3	1	2	3

<i>Covariates</i>						
Sexual experience	39.4%	47.5%	57.8%	43.3%	49.1%	58.9%
Male	52.4%			51.6%		
Age	16.89 (1.24)			17.27 (1.03)		
White	97.3%			5.5%		
Black	0.2%			22.5%		
Hispanic	1.1%			39.5%		
Asian	0.9%			31.1%		
Other	0.5%			1.3%		
GPA	2.60 (.77)	2.62 (.77)		2.73 (.76)	2.51 (.79)	
Binge drinking	0.69 (.79)			0.48 (.75)		
Religiosity	1.27 (1.20)			2.01 (1.08)		
Parental education	.342 (.475)			.356 (.479)		
Extracurricular activities	2.15 (2.06)			1.47 (2.35)		
Pubertal development	.439 (.500)			.315 (.465)		
<i>Network</i>						
Density	.008	.005	.005	.002	.002	.001
Average Outdegree	4.665	4.039	3.088	2.496	2.168	1.364
Reciprocity	.444	.388	.444	.392	.319	.353
Jaccard Index	.275	.259		.202	.233	
Number of Ties	2,869	3,345	1,949	3,073	3,688	1,617
n	615	828	631	1231	1701	1185

*Note.* Density is the ratio of the actual number of ties over the possible number of pairs given nodes. Average outdegree refers to the average number of friends that a respondent nominates. Reciprocity was calculated as the fraction of ties reciprocated against the total number of ties. Jaccard index denotes to the proportion of ties that were present in consecutive waves over all the ties in the two waves.

Table 2. Parameter Estimates of SIENA for Friend Selection and Sexual Debut

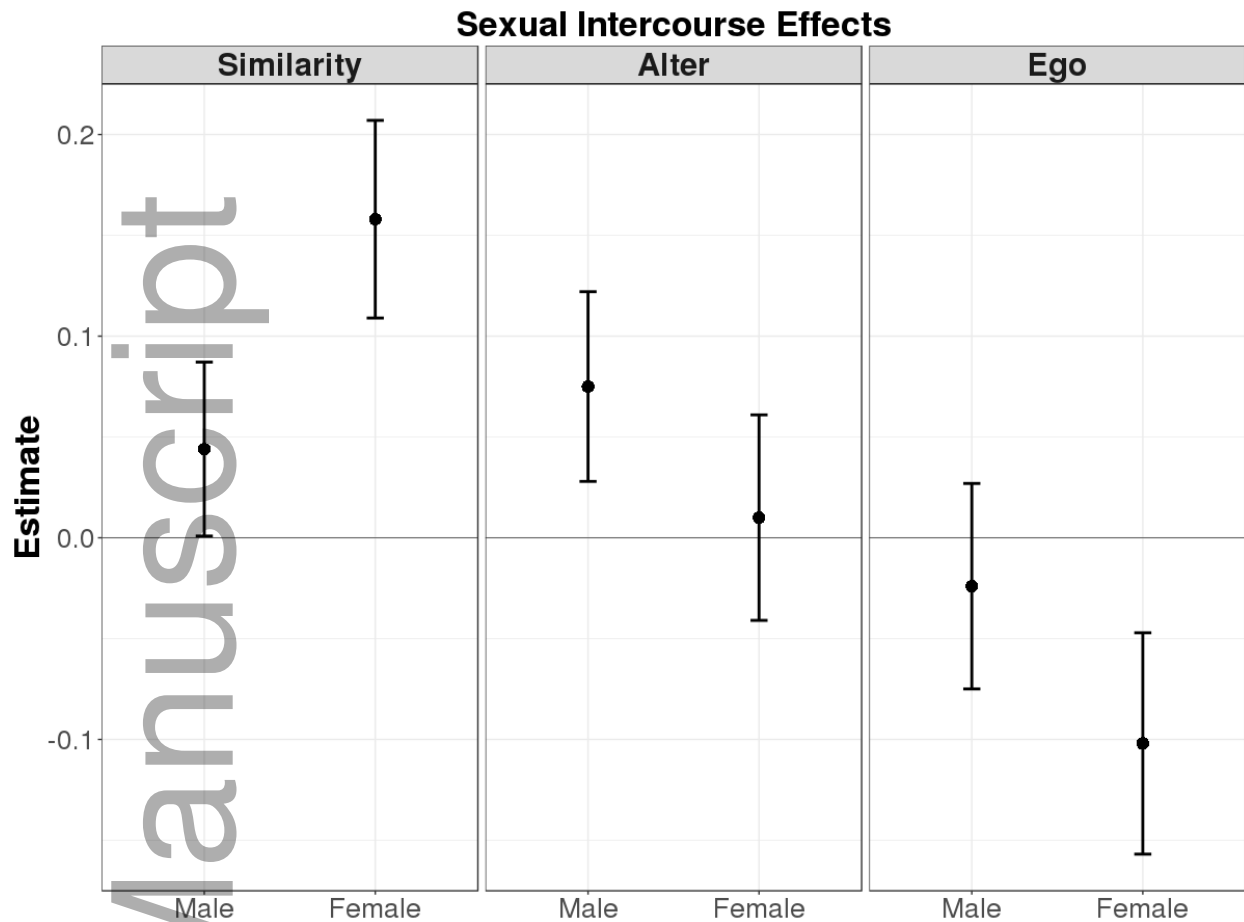
Selection Parameters	Model 1			Model 2		
	Est.		SE	Est.		SE
<i>Structural Effects</i>						
Outdegree	-4.716	***	0.072	-4.716	***	0.075
Reciprocity	2.144	***	0.038	2.145	***	0.039
Transitive triplets	0.482	***	0.018	0.482	***	0.019
Indegree-popularity(sqrt)	0.135	***	0.018	0.135	***	0.018
outdegree – activity (sqrt)	0.019		0.018	0.019		0.018
<i>Similarity effects: Choosing alters similar to oneself</i>						
Sexual intercourse	0.195	***	0.021			
Male ego × Sexual intercourse				0.044	*	0.022
Female ego × Sexual intercourse				0.158	***	0.025
Male	0.223	***	0.020	0.221	***	0.02
Race	0.679	***	0.035	0.677	***	0.034
Age	2.436	***	0.124	2.438	***	0.122
Parental education	0.075	***	0.021	0.076	***	0.022
Religiosity	0.110	***	0.030	0.111	***	0.034
Binge drinking	0.234	***	0.036	0.231	***	0.035
GPA	0.472	***	0.056	0.471	***	0.052
Shared Extracurricular Activities	0.194	***	0.016	0.195	***	0.017
<i>Alter effects: Who is more often nominated?</i>						
Sexual intercourse	0.087	***	0.022			
Male ego × Sexual intercourse				0.075	**	0.024
Female ego × Sexual intercourse				0.010		0.026
Male	0.028		0.019	0.029		0.022
Age	-0.006		0.012	-0.006		0.012
Parental education	0.016		0.022	0.016		0.022
Religiosity	-0.009		0.008	-0.009		0.009
Binge drinking	0.018		0.016	0.016		0.016
GPA	0.022		0.016	0.022		0.015

