

# **Parental Influences on Adolescent Friendship Pairings**

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THESIS

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This dissertation is dedicated to my beloved family, without whom it would never have  
been accomplished

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## **I. INTRODUCTION**

### **A. Specific Aims**

This study examines how parents influence adolescents' actual friendship nomination, both directly and indirectly.

A sizable body of research on the relative influences that parents and peers exert during adolescence has accumulated over the last 30 years. Initially, researchers proposed parents and peers as two dissonant resources that compete with each other (e.g., Gecas and Seff 1990; Steinberg and Silverberg 1986), which Coleman (1980) termed the parent-peer conflict proposition. The proposition argues that as youths attempt to achieve autonomy, parental control and guidance declines (Steinberg and Silverberg 1986). On the other hand, increased interactions between youths and their peers lead to greater peer influences. For example, negative peer influences, such as delinquency and drug use, are a proximal link to youths' own problem behaviors and distraction from academic activities (Aseltine 1995; Erickson, Crosnoe, and Dornbusch 2000; Snyder, Horsch, and Childs 1997;).

More recent research, mindful that complex layers of the environment can jointly affect adolescents, moves away from conflict arguments and uses a proposition of parent-peer linkage (Kandel 1996). This proposition argues that parents and peers are connected to each other through their interaction with adolescents (e.g., Fuligni 1993; Kandel 1996; Mounts 2002, 2004; Parke and Bhavnagri 1989). Scholars have used this supposition to formulate two major implications of parental influences in adolescent peer relations. First, parents may influence the development of their children's social competence and social

skills (Brown et al. 1993; Mounts 2001) by arranging their social setting (Knoester, Haynie, and Stephens 2006), and, consequently, determining the quality of peers with whom adolescents affiliate. In this indirect manner, parents affect adolescents' social adjustments and guide them toward peers with similar desirable qualities. Second, parents may influence adolescents' peer relationships directly through actions, such as their involvement in and monitoring of youths' activities (Durbin et al. 1993; Nebbitt, Lombe, and Lindsey 2007). This type of influence is driven by parenting style, such as parents having the authority to set rules about peer interaction (Brody 2001; Laird and Marrero 2010), and by familism value, such as maternal and paternal familism value interaction preventing youths from deviant peer affiliations (German, Gonzales, and Dumka 2009).

However, studies of direct and indirect influences tend to mainly focus on the quality of peers, which reflect the overemphasis on internalizing and externalizing behaviors as outcomes. Recent studies on the mechanisms of similarities and proximity associated with the formation of individual relationships, along with the availability of data at the dyadic level, constitute a promising approach for exploring direct and indirect parental influences on friendship pairings. To fill in the literature gap and identify the pathways of parental influences on friendship pairings, this study will address three specific aims. (Because studies use the terms *indirect* and *direct* in varying ways, I instead employ the terms *fundamental influences* and *moderating influences*, respectively, throughout this study.)

First, I examine the fundamental influences of parents on friendship pairings. Social epidemiologists use *fundamental causes* to refer to the social contexts associated with inequalities that create and shape the patterns of diseases (Link and Phelan 1995;

Link et al. 1998; Link et al. 2008). In the present study, I define fundamental influences as the parents' characteristics (e.g., level of education and income, smoking and drinking habits), parenting behaviors (e.g., educational aspirations on adolescent, participating in parent-teacher association and parent monitoring and choosing neighborhood because of school district), and parent-child relations (closeness, availability, and involvement). I examine whether these fundamental influences correlate with youths' social adjustments, which, in turn, affect the friendship pairings process. Second, I examine whether parents fundamentally influence the availability of adolescents' potential friends. Finally, I examine whether parents moderate youths' friendship pairings more directly by guiding youths toward peers with characteristics that parents prefer and away from peers with characteristics that parents dislike.

## B. Background and Significance

### 1. Background of the Study

#### a. Parenting, Adolescent Adjustments, and Peer Affiliation

Sociologists emphasize that social and economic milieus pattern the process of friendship pairings (Milardo and Wellman 1992). Given the evidence that the characteristics of friends could either be academic resources (Crosnoe, Cavanagh, and Elder 2003) or risk factors (Aseltine 1995; Snyder et al. 1997; Matsueda and Anderson 1998; Erickson et al. 2000), parents' characteristics and behaviors may affect their adolescent children's peer-selection process.

For example, studies consistently show positive associations between parents' characteristics and youths' adjustment outcomes (Cohen 1987; Li and Wojtkiewicz 1992;

Biblarz and Raftery 1999; Gorman-Smith, Tolan and Henry 2000; Battle 2002; Trusty 2002; Heard 2007). Parents' characteristics and behaviors may restrict or encourage adolescents' access to specific resources (such as educational resources) or expose them to specific risks (e.g., a tendency toward smoking or drinking) which, in turn, affect youths' social adjustments and enhance the possibility for youths to become friends with adolescents with a similar social adjustment. In other words, parents' characteristics predict their children's prosocial and antisocial character and thus fundamentally influence the processes of friendship pairings.

Parents may also select the space where adolescents would interact with their peers to form friendships. For instance, Knoester, Haynie, and Stephens (2006) found that youths whose parents selected the neighborhood because of its good school were 8% less likely to become friends with antisocial adolescents than others whose parents don't select this way. These parents selected neighborhoods to influence the supply of potential peers and thereby direct their children away from antisocial peers.

How students are grouped in school can also fundamentally affect their opportunities for having contact with each other and forming friendships. A new measure for capturing school clusters may help to better understand the concept. Local positions capture clusters of students who take a similar set of courses (Field et al. 2006) and can create microlevel school stratification. Local position allows me to study friendship pairings in two ways. First, local positions cluster similar youths, allowing them more chances to interact (as in propinquity). Second, being in the same local position signals and reinforces youths to become similarity, which increases the probability of becoming friends. Thus, local positions provide a new direction for studying school friendships.

No studies to date have examined the possible connection between parents' influences and their adolescent children's local positions. But some studies on other kinds of clusters such as tracking or extracurricular activities indicate that parents can influence youths' within-school affiliations. Within-school affiliation is one possible pathway by which parents may fundamentally influence their children's academic course enrollment and thus affect their exposure to potential friends.

Additionally a substantial body of literature accounts for how parents directly influence friendship affiliation, particularly how parents' monitoring of their children, parent-child relations, and other parenting characteristics restrict or encourage youths' choice of friends (Dishion 1990; Dishion et al. 1991; Brown et al. 1993; Mounts and Steinberg 1995; Parke and Buriel 1998). These studies form the basis for my examination of how parents moderate the effects of homophily and propinquity. That is, given children are part of particular social milieus, are some parents able to guide them toward friends with more desirable characteristics (e.g., who are less engaged in delinquency and more engaged in academics)?

#### b. Homophily and Propinquity

In addition to the interactions among parents, youths, and their peers, the mechanisms of friendship pairings per se deserves research attention. Two people who share similar characteristics are more likely to become friends than two people who are dissimilar. This idea is captured by the adage "Birds of a feather flock together." Sociologically, the term *homophily* is used to conceptualize the idea that "contact between similar people occurs at a higher rate than among dissimilar people" (McPherson,

Smith-Lovin, and Cook 2001:416). The processes whereby two people can be similar in *status* and/or *values* are known as *status homophily* and *value homophily*, respectively. Status can be ascribed (e.g., race, ethnicity, and sex) and acquired (e.g., religion, education, and behavior). Values are inner attitudes and beliefs that shape behaviors.

Like the broader research literature on adults, research on adolescents finds that friendships are more likely to be formed when adolescents share ascribed characteristics such as race, ethnicity, gender, and age (Epstein 1983; Shrum, Cheek, and Hunter 1988; Hallinan and Williams 1989; Joyner and Kao 2000). Acquired characteristics, such as delinquency, drug use, and school performance, also can contribute to friendship pairings to some extent (Kandel 1978; Cairns et al. 1988; Kupersmidt, Derosier, and Patterson 1995; Urberg et al. 2000), as can attitudes toward educational orientation and religious beliefs (Kandel 1978; Urberg, Degirmencioglu, and Tolson 1998; Hamm 2000). On the whole, these studies provide substantial evidence that ascribed characteristics are stronger predictors for friendship pairings than acquired characteristics and values at both the dyadic and the individual level (McPherson et al. 2001).

However, in certain situations individuals with different attributes are likely to become friends. Apart from widespread studies of homophily, which focus on the commonalities of adolescents' own attributes, a number of studies have incorporated the concept of propinquity to study the social environments for friendship pairings (Moody 2001; Quillian and Campbell 2003; Mouw and Entwisle 2006). The term *propinquity* is used to capture the idea that being physically close or having contact with another is critical for allowing the process of homophily to operate. Propinquity “make[s] communication between similar others more likely” (McPherson et al. 2001:416). Two

people may share similar statuses and values, but they may not become friends because they do not have many opportunities for contacting or approaching each other.

Some studies have examined the importance of neighborhood propinquity to friendship pairings among same and different race peers. For example, students who live in racially segregated neighborhoods have greater tendencies to choose friends within their own race than students who live in racially diverse neighborhoods (Mouw and Entwisle 2006). Other studies have observed that living in impoverished neighborhoods (e.g., those with low socioeconomic status (SES), high crime rates, and high residential mobility) makes adolescents more likely to have contact with peers whose characteristics parents may wish to avoid (Elliott et al. 1996; Brody et al. 2001).

Literature related to extracurricular activities and school tracking indicates that students who participate in the same activities and/or track have more opportunities to become friends (Kubitschek and Hallinan 1998, Quiroz, Gonzalez, and Frank 1996), even if they are not from the same race and ethnicity group (Moody 2001) or at the same level of delinquency (Crosnoe 2002).

Although, to my knowledge, no previous study has extensively examined how parental influences correlate/interact with homophily and propinquity to affect the friendship pairing process, the accumulated literature examining friendship pairing mechanisms (i.e., homophily and propinquity) and parental influences on adolescents' characteristics, their activities space, and their choice of friends demonstrates the research potential for this study.

### c. Friendship Pairings

#### c.1. Nomination

To analyze adolescents' friendship pairings, some studies of similarity and dissimilarity ask children to report the distribution of their friends. Others collect network data about the characteristics of friend dyads. In this study, I mainly look at a dyadic report of being friends and the characteristics of youths and their parents within each pair of possible friends. Table 1 identifies the possible combination of friendship nominations.  $Y_i$  and  $Y_j$  represent Youth  $i$  and Youth  $j$  from the population. As the table shows,  $Y_i$  has two possible choices in regard to nominating  $Y_j$  as a friend. If  $Y_i$  nominates  $Y_j$  as a friend, the value of the outcome variable, *friendship pairings*, is equal to 1 (*Cell 1*) and otherwise 0 (*Cell 2*). (Note, the current study focuses on the nomination of the friends rather than the friendship reciprocity. Thus, I use permutation through the nomination construction for all possible pairings which captures  $Y_j$ 's nomination of  $Y_i$  as an independent event from  $Y_i$ 's nomination of  $Y_j$ .)

Table 1.1 Predicted Outcomes: Whether  $Y_i$ 's nominates  $Y_j$

$Y_i$ nominates $Y_j$ ( <i>Cell 1</i> )	$Y_i$ doesn't nominate $Y_j$ ( <i>Cell 2</i> )
--	---

#### c.2. Youths' Attributes at the Dyadic Level

Because friendship pairings are the outcome variable in this study, I use both individual- and dyadic-level attributes as units in the models. Applying the dyadic-level predictors to models is not as straightforward as using the individual-level predictors. In



this study, dyadic-level predictors are always the similarities or dissimilarities of pairs of youths and/or the characteristics or behaviors of the two youths' parents.

I use a composite variable named *Prosocial-Antisocial Continuum* throughout this study. The *Prosocial-Antisocial Continuum* is a composite variable of GPAs, educational aspirations, delinquency and drug use. Youth *i* and Youth *j*'s *Prosocial-Antisocial Dichotomy* is based on a median split of the *Prosocial-Antisocial Continuum* which simplifies the creation of dyadic measures. . I define the youths whose values are above the median as higher or prosocial adjustments and below the median as lower or antisocial adjustments. I then examine the cross classification of each pair of youth's dummy indicators to define the dyadic-level *Prosocial-Antisocial Classification* includes four categories: Prosocial-Prosocial adjustments (note, to indicating dichotomizing of the concept using median as a split between prosocial and antisocial adjustments, P and A will be used.) (PP), Antisocial-Antisocial adjustments (AA), Prosocial-Antisocial adjustments (PA), and Antisocial-Prosocial adjustments (AP).

Table 1.2 Four Possible Classification of  $Y_i$ 's and  $Y_j$ 's Prosocial-Antisocial Dichotomy

	<i>If <math>Y_j</math> is above the median of Prosocial-Antisocial Continuum</i>	<i>if <math>Y_j</math> is below the median of Prosocial-Antisocial Continuum</i>
<i>if <math>Y_i</math> is above the median of Prosocial-Antisocial Continuum</i>	PP (Cell I)	PA (Cell II)
<i>if <math>Y_i</math> is below the median of Prosocial-Antisocial Continuum</i>	AP (Cell III)	AA (Cell IV)

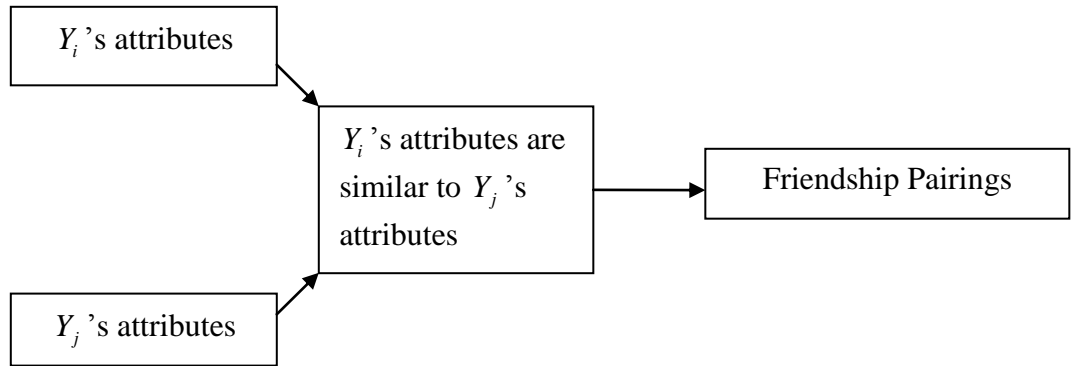
To better understand this data structure, I use an example in Table 1.3. The first column contains the dyad's ID number. The second column shows the outcome variable ( $i$  nominated  $j$ ). The third and fourth columns contain nominator ID and nominee ID, respectively. Columns 5 and 6 represent the nominators' and nominees' prosocial behaviors levels. The dyadic level *Prosocial-Antisocial Continuum* level is listed in Column 7. Because I consider youths' friendship nomination within schools, I provide hypothesized School IDs in the last column.

Table 1.3 Data Structure Preview

Dyad ID	$Y_i$ nominates $Y_j$	$Y_i$ ID	$Y_j$ ID	$Y_i$ 's <i>Prosocial-Antisocial Dichotomy</i>	$Y_j$ 's <i>Prosocial-Antisocial Dichotomy</i>	<i>Prosocial-Antisocial Classification</i>	School ID
1	1	10001	10002	P	A	PA	1
2	0	10001	10003	P	P	PP	1
3	0	10002	10001	A	P	AP	1
4	1	10002	10003	A	P	AP	1
5	0	10003	10001	P	P	PP	1
6	0	10003	10002	P	A	PA	1
7	1	20001	20002	A	P	AP	2
8	0	20001	20003	A	A	AA	2
9	0	20001	20004	A	P	AP	2
10	0	20002	20001	P	A	PA	2
11	0	20002	20003	P	A	PA	2
12	1	20002	20004	P	P	PP	2
13	0	20003	20001	A	A	AA	2
14	1	20003	20002	A	P	AP	2
15	0	20003	20004	A	P	AP	2
16	0	20004	20001	P	A	PA	2
17	1	20004	20002	P	P	PP	2
18	0	20004	20003	P	A	PA	2

The concept of homophily explains that youths are more likely to choose each other as friends when they are similar. For example, in Table 2, when  $Y_i$  and  $Y_j$  are either in *Cell I* (PP) or *Cell IV* (AA), they are more likely to form friendships because they are similar to each other in their level of social adjustment. If  $Y_i$  and  $Y_j$  are either in *Cell II* (PA) or *Cell III* (AP), they are less likely to form friendships because of the dissimilarity in social adjustment. Figure 1.1 demonstrates the homophily mechanism.

Figure 1.1 An Example of Friendship Pairings



## 2. Summary and Significance of the Study

This study evaluates the importance of parents in adolescents' friendship pairings by examining both their fundamental and moderating influences. I assess the parenting and peer relationship association through the study of homophily and propinquity.

Dyadic friendship ties between pairs of students are treated as the dependent variable. Although scholars have widely and separately studied the mechanisms of homophily, propinquity, and parent-peer linkage, it is surprising that no studies have examined whether family context contributes to and/or interacts with homophily and propinquity for adolescents' friendship pairings. This represents a gap in the literature between the studies of friendship pairing mechanisms (i.e., homophily and propinquity) and the studies of parental influences on friendship pairings.

One possible explanation for this gap might be the limitation of data structure. Much of the previous literature has relied on youths' reports of their friends' characteristics rather than network-level data about the characteristics of youths' potential and actual friends. Data that allow for the examination of the influence of parental characteristics on the potential pairing of youths are rare.

Another explanation for the literature gap may be differences in research objectives, given that previous studies often focused on the composition of friends rather than the process of friendship pairings. For example, Knoester et al. (2006) investigated the relationship between parenting practices and the composition of adolescents' friendship networks using the National Longitudinal Study of Adolescent Health (Add Health). Because their original focus was network composition, they used network data to capture the individual level of friends' characteristics instead of the dyadic level of youths' friendship pairings within social networks. I build on Knoester et al.'s study and use the network data to examine parental influences on friendship pairings.

Additionally and most importantly, to test the contribution of individual-level and dyadic-level predictors, I adopt two-level models. The dyadic level (Level 1) is for the structure of the dependent variable "the possibility of friendship," which is the potential tie between any two adolescents in a school network. Using random effects to capture the effects of both youths in each pair (the nominator and nominee) reduces the number of parameters (Zijlstra and Van Duijn 2003). The individual level (Level 2) takes into account the fundamental contribution from nominators and nominees' parents. Parents' moderating influences are only tested at Level 1, which focuses on whether the predictors of youths' similarities are moderated by parents' similarities.

I use the Add Health data set, which allows me to improve the understanding of adolescents' friendship pairings by looking at the broader family picture. In this paper, I discuss parental influences on the characteristics that youths bring to their friendship contexts and to the friendship pairing process that parents may manage. I examine how parental characteristics and influences (1) contribute to youths' similarities in acquired

characteristics and physical space and then fundamentally affect the friendship pairings and (2) moderate the relationship between homophily/propinquity and friendship pairings.

### C. Organization of Chapters

Chapter I presents the aim of the study, its background, and its significance. Chapter II integrates theoretical perspectives of social control theory and schema from direct and indirect parental influences to clarify the parent-peer linkage through the ecological framework. It also includes a review of the mechanisms of homophily and propinquity to explain friendship pairings, allowing me to hypothesize two possible pathways that lead from parental characteristics to friendship pairings. . Chapter III includes research questions and hypotheses. Chapter VI describes the Add Health data set and sample selection criteria used for this study. The measures are described in detail. To test parent-peer linkage, crossed-random effect models are adopted to examine the individual-level and dyad-level characteristics related to friendship pairings. Chapter V presents the model results, and the final chapter (Chapter VI) discusses the conclusion and the limitation of current study.

## **II. THEORETICAL FRAMEWORK AND RELATED LITERATURE**

In this chapter, I review two sets of literature that are related to: (1) parental influences on friendship pairings and (2) basic mechanisms of friendship pairings.

In Section A, I review the prior studies about parent-peer interaction to constitute two types of parental influences (fundamental influences and moderating influences) on friendship pairings.

Section B reviews earlier literature regarding the homophily process in adolescents' friendship pairings. Similarities across acquired characteristics, including grade-point averages (GPAs), college expectations, delinquency, and drug use, and the like, also affect friendship pairings. In section B, I also examine the literature that has studied the association between propinquity and friendship pairings. Studies indicate that youths who live close to each other or have extensive daily interaction are more likely to select each other as friends.

In Section C, I extend Section A's fundamental influence discussion to incorporate the assumption of homophily and propinquity thereby examining parental indirect influences on friendship pairing process. Section D follows with my discussion of moderation effects anticipates that parent characteristics moderate the homophily and propinquity process to affect youths' friendship pairings.

Section E discusses confounding factors which may bias the association between youths' similarities and friendship affiliation when ignored.

In the final section F, I summarize the framework of my review and discuss the data that I adopted in the current study.

## A. Parent-Peer Interactions

According to the ecological framework, complex layers of environment can jointly affect adolescents (Bronfenbrenner 1979). The proposition of parent-peer linkage, rather than the proposition of parent-peer conflict, will be adopted to discuss how parents influence adolescents' friendship pairings. Because previous studies hypothesized the indirect and direct pathways from parental influences to friendship pairings, I will review those studies and integrate them into my hypotheses.

### 1. Parent-Peer Conflict

The perspective of parent-peer conflict viewed family and peers as two dissonant social forces that compete with each other (Coleman 1980). Youths seek the approval of and guidance from their parents to form standards, values, and educational or occupational goals (Kandel and Lesser 1972), whereas they achieve an extrafamilial reality and experience from peers (Savin-Williams and Berndt 1990:278). Similarly, Steinberg and Silverberg (1986) indicated that by the onset of puberty, adolescents' increasing susceptibility to peer influence and decreasing susceptibility to parental influence results in a rush from dependency on parents to dependency on peers. But over the past decade, researchers have moved away from this competitive proposition by examining the interactions between parents and peers, thus restating linkages across the different social settings.



## 2. Parent-Peer Linkage

Bronfenbrenner (1979) developed an ecological framework to identify the complex layers of environments which have an effect on an individual's development. His framework underscores the importance of jointly examining individual behaviors and their social contexts. Informed by the ecological framework, some studies of parental and peer influences argue that parents and peers are connected with each other during youths' development, a connection known as parent-peer linkage.