<i>Ego effects: Who nominates more alters?</i>						
Sexual Intercourse	-0.125	***	0.024			
Male ego × Sexual intercourse				-0.024		0.026
Female ego × Sexual intercourse				-0.102	***	0.028
Male	0.101	***	0.022	0.185	***	0.034
Age	-0.053	***	0.012	-0.053	***	0.012
Parental education	0.010		0.027	0.008		0.023
Religiosity	-0.041	***	0.011	-0.041	***	0.011
Binge drinking	0.041	*	0.017	0.039	*	0.017
GPA	-0.001		0.015	-0.001		0.015
Sunshine school	-1.808	***	0.118	-1.821	***	0.116
<i>School Interactions (Sunshine = 1)</i>						
Transitive triplets	0.098	***	0.028	0.098	***	0.030
Outdegree-activity(sqrt)	0.230	***	0.032	0.232	***	0.034
Same race	1.085	***	0.076	1.091	***	0.073
Age similarity	0.618	**	0.218	0.617	**	0.207
Religiosity ego	-0.095	***	0.021	-0.097	***	0.020
GPA alter	0.126	***	0.029	0.126	***	0.027
<i>Rate Effects</i>						
Jefferson, period 1	13.874	***	0.527	13.855	***	0.602
Jefferson, period 2	15.330	***	0.721	15.348	***	0.802
Sunshine, period 1	11.492	***	0.552	11.490	***	0.517
Sunshine, period 2	9.504	***	0.494	9.501	***	0.434
<b>Behavior Parameters</b>						
Debuted peer (total exposure)	0.334	***	0.074	0.332	***	0.079
Male × Debuted peer (total exposure)				-0.124		0.173
Male	-0.068		0.123	-0.036		0.146
Age	0.184	*	0.082	0.187	**	0.067
Religiosity	-0.153	**	0.057	-0.154	**	0.054
Binge drinking	0.361	***	0.092	0.363	***	0.092
GPA	-0.312	**	0.101	-0.313	***	0.081

Pubertal development	0.359 *	0.146	0.362 **	0.144
Extracurricular activities	0.049	0.178	0.050	0.149
Rates for Jefferson, period 1	0.049 ***	0.014	0.049 ***	0.015
Rates for Jefferson, period 2	0.348 ***	0.061	0.353 ***	0.082
Rates for Sunshine, period 1	0.077 ***	0.018	0.078 ***	0.018
Rates for Sunshine, period 2	0.449 ***	0.058	0.451 ***	0.074
Overall maximum convergence ratio	0.230		0.248	

*Note.* Convergence t-ratios for all parameters are below .100. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$  (two-tailed tests). Values are unstandardized contributions to log-probabilities.

Figure 1. The Differential Effects of Sexual Debut on Friendship Formation by Gender



*Note.* This plot reports the estimates of the gender and sexual intercourse interaction terms predicting friendship formation, displaying 95% confidence intervals calculated from Model 2 in Table 2. The panels were organized by the different types of effects: Similarity (higher values indicating greater similarity in friends than not), alter (positive values indicating more rapid increase of received nominations), and ego effects (positive values indicating more rapid increase of nominations).

## Appendix

Table A. Friendship Selection Table by Gender and Sexual Debut Status

		<b>Boys</b>				<b>Girls</b>	
		<i>Alter</i>				<i>Alter</i>	
		Debuted	Not debuted			Debuted	Not debuted
<i>Ego</i>	Debuted	.399	.280	<i>Ego</i>	Debuted	.228	.071
	Not debuted	.379	.348		Not debuted	.174	.329