Studies often establish the connections between parents and peers by examining parents' influences on the qualities of peers. On the one hand, parents may influence the development of their child's social competence and social skills, which helps adolescents develop their peer relationships (e.g. Parke and Bhavnagri 1989; Fuligni 1993; Kandel 1996; Mounts 2002, 2004). On the other hand, parents can influence the qualities of peers with whom the adolescent affiliates through their management of peer relationships (Durbin et al. 1993; Knoester et al. 2006; Nebbitt et al. 2007) as well as parental control in parent-child dyad, (Updegraff et al, 2002) and maternal and paternal familism value interaction (German, Gonzales, and Dumka 2009). A few studies examine those two implications together (e.g. Parke and Bhavnagri 1989; Kandel 1996; Chen 2000; Chen, Dornbusch, and Liu 2007). For example, Parke and Bhavnagri (1989) and Kandel (1996) present extensive frameworks for understanding the pathways that link parents to peers. These pathways are known as the direct way and indirect way. Although they use the same terminologies (direct and indirect), the meaning of these terms in their studies differ.

Parke and Bhavnagri (1989) refer to both parenting practices that directly target peer relationships and parent child-rearing processes that indirectly influence peer relationships. That is, as the family shapes youths' values, personality, and characteristics, these attributes are indirectly brought to the peer context. In the direct way, parents initiate, arrange, monitor, and facilitate their children's contact with potential friends.

Kandel (1996) defined direct and indirect ways to parents contribute to their children's peer selection. Indirect parental effects work through transactions internal to the family (e.g., parental behaviors, parental norm setting, and quality of parenting) and/or through transactions in the community (e.g., parents' decision to settle in certain neighborhoods and to establish ties with other parents and institutions in the community) that are external to peer selection. Direct parental effects on peer group affiliations arise through role modeling, social reinforcement (i.e., the prescription of appropriate norms and standards), and child-rearing strategies.

Apart from the above-mentioned studies, which defined direct and indirect ways of targeting different friendship outcomes, scholars from the field of criminology also defined direct and indirect causal relationships among parents, peers' group affiliations, and youths' outcomes (Dishion et al. 1991; Patterson et al. 1991) They contended that there are direct and indirect pathways leading from parenting practices to friendship pairings. The direct influence refers to a causal sequence proposed from parenting to child behavior to peer-group affiliation. The indirect influence has been defined as the alternative pathway from parenting to peer-group affiliation to child behavior.

### 3. Summary

The aforementioned studies have adopted a proposition of parent-peer linkage that is focused mainly on parental influences on the qualities of peers instead of friendship pairings per se, and the hypothesized pathways from parents to friendship pairings remain unclear. To fill in the literature gap, this study builds on previous studies of indirect and direct pathways to fill in the parent-peer linkage proposition by hypothesizing two mechanisms through which parents may influence adolescent's friendship pairings.

#### a. Fundamental Influences

Researchers across disciplines have adopted Bronfenbrenner's (1979) models for their studies of the social context. For example, social epidemiologists apply the ecological models to their studies of disease and define social contexts as the "fundamental causes." Fundamental causes refer to the social conditions that are associated with inequalities that create and shape patterns of diseases (Link and Phelan 1995, Link et al. 1998, and Link et al. 2008). Social epidemiologists' objectives related to conceptualization of social contexts are first to identify the social distributions of disease and then to obtain the resources that help individuals avoid disease and its negative consequences.

Meanwhile, social control theory makes it possible to apply the fundamental causes to the study of parenting and friendship pairings. Hirschi's (1969) social control theory proposes that individuals are prevented from engaging in deviant behaviors by their bond to society. The social bonds include the elements of (1) attachment to

conventional others, (2) commitment to conventional goals and activities, (3) involvement in conventional activities, and (4) belief in conventional norms.

When these bonds are weak, the individual has a greater tendency to engage in deviant behaviors such as delinquency and drug use. When these bonds are strong, youths are socialized toward conventional behaviors such as academic activities. Although friends are one of social agents to which youths are bonded, attachment to parents is regarded in the social-control perspective as the primary social bond. The quality of children's socialization within the family is the main contributor to their social adjustment.

Additionally, Gottfredson and Hirschi (1990) discussed the family structure that is closely related to the social bonding function of the family. They argued that it is difficult to maintain high levels of bonding between a parent and child in the absence of one or both parents. Non-intact families hamper the establishment of bonds to conformity and provide less control and monitoring to socialize children to appropriate values and rules.

I apply the concepts of fundamental causes and social-control to friendship pairings. In this study, I define four sets of parent-related variables, including (1) parents' background; (2) parents' behaviors; (3) parenting practices and (4) parent-child relations, as fundamental influences for friendship pairings. I assume that those four sets of parent related variables model and define adolescents' social adjustments (e.g., grade-point averages (GPAs), college expectations, delinquency, and drug use). As such, youths' similarities, which result in friendship pairings, could be fundamentally influenced by their parents' characteristics and behaviors (homophily). In addition, those factors may also accumulate effects on youths' living space and their school location which bring youths within the similar physical space together and form friendships (propinquity).

Thus, I consider the following *Fundamental Influences*. Parents influence friendship pairings through the socialization process within the family, which shapes youths' characteristics. Parents bring influences to bear through their income, education, and lifestyle behaviors such as smoking and drinking, monitoring and closeness. Parents may also target the supply side of youths' potential friends within the neighborhood and in schools, which allow youths to be exposed to parent-preferred peers and keep their distance from peers that parents do not prefer. Thus, through their selection of neighborhood, parents can affect youths' within-school propinquity.

#### b. Moderating Influence

Social control theory states another possible way to analyze parental influence on youth's friendship pairings as the effects of parenting practices on adolescent peer-group affiliation. It defines family as one of important socialization resource to interact with other social agenda to reshape youths' social activities. Some of studies contend that inept parenting fosters affiliation with deviant behaviors and peers (Dishion et al. 1991; Patterson and Dishion 1985; Patterson et al. 1992; Brook et al. 1990; Elliott et al. 1985; Melby et al. 1993). Others affirm the link of effective parenting practices, conforming behaviors, and affiliation with various prosocial friends (Brown et al. 1993; Durbin et al. 1993; Chen 2000; Mounts 2001; Tilton-Weaver and Galambos 2003).

Empirical criminology studies also hypothesized the direct influence from parenting practices to peer-group affiliations. Although these studies focused on the delinquent outcome per se rather than the choices of friends, their hypotheses still supported the

social ecological framework that social contexts jointly affect individuals (e.g. Melby et al., 1993, Scaramella et al., 2002).

My study of moderating influences will focus on literature that closely examines the relationship between parenting practices and peer-group affiliation.

Thus, I defined the *Moderating Influences* in the following way. Parents can be involved in youths' academic activities and may monitor their children's after-school activities. In this situation, the parental influences interact with homophily and propinquity thereby guiding youths toward befriending parent-preferred peers.

## B. The Mechanisms of Friendship Pairings

### 1. Homophily

Homophily studies on youths' friendship pairings often serve two purposes. One purpose is to further an understanding of the patterns of friendship pairings in the early stage of life. Thus, studies often analyze basic social demographic traits (i.e., ascribed characteristics including race and gender) and how they influence individual opportunities to generate relationships (e.g., Epstein 1983; Shrout et al. 1988; Hallinan and Williams 1989; Clark and Ayers 1992; Kupersmidt et al. 1995; Joyner and Kao 2000; Moody 2001; Quillian and Campbell 2003; Kao and Vaquera 2006). The other purpose is to facilitate understanding of the peer context. Researchers examine the mechanism of homophily to assess the relative importance of peer selection vs. peer socialization on adolescents' behavioral outcomes including drug use, delinquency, and aggression behaviors (e.g., Kandel 1978; Cairns et al. 1988; Akers, Jones, and Coyle 1998; Urberg et al. 1998; Knoester et al. 2006).

These two areas of focus on youths' attributes are not mutually exclusive. For example, to identify the patterns of friendship pairings, studies often include behavior characteristics as well as demographic characteristics. To evaluate the explanation of influences versus socialization, demographic characteristics such as race and gender are often used as moderators or controls within the analytical frameworks. My study, however, will concentrate more on acquired characteristics to target the parent-peer link, because unlike characteristics related to demography, acquired behaviors can change over time and be influenced by parents.

#### a. The Concept and Types of Homophily

Lazarsfeld and Merton (1954) conceptualized the term *homophily* to refer to the similarity of various attributes among persons who affiliate with each other. Sociologically, the term is used to propose the idea that “contact between similar people [*in statuses and values*] occurs at a higher rate than among dissimilar people [*in statuses and values*]” (McPherson et al. 2001:416). This idea can be captured by the adage “Birds of a feather flock together.” Two people who are similar in *statuses* and/or *values* can be regarded in terms of *status homophily* and *value homophily*. Status homophily refers to the major ascribed characteristics, such as race, ethnicity, age, and gender, and acquired characteristics, including religion, education, and behavior. Meanwhile, value homophily includes inner attitudes and beliefs that shape behaviors (e.g., political beliefs, moral identities, and moral values) (McPherson et al. 2001). Because values are still in the formation process for adolescents, my study will focus on status homophily, which includes acquired characteristics only.

## b. Homophily of Acquired Characteristics in Adolescence

According to the literature on social networks, homophily with the ascribed characteristics of race, gender, and age create stronger divides within school environments than acquired characteristics such as behaviors and education (McPherson et al. 2001). Moreover, previous studies have also indicated that race homophily is the most significant ascribed characteristic to predict friendship pairings for adolescents (Epstein 1983; Shrum et al. 1988; Hallinan and Williams 1989; Clark and Ayers 1992; Kupersmidt et al. 1995). For example, by examining high school students' friendship pairings, four studies using Add Health dataset indicated that racial homophily within friendship networks is dominant in junior high and high schools across the U.S. (Joyner and Kao 2000; Moody 2001; Quillian and Campbell 2003; Kao and Vaquera 2006; Mouw and Entwisle 2006).

However, taking into account that same-race and same-gender youths are more likely to be friends, questions remain about the patterns of friendship pairings among youths who are of the same race and gender. A substantial body of empirical research demonstrates that homophily of acquired characteristics, such as similarities in prosocial and antisocial behaviors, increases the probability of friendship pairings (Kandel 1978; Cairns et al. 1988; Akers et al. 1998; Urberg et al. 1998; Knoester et al. 2006). These studies served two purposes: (1) to understand the general patterns of the friendship pairings and (2) to understand why and how peer influences on behaviors occur.

For the group of studies about general patterns of friendship pairings, scholars are trying to identify different dimensions of homophily and how they are associated with



friendship pairings. Epstein (1983) found that similarities among social class, self-reliance, and school achievement contribute to patterns of friendship selection. By measuring the school achievement and verbal achievement of 136 young adolescents, Clark and Ayers (1992) highlighted how similar personal characteristics affect friendship choices. The results indicated that, after accounting for the similarities of race and gender, youths still tend to select friends who have similar achievements. In addition, Urberg et al. (2000), in a study of 489 white 7th, 9th, and 11th graders, examined how similarities in social adjustments, such as delinquency, grade point average, and use of cigarettes, marijuana, and alcohol, construct the social crowd for youths, and how youths who belong to the same social crowd then have a greater chance to become friends. The results indicated that the similarities in specific outcomes, such as grades, significantly contributed to both peer- and self-identified crowd memberships, which, in turn, enhanced the possibility for youths to become friends with crowd members who have similar academic achievements.

However, few studies provide a comprehensive understanding of friendship pairings based on similarity across all dimensions. One exception is a comprehensive study by Kupersmidt et al. (1995) on homophily for children's friendship selection, which examined the similarities in demographic, behavioral, academic, and social attributes as descriptors of children's friendships. The sample size included 4,725 dyads, which were created from 554 third and fourth graders, and Kupersmidt et al. suggested that the more similar the children were, the more likely they were to become friends. Specifically, in an orderly sequence, patterns of gender, race, poverty, aggression, withdrawn behavior, achievement, and sociometric status between dyad members were

predictive of children's friendships. Therefore it can be concluded that children choose friends based on the degree of similarity across social dimensions of ascribed characteristics such as race, gender, age, and acquired characteristics. However, the study did not separate the effects of ascribed characteristics from acquired characteristics, and no such comprehensive study about friendship selection for adolescents was found.

Kandel (1978) conducted a classic study of peer influences. She measured a panel sample of 957 adolescent school-friend dyads from time 1 to time 2 in a longitudinal survey of adolescents' illicit drug use in New York State high-school students. Prior to actual friendship pairings, adolescents in dyads of friend-to-be tended to become friends when they were similar to each other in terms of drug use, educational aspirations, political orientation, and minor delinquency. The similarity of illegal drug use was one of the strongest predictors for friendship pairings in her models.

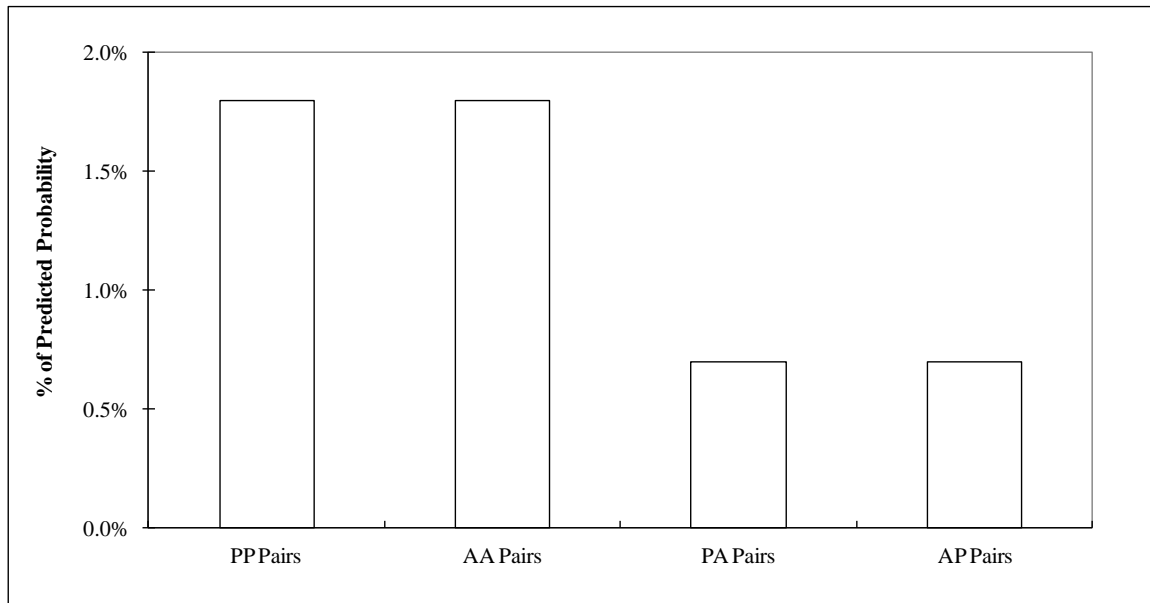
Other studies using different data resources found some evidence to support the finding from Kandel (1978) that the similarity of youths in the prosocial and antisocial adjustments could lead to their becoming friends with prosocial or antisocial peers, respectively. Cairns et al. (1988) studied social networks and aggressive behavior from two cohorts of boys and girls in the 4th and 7th grades ( $N = 695$ ). The cross-sectional study indicated that aggressive children tended to affiliate with aggressive peers. In a longitudinal study, Urberg et al. (1998) examined friendship selection and termination on 1,183 6th, 8th, and 10th graders in both public and private schools at two points of time. Adolescents examined at Time 2 showed significant similarities with Time 1 about-to-be friends regarding behaviors such as minor delinquency and cigarette and alcohol use. Using 1,350 youths from Add Health Wave I and Wave II data, Deptula et al. (2007)

identified that the similarities of youths' attitudes toward the costs of sex increased the possibility for youths to choose each other as a friend.

### c. The Example of Homophily

Figure 2.1 helps to visualize the homophily with hypothetical data as an outcome of  $Y_i$ 's and  $Y_j$ 's friendship pairings.<sup>1</sup>

Figure 2.1 Expected Friendship Pairings under Homophily using Hypothetical Data



The distribution of probabilities that  $Y_i$  and  $Y_j$  are friends depends on their social adjustments. According to the homophily assumption, when  $Y_i$  and  $Y_j$  are both in the higher level of social adjustments (PP) or lower level of social adjustments (AA), their friendship pairings probability is relatively high. Also, PP and AA should equally predict

<sup>1</sup> I also have the possibility of HL and LH being friends to be non-zero because of the proposition that “opposites attract” (i.e. youth may be attracted by someone who has different or distinct behaviors). Because my focus is on the effect of social structure, I will not examine the concept of “opposites attract” in detail.

the possibility of friendship pairings under homophily. In contrast, when  $Y_i$  and  $Y_j$  are not in the same level of social adjustments (either PA or AP), their friendship pairings probability faces to equivalently lower levels.

## 2. Propinquity

### a. The Concept of Propinquity

*Propinquity* refers to the sources of homophily that “make communication between similar people more likely” (McPherson et al. 2001:416). The greater the propinquity of two groups, the greater the likelihood of social interaction between them (Blau, 1977, P90–P91). In the context of friendship pairings, it is critical that two people have contact with each other. Two people may share similar statuses and values, but the possibility of becoming friends depends on their different chances for contacting each other. All else equal, people are most likely to become friends with those in closest contact with them. Propinquity for adolescents’ friendship pairing proposes the condition that physical proximity between youths in school or neighborhoods influences the chance of interaction, and in turn, the possibility of becoming friends.

### b. Neighborhood Propinquity

Neighborhood propinquity can impact friendship pairings in schools. A study on 136 adolescents provided evidence of friendship pairings under neighborhood propinquity (Clark and Ayers 1992). They found that African Americans who live within walking distance from each other in their neighborhood or who take the same school bus with same-race peers were more likely to choose each other than whites as friends.

Additionally, students who live in racially segregated neighborhoods are more inclined to choose friends from within their own race than from diverse racial and ethnic neighborhood. (Mouw and Entwisle 2006) Drawing on the Add Health data, friendship formation was examined with neighborhood effects on multilevel  $P^*$  logit models by Mouw and Entwisle (2006). They examined the effect of racial residential segregation on school friendship segregation by estimating the racial effect within school, residential segregation, and school diversity on friendship formation. The evidence showed that there was an effect of spatial proximity on racial friendship segregation across schools that restricted opportunities for interracial friendships.

Neighborhood racial composition may also be important for school friendship choice. In addition to analyzing race on individual or dyadic levels, the aforementioned studies consider the social contexts, such as schools and neighborhoods, wherein friendships are formed and argue that propinquity can modify the racial homophily to some extent and decrease existing racial segregation. Using nearly 70,000 cases, Joyner and Kao (2000) demonstrated through a multivariate logistic regression model that the more racially diverse the school, the weaker the tendency toward same-race friendship. Schools structured opportunities for adolescents to become friends with students of different races. Drawing on dyadic samples that were created from all possible ties among 72,957 youths, Quillian and Campbell (2003) found, by applying  $P^*$  models on the dyadic level, that race had a significant influence on student friendships that persisted across immigrant generations. They reported that similarities in racial background were a powerful factor in influencing adolescent friendship formation for diverse racial groups. But when the distributions of race and ethnicity in schools were diverse, interracial

friendships became easier to form. Moody (2001) discussed extracurricular arrangements in school context and examined how those arrangements increased the probability that adolescents would select friends from within the same organization rather than a friend having the same characteristics. School settings on the organizational level differentiate the opportunities among adolescent to contact each other, and as a consequence propinquity could adjust the likelihood of friendship formation within the same race and ethnicity groups.

### c. Within-School Propinquity

McPherson et al. (2001:431) argued, “After propinquity created by neighborhood play groups, school is the next major focus of tie formation across the life course.” I examine how parents influence within-school friendship pairings.

At the whole-school level, schools may be integrated, but internally, they may still be structurally divided. Students can be grouped within schools by grades and extracurricular activities. Such within-school groups increase the likelihood that particular types of students will meet and interact and therefore increase their opportunities to become friends. I will refer to this as *within-school propinquity*.

Quiroz and colleagues (1996) examined the high school extra curriculum as an important mechanism and one source of social capital that helped student make connections with peers. Their ethnographic research on a high school located in a Midwestern urban area showed that students’ sense of belonging and their friendships nomination were associated with their school extra curriculum. If a student didn’t

participating in certain activities, they are less likely to be affiliated with the peers who participated in those extra curriculums.

There is empirical evidence that within-school propinquity affects the process of friendship pairings. Using 16,759 dyads from the first wave of High School and Beyond (HSB) data, Kubitschek and Hallinan (1998) examined the association between same-school tracking and friendship pairings. They measured the effects of track propinquity on dyad level “in the same track” and argued that students in the same track have more opportunities to be exposed to each other than to students in different tracks. Results holding gender, race, SES, grade, and school size constant showed that youths in the same track have a 17% increased probability of becoming friends with each other.

Hallinan and Sorensen (1985) examined whether membership in the same ability group was a significant predictor of friendship pairings. Using 1,477 fourth, fifth, and sixth graders in 48 classes from 10 elementary schools in northern California, probit analysis showed that ability grouping did matter for friendship formation across six time points over the school year. There was a positive effect of membership in the same ability group on best-friend choice nested within the effects of other relevant dyadic characteristics.

#### d. The Example of Propinquity

Figure 2.2 helps to visualize the neighborhood propinquity with hypothetical data as an outcome of  $Y_i$ 's and  $Y_j$ 's friendship pairings.

Figure 2.2 Expected Friendship Pairings under Neighborhood Propinquity using  
Hypothetical Data

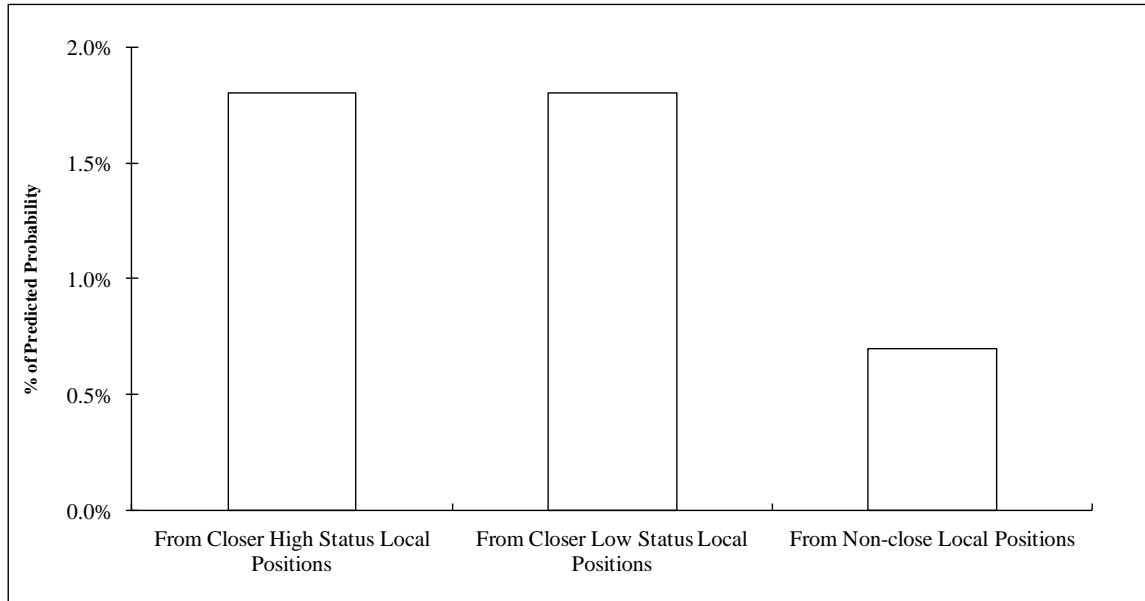


The distribution of probabilities that  $Y_i$  and  $Y_j$  are friends depends on the neighborhoods that they live. According to the propinquity assumption, when  $Y_i$  and  $Y_j$  are both from advantaged neighborhood or disadvantaged neighborhood, their friendship pairings probability is relatively high. Also, being from same advantaged and disadvantaged neighborhood should equally predict the possibility of friendship pairings under propinquity. In contrast, when  $Y_i$  and  $Y_j$  are not in the same neighborhood, their friendship pairing probability is decreased to lower levels.

Figure 2.3 is for visualize the within school propinquity with hypothetical data as an outcome of  $Y_i$ 's and  $Y_j$ 's friendship pairings.



Figure 2.3 Expected Friendship Pairings under Within School Propinquity using Hypothetical Data



The distribution of probabilities that  $Y_i$  and  $Y_j$  are friends depends on the school local position that they are from. According to the propinquity assumption, when  $Y_i$  and  $Y_j$  are both from similarly higher or lower local positions, their friendship pairing probability is relatively high. Also, being from similarly high- or low-status local positions should equally predict the possibility of friendship pairings under propinquity. In contrast, when  $Y_i$  and  $Y_j$  are from dissimilar local positions, their friendship pairing probability is decreased to lower levels.

### C. Fundamental Influences on Friendship Pairings

Social bonding to parents does not wane as children age; it continues to hold an important position in adolescents' daily activities. The association between parental characteristics and youths' social outcomes has been widely recognized in the literature.

For example, parents' socioeconomic status (SES), as a composite indicator of parents' educational attainment, income, and occupation, has been demonstrated to have a long-term effect on students' school performance during adolescence (Cohen, 1987; Trusty, 2002). Strong attachment to parents inhibits delinquency (Mack et al. 2007). Conversely, parental drinking and drug use associate positively with youths' antisocial behaviors (Clark and Loheac 2007). In this section, I review the literature related to parental characteristics (e.g., education, income, parent teacher association membership, drinking, and smoking), parent-child relations (e.g., closeness, availability, involvement), and parenting behaviors (e.g. monitoring, choosing neighborhood because of school, educational aspiration) to generate corresponding hypotheses.

## 1. Parental Fundamental Influences on Homophily

### a. Parental Influences on Ascribed Characteristics of Youths

Parental characteristics are related to adolescents' schooling, particularly their GPAs and college expectations. For example, Cohen (1987) studied types of influences on parent-child linkage in terms of educational activities. He proposed that parents' educational attainments influence adolescents' lifestyles. As expected, parents served as both models and controllers for their children's college expectations and school attainments. Parental income, occupation status and parental educational attainment were positively associated the educational outcome of adolescents.

Rather than examining parents' education, occupation, and income separately, some studies examined parental composite SES as a predictor of adolescents' school performance. For example, Trusty (2002) examined the direct and indirect effects of SES

on African Americans' postsecondary college expectations, which were measured 2 years after high school graduation. He extracted 875 eighth- and twelfth-grade African American females and 874 eighth- and twelfth-grade African American males from the National Education Longitudinal Study's (NELS: 88) base-year to third-year follow-up panel sample. The findings were consistent with the status-attainment theory that SES is a good predictor for African American males' educational expectations. For African American women, the weak effect of SES was explained by the occurrence of important life events such as marriage and childbirth.

Apart from parents' personal characteristics, their parenting characteristics, including college expectations, education involvement, and monitoring, are associated with adolescents' educational expectations and school performance. For example, research shows that parents' college expectations are consistently and positively associated with adolescents' college expectations (Parsons et al. 1982; Wilson and Wilson 1992; Hao and Bonstead-Bruns 1998) and academic achievement (White 1982; Singh et al. 1995; Fan and Chen 2001; Eccles and Wigfield 2002). In addition, studies indicate that parental involvement significantly predicts youths' school achievement across grades (Dornbusch et al. 1987; Steinberg, Dornbusch, and Brown 1992; Fan and Chen 2001; Hill et al. 2004).

Other studies that have focused on parent-peer linkage extensively examined whether parents' efforts affect the qualities of peers. For instance, Brown et al (1993) posited that achievement-oriented parents influence their children's academic performance, indirectly leading them to a specific crowd. Mounts (2001) stated that parental guidance and monitoring indirectly affect peers' quality by reshaping their own

children's qualities. Chen's and colleagues' studies (i.e., Chen 2000; Chen et al. 2007) provided additional longitudinal evidence that parents' constructive behaviors such as monitoring, parental involvement, spending time with the adolescent, and the family functionally organized are associated with their children's achievements and indirectly contribute to adolescents' affiliation with achievement-oriented peers.

In addition to parental influence on positive outcomes, more literature has concentrated on youth's negative social adjustments. It has long been assumed that delinquency is rooted in an individual's macrosocial environment, and thus delinquency theories have typically begun with the person's social contexts. One of the key aspects of adolescents' social context is parental SES. For example, a recent study using the Add Health data found that parental income and education significantly predicted adolescent drug use (Clark and Loheac 2007).

One possible explanation for this correlation is Cohen's (1955:97–109) "strain theory." He stated that family poverty placed children at risk for delinquency. Family with poor family economic status is less capable to influence children's schooling than family with better economic status. In other words, the ability of parents as controllers is weakened if they are struggling with economic disadvantages.

However, some empirical studies have found weak or nonexistent correlations between individuals' SES and their delinquent behaviors (e.g., Johnson 1980; Tittle and Meier 1991). The weak correlation may be due to the offsetting effects of mediators. SES can be a distal risk factor whose effects are mediated by proximal risk factors (Yates, Egeland, and Sroufe 2003). Such proximal risk factors include parental behaviors such as

smoking and drinking. Consequently, it is necessary to examine not only SES but also parenting behaviors as predictors for children's antisocial behaviors.

Because the Add Health questionnaire did not ask parent behaviors, such as criminal records and illegal drug use, it is difficult to determine whether youths imitate their parents' deviant behaviors. However, there is evidence that parents' other behaviors, such as smoking and drinking, may be associated with youths' deviant behaviors. For example, Clark and Loheac (2007) found, from 9,600 Add Health cases from Wave I and Wave II who took part in in-home interviews, that children of smokers and drinkers were more likely to be smokers and drinkers themselves than children of nonsmokers and nondrinkers. The results indicated the positive and significant interaction between parents' smoking and peer group smoking. The children of smokers not only are more likely to be smokers themselves, as revealed by the estimated coefficient on parents' tobacco participation, they are also more susceptible to their peers' smoking behavior. The same analysis, carried out for drinking, also revealed positive coefficients, but these were not significant.

Not only do parents' own behaviors affect youths' outcomes, parents who maintain a high level of parenting practices may act as a protective buffer against possible risk factors that would otherwise promote delinquent activities in their adolescent children (Patterson and Stouthamer-Loeber 1984; Dishion et al. 1991; Kandel 1996; Gorman-Smith et al. 2000; Knoester et al. 2006) and drug use (Brown et al. 1993; Steinberg, Fletcher, and Darling 1994; Fletcher et al. 1995; Kandel 1996; Mounts 2001).

For example, using a sample of 206 fourth-, seventh-, and tenth-grade boys and their families, Patterson and Stouthamer-Loeber (1984) examined how parents' family-

management skills were related to delinquency. Parent monitoring and discipline correlated significantly with youths' self- and police-reported delinquency. Gorman-Smith, Tolan and Henry (2000) investigated the relation of family functioning to patterns of delinquency by using four waves' data from the Chicago Youth Development Study. Parenting practices were categorized to four scales including positive parenting, discipline effectiveness, avoidance of discipline, and extent of monitoring/involvement in the child's life. The study showed that youths from the exceptionally functioning families were less likely to be involved in delinquent offending than youths from struggling families.

Conversely, neglectful and low-control parents could promote adolescent delinquency, poor academic performance, and reduced orientation to school (Patterson and Stouthamer-Loeber 1984; Steinberg et al. 1994). One interesting finding from Steinberg and colleagues' longitudinal studies (1994) was that poorly monitored adolescents were more likely to use drugs. Parental monitoring was especially important for youths at the outset of any substance use, rather than at the transition from experimentation to regular use. Drug-using adolescents were likely to seek out like-minded friends. Once an adolescent began to associate with drug-using peers, his or her own substance use approached their level. Studies by Brown et al. (1993) showed that parenting behaviors such as low monitoring indirectly led youths to affiliate with drug-using crowds. Mounts (2001) noted that ineffective parental guidance and monitoring led to the risk that children may begin using drugs, which indirectly increased the possibility of these youths having drug-using friends.

## b. Summary

The existence of the association between parental characteristics/behaviors and youths' social adjustments indicate a research agenda that links two sets of prior studies—examining the influences of parents on children's social adjustments and testing how these adjustments differentiate members of crowds or the quality of peers. In addition to examining individual levels parental influence on friendship, my study will examine to what extent parental characteristics influence youths' friendship pairings by affecting their social adjustments, which are related to homophily on the dyadic-level characteristics of friends.

## c. Hypotheses

My homophily hypotheses assume that pairs who are both in the high level or both in the low level of social adjustments such as GPAs, college expectations, delinquency, and drug use will be more likely to nominate each other as friends. Thus, for parental fundamental influences on friendship pairings, I propose that:

*Youth homophily mediates the relationship between parenting and friendship pairings. The relationship between homophily and friendship pairings is explained in part by parental SES, parental involvement, parental educational aspirations for youths, parent choosing neighborhood because of school, parental smoking and drinking, and parental monitoring.*

## 2. Fundamental Influences on Propinquity

### a. Neighborhood Propinquity

Neighborhoods shape the supply side of contacts within their geographic boundaries. Youths in different types of neighborhoods (i.e., high-SES vs. low-SES) are unequally exposed to prosocial and antisocial peers with whom they might form friendships.

For example, the proximity of low-SES neighbors and peers may disadvantage children because such children are more likely to become involved with antisocial peers. On the other hand, youths residing in high-SES neighborhoods are more likely to form friendships with conventional peers (Jencks and Mayer 1990). An empirical study using Add Health data confirmed the findings of neighborhood propinquity and how it is related to the peer-group affiliations. Haynie, Silver, and Teasdale (2006) evaluated whether exposure to violent and academically motivated peers mediated the relationship between neighborhood characteristics and adolescent violence. Hierarchical linear modeling was applied to both neighborhood- and individual-level characteristics for a sample of 12,747 adolescents. Neighborhood disadvantages were associated with an increased likelihood of exposure to violent peers and a reduced likelihood of exposure to academically oriented peers. Neighborhood propinquity moderated youths' friendship affiliation by changing the opportunities to contact peers with specific qualities.

Therefore, parents may select neighborhoods based on school quality and influence their children's contact opportunities, thereby ensuring that their children can approach peers who share their preferred values and behaviors.



Rubin and Sloman (1984) stated that parents had the power to influence their children's choice of friends by selecting neighborhoods and schools, arranging get-togethers between children's playmates, enrolling their children into various programs to meet with potential friends, and so on. Some parents may be motivated to select advantaged neighborhoods to direct their children's friendship choices toward prosocial peers. For example, Knoester et al. (2006), using Add Health, examined a sample of 11,044 adolescents to determine whether parental strategies of selecting neighborhood affect the composition of youths' friends. The results showed that, compared with adolescents whose parents did not choose their neighborhood because of the availability of better schools, adolescents whose parents did choose their neighborhood based on the quality of its schools had friends whose GPAs and college-attendance expectations were high. In addition, when parents reported having chosen their neighborhood because of its good schools, their adolescent children had friends who engaged in 8% less fighting than the friends of adolescents whose parents did not report choosing their neighborhood because of its schools.

#### b. Within-School Propinquity

Parents may also alter within-school propinquity by influencing how youths group within each school. Groups in school are often defined by a single, rather than by multiple, dimensions. For instance, track placement depends mostly on academic abilities. Youths who participate in sports or science clubs are grouped by their interests and capabilities in the fields of sport or science. Thus, academic abilities, sports interests, and science interests comprise the homogeneity in each of these groups. And youths' other

characteristics (e.g., GPAs, college expectations, delinquency, drug use) vary within these groups.

Being in the same groups may increase youths' opportunities to be friends, although youths within groups may differ on their race, gender or social behaviors. Extrapolating on data from Add Health regarding friendship nomination, Moody (2001) discussed the extracurricular arrangement in the school context and found that this arrangement increased the probability of adolescents selecting friends from the same organization rather than friends of the same race. organization participation within the school differentiate the opportunities among children to contact each other, whereas students of different races participating in the same school organization may be more likely to become friends than those in a different organization.

Crosnoe (2002) focused on the quality of tracking (i.e., lower tracking is associated with more delinquent peers and higher tracking with less delinquent peers). He emphasized that, in addition to analyzing whether being in the same track promotes opportunities for youths to become friends, it is meaningful to examine the kinds of tracking that youths were in that were linked to their outcomes of friendship formation. Track placement constrains students' interaction across the tracking and makes them more likely to be influenced by the peers in the same tracking than by peers in different tracking. Therefore, lower tracking placement increases negative similarities and higher tracking placement amplifies positive similarities.

A newly developed algorithm may enable a better understanding of one type of hierarchical groups within school by measuring student's academic standing. Field et al. (2006) introduced a technique for measuring social experiences consisting of sets of

actors and events. Instead of the idea that social network affiliations are events in which interactions are concentrated, or as blocks wherein actors engage in similar patterns of interaction, *local positions*, represent both actors and events in social networks and then more accurately reflects youths' rank within schools. .

The measures of local positions were applied to Adolescent Health and Academic Achievement [AHAA] school transcript data obtained for Add Health participants and created unique school clusters within each school, because (1) the course taking in high school is a typical position that links actors and events; (2) the patterns of course-taking reflect the structural restriction within schools and include grade restrictions, demonstrated academic ability or completion of appropriate prerequisites, and individual dispositions. Those structural restrictions can subgroup students and form clusters within schools. Thus, local positions help to identify unique clusters that connect students and their course taking.

In other words, local positions identified clusters of students who took similar courses (e.g., a group of students, all of whom take Mathematics level I, English level I, and Chemistry level II, are differentiated from another group of students, all of whom take Mathematics level II, English level II, and Chemistry level I.) Schools, then, become the space where sets of adolescents participate in uniquely identifying sets of courses (Powell, Farrar, and Cohen. 1985). In addition, local positions are non-overlapping, and students were assigned to a maximum of one local position. Because of the varying difficulty of sets of courses, local positions are stratified from low to high, which in turn, reflect students' rank within their schools (Frank et al. 2008).

Because of the recent development of the two-mode measure of local positions, there are currently no studies that discuss the possible connection between parents' influences and their adolescent children's local positions in schools. The current study examines the association among parental influences, youths' local positions and friendship pairings.

### c. Summary

Parents may alter neighborhood propinquity and within-school propinquity to ensure that their adolescent children are exposed to prosocial peers. To some extent, youths' parents may select advantaged neighborhoods (e.g., ones with less crime, less drug use, and other illegal activity) and affect local positions (e.g., higher-ranked local position vs. lower-ranked local position) to which youths belong, allowing them to have more exposure to the peers they value.

Because the measures of parental influences on local positions, such as selection of courses, are not available from Add Health, it is not possible to assess whether parents influence youths' choice of courses and how they might influence the course sequences. However, Add Health does provide measures regarding parental involvement in parent-teacher organization activities and in youths' schooling, which may be correlated with local positions. Thus, I will also treat parental involvement in schooling and participating in parent-teacher association activities as possible measures of parental influences on within-school propinquity.

#### d. Hypotheses

My propinquity hypothesis assumes that youths who live in the same neighborhoods and/or occupy the same school local position will be more likely to choose each other as friends than youths who are in different neighborhoods and/or local positions. Thus, I propose parental fundamental influences on propinquity as follows:

*Youth propinquity mediates the relationship between parenting and friendship pairings. The relationship between propinquity and friendship pairings is explained in part by parental SES, parental involvement, parental educational aspirations for youths, parent choosing neighborhood because of school, parental monitoring and parental smoking and drinking.*

#### D. Moderating Influences

Baron and Kenny (1986) in a very early literature defined a moderator as a variable that affects the direction and/or strength of the relation between an independent or predictor variables and a dependent or criterion variable. In the current study, I am not only examine parental variables (parents' education, income, parent-teacher association, , the relations between parents and youths (involvement, availability, closeness), parent choosing neighborhood because of school, educational aspirations for youths and smoking and drinking , and parental monitoring) as fundamental influence variables but also test whether those parental variables affect the direction and/or strength of the relation between youth homophily/propinquity and friendship pairings.

## 1. Literature Review

An early study of parental influences on youths' peer relationship argued, using bivariate correlations and multivariate regression, that parental behaviors (e.g., parent discipline and parent monitoring) were directly and indirectly related to adolescent peer relationships and antisocial behaviors (Dishion et al. 1991). This study of 206 boys at age 10 and their families found that poor parental discipline, monitoring practices, etc., were prognostic of involvement with antisocial peers at age 12 (i.e., had a direct influence). Additionally, parenting influenced boys' delinquency at age 10 and subsequently, affected their contact with delinquent peers at age 12 (i.e., indirect or fundamental influences).

To explain the findings regarding indirect and direct influences, Patterson and colleagues (1991) categorized adolescents into two groups and reported that for early-onset delinquency (i.e., those who engage in delinquent behavior during early adolescence), parenting affects peer relations through childhood antisocial behavior. As such, parenting directly influences the social-adjustment outcomes of youths. For late starters (i.e., youths who experiment with delinquent acts during mid-to-late adolescence), a lack of parental monitoring and supervision is predicted to directly increase the risk for deviant peer affiliations and later result in antisocial behaviors. The findings from Patterson and colleagues' other work (Patterson, Reid, and Dishion, 1992; Patterson and Yoerger, 1993) suggested that both the indirect and direct influences of parenting practices on youths' outcomes were corrected by addressing the distinctions between early and late starters.

Empirical criminology studies also hypothesized the direct influence from parenting practices to peer-group affiliations. Although these studies focused on the delinquent outcome per se rather than the choices of friends, their hypotheses still supported the social ecological framework that social contexts jointly affect individuals. Attributes of the peer contexts, for example, are influenced by attributes of family environment. Melby et al. (1993) evaluated early adolescent tobacco involvement by examining parental child-rearing strategies (i.e., harsh/inconsistent and nurturant/involved) and reported parent, sibling, and peer tobacco use ( $n = 204$ ). Results from correlational analyses and structural equation modeling showed that parenting behaviors had direct effects on seventh-grade boys' tobacco use through the adolescents' associations with peers who used tobacco.

Scaramella et al. (2002) also adopted structural equation modeling to examine the relationship between parenting and peer-group affiliation. They used two independent samples of early adolescents followed over a four-year period. Six-hundred and sixty-seven sixth-grade children and their parents comprised the first sample (i.e., Project Family), and 451 seventh-grade children, their parents, and a close-aged sibling made up the second sample (i.e., Iowa Youth and Families Project). Estimations from both samples indicated that a lack of nurturing and involved parenting indirectly predicted delinquency by increasing children's earlier antisocial behavior and deviant peer relationships. Apart from their findings on the social adjustments outcome (i.e., antisocial behaviors), the significant coefficients ( $r = -.39$  for Project Family;  $r = -.19$  for Iowa Youth and Families Project) indicated findings consistent with those of Melby et al.

(1993) about the direct influence of nurturant-involved parenting on deviant peer associations.

Studies from other research disciplines also demonstrated the direct influences of parenting practices on peer-group affiliation. For example, Durbin et al. (1993) evaluated the association between peer-group orientation and parenting styles among 3,407 ninth- to twelfth-grade, European-American high school adolescents. Built on the typology of parenting styles, Durbin et al. (1993) used parenting practices to construct four types of parenting styles, including authoritative (i.e., higher in both acceptance-involvement and control), authoritarian (i.e., lower in acceptance-involvement but higher in control), indulgent (i.e., higher in acceptance-involvement but lower in control), and uninvolved parenting (i.e., lower in both acceptance-involvement and control). Their analysis indicated that parenting styles (the combination of controls and involvements) were related to adolescents' orientation toward particular peer groups. Specifically, adolescents who characterized their parents as authoritative were more likely to be oriented toward adolescents who were rewarded by their parents' norms than to adolescents who perceived their parents as authoritarian.

Henry, Tolan and Gorman-Smith (2001) compared four models of family and peer effects on delinquency using a sample of 246 adolescent male from the Chicago Youth Development Study. Among those four models, a Partially Mediated Model (viewing family relationships and parenting as both direct influences and a mediator) fitted data better than three other models (moderated model, direct-effects model, fully mediated model). It indicated that parenting and family relationship characteristics promoted association with deviant peers.



Additional evidence can be found in Nebbitt et al.'s (2007) study of the effect of parenting practices of African-American adolescents. Specifically, the authors examined the role of parenting behaviors in adolescent peer-group formation using a sample of 238 African-American adolescents. Results suggested that levels of parental supervision and encouragement had a protective effect against affiliation with delinquent peers. Studies that focused on the parenting influence on peer-group affiliation contributed to later research on their frameworks of the direct influences. However, it would be risky to draw the conclusion of direct influence without considering the youths' own characteristics. For example, one possible challenge for their studies would be how the omitted effects of youths' own characteristics may have contributed to their group formation in terms of homophily.

Using a longitudinal survey data set from nine California and Wisconsin high schools (from the ninth through twelfth grades, with an approximate age range of 14 through 18), Chen, Dornbusch, and Liu (2007) used structural equation models to estimate the causal relationship between early parental constructive behaviors (e.g., "monitoring," "family being functionally organized," "parental involvement in education," and "parents spending time with adolescents") and peer-group affiliation, particularly with academically oriented peers, in late adolescence. They also found direct pathways from constructive parental behavior such as monitoring, parental involvement, spending time with the adolescent, and the family functionally organized to the perceived achievement orientation of friends. After controlling for youths' own achievement orientation and their prior peer affiliation to the models, constructive parental behavior still had a significant effect on the perceived achievement orientation of friends over time.

Because evidence exists for a direct correlation between parenting practices and peer-group affiliation, it is possible that this correlation contributes to the association between youths' similarities and their friendship pairings. Therefore, in terms of the direct correlation between parenting and peer-group affiliation, an additional assumption emerges that indicates that parents may moderate peer-group affiliation by interacting with their children's preferences regarding similarities.

Knoester et al. (2006) examined the influence of parental factors on the quality of friends from a sample of 11,044 adolescents in Add Health. Parental influences, which include the strategies of maintaining parent-child relationship quality and supervision, significantly affected the composition of their adolescents' friendship network by leading them to reject the delinquent friends and encouraging an association with the friends with good academic standing. They stated that "parents can shape the network of friends that their child has, even after considering the extent to which their child may select, and be influenced by, friends who share similar attitudes and behaviors" (Knoester et al 2006:1257). They did find evidence of interaction effects between parenting practices and friendship pairings. For example, adolescents were more likely to select friends like themselves in terms of aggressiveness and fighting and expectations for college when their parents granted them more autonomy. Also, when both parent-child relationship quality and parental supervision were high, adolescents were less likely to have delinquent friends and more likely to have prosocial friends.

## 2. Summary and Hypotheses

### a. Summary

According to the finding of a causal relationship between parenting practices and friendship pairings and the mechanism of homophily that featured the youths' preferences of friends, this study will attempt to examine how parenting practices moderate friendship affiliation by interacting with youths' similarities on the dyadic levels.

Basic homophily assumptions (Figure 1.1 on page 11) tell that,  $Y_i$  and  $Y_j$  would have more chances to become friends if they are both in the high levels of social adjustments (PP) or both in the lower levels of social adjustments (AA). If they are in the different levels of social adjustments (AP or PA), they are less likely to become friends. However, parental moderating effects may reduce the likelihood of  $Y_i$  and  $Y_j$  becoming friends when they are in the same levels of social adjustments (PP or AA), or may increase the likelihood that they become friends when they are in different levels of social adjustments (PA or AP). In order to illustrate moderating effects of parental influences, I expanded Table 1.2 (a four-cell table on page 9) to show a 16-cell table in Table 2.1.

Table 2.1 represents the possible combinations of youths' Prosocial-Antisocial Dichotomy, depending on parent related measures, in 16 cells. For simplicity, parental variables are split in median to create dichotomous variables; namely, the high level of parent related measures (H) and the low level of parent related measures (L). There are four classifications of parent related dichotomy [(HH), (HL), (LH), and (LL)] combined with Prosocial-Antisocial dichotomy classification (PP, PA, AP, and AA).

Table 2.1 Sixteen Possible Classification of  $Y_i$  's and  $Y_j$  's Prosocial-Antisocial

dichotomy and parent related dichotomy

		<i>If <math>Y_j</math> is above the median of Prosocial-Antisocial Continuum</i>		<i>if <math>Y_j</math> is below the median of Prosocial-Antisocial Continuum</i>	
		<i>If parent of <math>Y_j</math> is above the median of parent related measures</i>	<i>If parent of <math>Y_j</math> is below the median of parent related measures</i>	<i>If parent of <math>Y_j</math> is above the median of parent related measures</i>	<i>If parent of <math>Y_j</math> is below the median of parent related measures</i>
<i>if <math>Y_i</math> is above the median of Prosocial-Antisocial Continuum</i>	<i>If parent of <math>Y_i</math> is above the median of parent related measures</i>	PP & HH Cell 1	PP & HL Cell 2	PA & HH Cell 5	PA & HL Cell 6
	<i>If parent of <math>Y_i</math> is below the median of parent related measures</i>	PP & LH Cell 3	PP & LL Cell 4	PA & LH Cell 7	PA & LL Cell 8
<i>if <math>Y_i</math> is below the median of Prosocial-Antisocial Continuum</i>	<i>If parent of <math>Y_i</math> is above the median of parent related measures</i>	AP & HH Cell 9	AP & HL Cell 10	AA & HH Cell 13	AA & HL Cell 14
	<i>If parent of <math>Y_i</math> is below the median of parent related measures</i>	AP & LH Cell 11	AP & LL Cell 12	AA & LH Cell 15	AA & LL Cell 16

Parenting may leverage or suppress the probabilities of  $Y_i$  and  $Y_j$  's friendship pairing through the interaction of their preferences with the friendship-formation process. For example, in the Cell 1-4 of Figure 2.1,  $Y_i$  and  $Y_j$  's probabilities of being friends will be conditional on their parental influences. Prosocial  $Y_i$  and  $Y_j$  may have a higher possibility to become friends when their respective sets of parents are in the higher level of parent

related measures such as SES than when their parents are in the lower level of parenting. The same rules applied to  $Y_i$  and  $Y_j$  if they are in the Prosocial-Antisocial classification to cells 5, 6, 7, and 8; to those in the Antisocial-Prosocial classification category to cells 9, 10, 11, and 12; and those in the Antisocial-Antisocial Classification to cells 13, 14, 15, and 16.

I will now extend Figure 2.1 to Figure 2.3 by adding parental influences on dyadic level to help visualize the moderating effects. In short, I expected that the possibility of  $Y_i$  and  $Y_j$  becoming friends will vary with parental related characteristics including parental SES, parental involvement, parental educational aspirations for youths, parental choosing neighborhood because of school, parental smoking and drinking as well as parental monitoring.

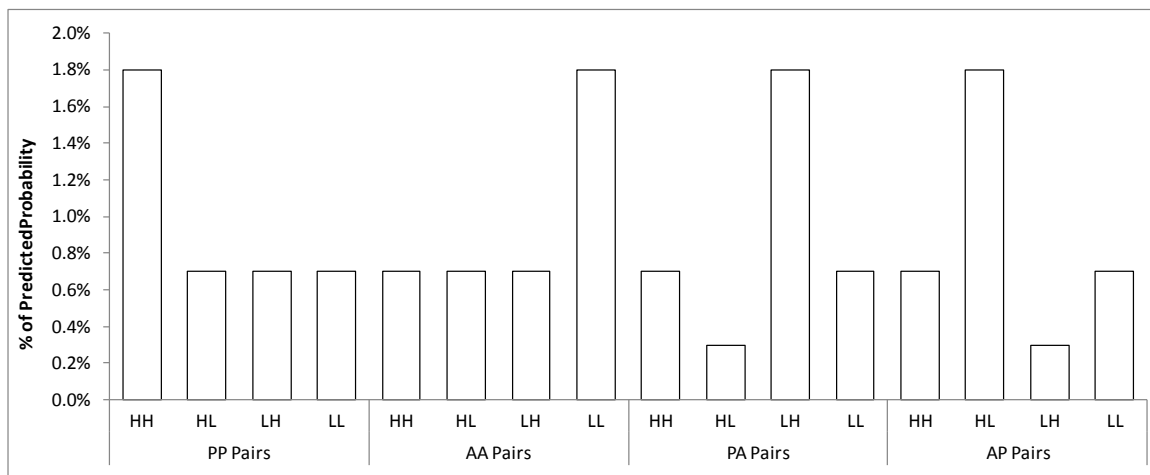
It is easy to conceptualize how, on the individual level, a high level of youths' own parent's practices matters for friendship pairings. It assumes that parents who are highly involved with their adolescents and diligently monitor and guide their children toward peers with parent-preferred values and behaviors (i.e. high level social adjustment). Therefore, even though a youth is an antisocial kid, he or she is more likely to select prosocial peers, rather than antisocial ones if his/her parents' influences are high. Thus, good parenting weakens the likelihood of antisocial youths to pick antisocial peers as friends and strengthens antisocial youths to pick prosocial peers as friends. On the other hand, parents with the low level of parenting have less influence on youths' friendship pairings. If a youth is a prosocial kid, he or she may be more likely to select prosocial peers when their parents are in the high level of parenting than when their

parents are in the low level of parenting. Good parenting influences thus reinforce the likelihood of prosocial youths to pick prosocial peer as friends and undermine the prosocial youths to pick antisocial peers as friends.

On the dyadic level, the concept becomes more complex. Figure 2.4 demonstrates the probability of friendship pairings conditional on parenting measures.(note, below hypotheses are applied to parenting SES, parental involvement, educational aspirations for youths, parental choosing neighborhood because of school, and parental monitoring. Parental smoking and drinking is hypothesized oppositely to above five measures for Prosocial-Antisocial dichotomy classifications.) To illustrate the effect of parental influences, I will compare the distribution of percentage of probabilities for friendship pairings within prosocial-antisocial dichotomy classifications. For each classification, the probability of  $Y_i$  and  $Y_j$  becoming friends varies conditionally on four types of parenting effects on the dyadic level HH, HL, LH, and HH.

Figure 2.4: Expected Friendship Pairings under Prosocial-Antisocial Dichotomy

Classifications using Hypothetical Data Conditional on Parenting Levels



For the Prosocial-Prosocial pairs (the first set of four bars), the assumption is that the probability of  $Y_i$  and  $Y_j$  becoming friends is higher with HH parenting than with HL, LH, and LL parenting. If  $Y_i$ 's and  $Y_j$ 's parents are in the high level of parenting, they may carefully control their children's in-school and after-school activities and ensure that their prosocial children will become friends with other prosocial children. In other words, Prosocial-Prosocial pairs with HH parenting are more likely to be formed as friends than with HL, LH, or LL parenting. The dyadic level HH parenting promotes the phenomena of the Prosocial-Prosocial pairings. The exceptions are parental smoking and drinking. The dyadic level LL parental smoking and drinking promote the phenomena of the Prosocial-Prosocial pairings.

When  $Y_i$  and  $Y_j$  are Antisocial-Antisocial pairs (the second set of four bars), they have the highest probability of becoming friends with LL parental influence. If  $Y_i$ 's and  $Y_j$ 's parents are in the low level of parental influences, they may not carefully control their antisocial children's in-school and after-school activities. In other words, Antisocial-Antisocial pairs with LL parenting are more likely to be formed as friends than with HH, HL, or LH parenting. The dyadic level LL parenting promotes the phenomena of the AA pairings. Parental smoking and drinking is still hypothesized oppositely to above hypotheses as Antisocial-Antisocial pairs with HH smoking and drinking parents are more likely to be formed as friends than with HL, LH or LL smoking and drinking parents.

In the third set of four bars for PA pairs, one assumption is that the highest probability of  $Y_i$  and  $Y_j$  to become friends is of PA pairs with LH parenting. If  $Y_j$ 's parents are in the high level of influences, they will guide their antisocial child  $Y_j$  toward  $Y_i$ , who is in the higher level of social adjustments. Meanwhile,  $Y_i$  is approachable for  $Y_j$  because  $Y_i$ 's parents are in the lower level of parental influences. In other words, PA pairs with LH parenting are more likely to be formed as friends than with HH, HL, or LL parenting. The dyadic level LH parenting promotes the phenomena of the PA pairings. The other assumption is that the lowest probability of  $Y_i$  and  $Y_j$  to become friends is of PA pairs with HL. If  $Y_j$ 's parents are in the low level of influences, they will not intend to guide their antisocial child  $Y_j$  toward  $Y_i$ , who is in the higher level of social adjustments. Meanwhile,  $Y_i$  is not approachable for  $Y_j$  because  $Y_i$ 's parents are intend to control their children's social network as they are in the higher level of parental influences. PA pairs with HL parenting are less likely to be formed as friends than with HH, LH or HL parenting. The dyadic level HL parenting demotes the phenomena of the PA pairings. Parenting smoking and drinking is hypothesized oppositely as the PA pairs with HL smoking and drinking parents are more likely to be formed as friends and the PA pairs with LH smoking and drinking parents are less likely to be formed as friends than other three classifications.

In the fourth set of four bars, the probability of AP pairs becoming friends varies conditionally on the dyadic levels of the parenting. The highest probability exists for the AP pairs to become friends with dyadic HL parenting. If  $Y_i$ 's parents are in the high level



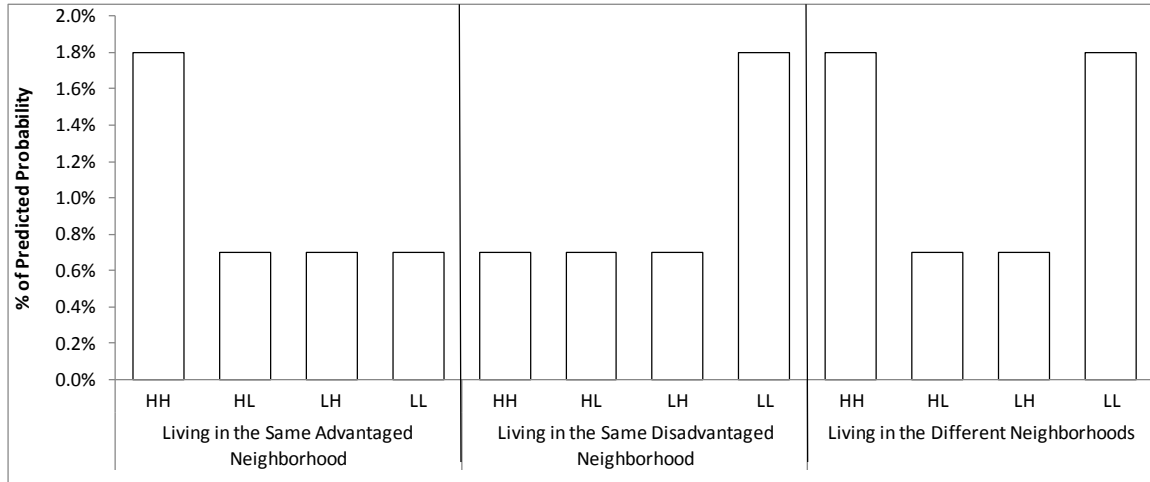
of influence, they can guide their antisocial child  $Y_i$  toward  $Y_j$ , who is a prosocial kid.

Meanwhile,  $Y_j$  is approachable for  $Y_i$  because  $Y_j$ 's parents are in the lower level of parental influences. AP pairs with HL parenting are more likely to be formed as friends than with HH, LH, or LL parenting. The dyadic level HL parenting promotes the phenomena of the AP pairings.

On the other hand, the lowest probability exists for the AP pairs to become friends with dyadic LH parenting. If  $Y_i$ 's parents are in the lower level of influence, they are not guiding their antisocial child  $Y_i$  toward  $Y_j$ , who is a prosocial kid. Meanwhile,  $Y_j$  is not approachable for  $Y_i$  because  $Y_j$ 's parents are in the higher level of parental influences. In other words, when parents are in the LH level of influences, the AP pairs with LH parenting are less likely to be formed as friends than with other level of parenting. The dyadic level LH parenting demotes the phenomena of the AP pairings. Parenting smoking and drinking is hypothesized oppositely as the AP pair is more likely to be formed as friends and the PA pair is less likely to be formed as friends than other three parenting smoking and drinking configurations.

I also extend Figure 2.2 to Figure 2.5 by adding dyadic level parental influences on neighborhood propinquity to visualize the moderating effects. The hypothesized data for local position propinquity is similar to Figure 2.5. As a result, I didn't extend Figure 2.3 but only use Figure 2.5 to demonstrate the percentage of probability of friendship pairings conditional on parenting with an example of neighborhood propinquity. Again parental smoking and drinking is hypothesized oppositely for propinquity measures.

Figure 2.5: Expected Friendship Pairings under Neighborhood Propinquity using  
Hypothetical Data Conditional on Parenting Influence Levels



To illustrate the effect of parental influences, I compare the distribution of percentage of probabilities for friendship pairings within each neighborhood configuration. For the each set of four bars, the probability of  $Y_i$  and  $Y_j$  becoming friends varies conditionally on four types of parenting effects on the dyadic level HH, HL, LH, and LL. For the living in the same advantaged neighborhood configurations, the assumption is that  $Y_i$  and  $Y_j$  have the highest probability of becoming friends under dyadic parenting (HH) than with dyadic parenting HL, LH, and LL. If both  $Y_i$ 's and  $Y_j$ 's parents are in the high level of influences HH, they may carefully control their children's activities and ensure that their children to be friends with kids from advantaged neighborhood. The dyadic level HH parenting promotes the phenomena of neighborhood propinquity for advantaged neighborhood. The exceptions are parental smoking and drinking. The dyadic level LL parental smoking and drinking and promotes the phenomena of neighborhood propinquity for advantaged neighborhood.

When  $Y_i$  and  $Y_j$  are in the same disadvantaged neighborhood, they have the highest probability of becoming friends with the dyadic level LL parenting. (See the second set of four bars) If  $Y_i$ 's and  $Y_j$ 's parents are in the low level of parental influences LL, they may not carefully control their children's activities and allow youths being friends with others who is from parent not preferred neighborhood (disadvantaged neighborhoods). When both parents are in the low level of influences, the pairs in the disadvantaged neighborhood are more likely to be formed as friends than when youths with both or either of high level parenting. The dyadic level LL parenting promotes the phenomena of neighborhood propinquity for disadvantaged neighborhood. Parental smoking and drinking is still hypothesized oppositely to above hypotheses as when both parents are in the high-high level of smoking and drinking, the pairs from disadvantaged neighborhood are more likely to be formed as friends than when parents are in LL, HL, or LH level of smoking and drinking.

In the last four columns of living in the different neighborhood configuration, the highest probability for the pair of  $Y_i$  and  $Y_j$  to become friends is when they are with dyadic level HH or LL parenting as the similarities of parents will moderate the non-propinquity of youths and provide them more chances to be friends with each other than the dissimilarities of parents.

#### b. Hypotheses

The moderating hypotheses for youths' social adjustments summarized as follows:

*Mod 1.1: Prosocial pairs with positively characteristic parents such as parents of high-high SES, high-high involvement, high-high educational aspirations for youths, yes-yes choosing neighborhood because of school, high-high monitoring, and low-low smoking and drinking are more likely to be friends with each other than prosocial pairs with other configuration of parents.*

*Mod 1.2: Antisocial pairs with negatively characteristic parents such as parents of low-low SES, low-low involvement, low-low educational aspirations for youths, no-no choosing neighborhood because of school, low-low monitoring, and high-high smoking and drinking are more likely to be friends with each other than antisocial pairs with other configuration of parents.*

*Mod 1.3: Prosocial-Antisocial pairs are more likely to form friends when they are with low-high positively characteristic parents than they are with other configuration of parents. Prosocial-Antisocial pairs are less likely to form friends when they are with high-low positively oriented parents than they are with other configuration of parents.*

*Mod 1.4: Antisocial-Prosocial pairs are more likely to form friends when they are with high-low positively characteristic parents than they are with other configuration of parents. Antisocial-Prosocial pairs are less likely to form friends when they are with low-high positively characteristic parents than they are with other configuration of parents.*

*Mod 2.1: Living in an advantaged neighborhood, pairs with positively characteristic parents such as parents of high-high SES, high-high involvement, high-high educational aspirations for youths, yes-yes choosing neighborhood because of school, high-high monitoring, and low-low smoking and drinking are more likely to be friends with each other than pairs with other configuration of parents.*

*Mod 2.2: Living in a disadvantaged neighborhood, pairs with negatively characteristic parents such as low-low SES, low-low involvement, low-low educational aspirations for youths, no-no choosing neighborhood because of school, low-low monitoring, and high-high smoking and drinking are more likely to be friends with each other than pairs with other configuration of parents.*

*Mod 2.3: Living in different neighborhoods, pairs with similar parents are more likely to be friends with each other than pairs with dissimilar parents.*

*Mod 3.1: From similarly higher school local positions, pairs with positively characteristic parents such as parents of high-high SES, high-high involvement, high-high educational aspirations for youths, yes-yes choosing neighborhood because of school, high-high monitoring, and low-low smoking and drinking are more likely to be friends with each other than pairs with other configuration of parents.*

*Mod 3.2: From similarly low school local positions, pairs with negatively characteristic parents such as parents of low-low SES, low-low involvement, low-low educational aspirations for youths, no-no choosing neighborhood because of school, low-low monitoring, and high-high smoking and drinking are more likely to be friends with each other than pairs with other configuration of parents.*

*Mod 3.3: From dissimilar local positions, pairs with similar parents are more likely to be friends with each other than pairs with dissimilar parents.*

## E. Confounding Factors

According to the findings from homophily of ascribed characteristics, significant differences exist across race, gender, and age groups. Thus, I control for dyadic level

indicators of the youth being of the same or different race and same or different age. In order to focus on my research questions about acquired characteristics and parental influences, I focus only on same-gender, same-race and similar age pairs. Thus, I only have two groups of models, one for same race and similar age boy-boy models and the other for same race and similar age girl-girl models.

In addition, prior research has found that family structure is associated with parental influences and youths' social adjustments. For example, Battle (2002) sampled 1,420 Hispanic students from NELS:88 and analyzed the associations between academic performance and family structure. One of his findings indicated that students who were in economically advantaged families performed better academically than those in poorer families, regardless of whether the family was headed by one parent or two.

However, other studies showed that family structure did matter for academic performance. Growing up in a single-parent family or stepfamily was negatively related to educational attainment (Li and Wojtkiewicz, 1992; Biblarz and Raftery, 1999; Heard 2007). For example, using the National Survey of Household and Families (NSHF) ( $n = 9,643$ ), Li and Wojtkiewicz (1992) measured four types of family structures, including both biological parents, mother-only, mother/stepfather, and "other" (e.g., father-only, father/stepmother, adoptive parents) and found that family structure has a great impact on children's status attainment, especially educational attainment (i.e., years of education completed). Living in a mother-only or mother/stepfather family undermined a child's academic performance. The negative influences increased as youths changed from a two-biological-parent family to a mother-only family, or changed from a mother-only family to a mother/stepfather family.

Biblarz and Raftery (1999) used three data sources, including the NSFH sample, along with Occupational Changes in a Generation data and Survey of Income and Program Participation to construct four family types: (1) two-biological-parent families, (2) alternative mother-headed families, (3) alternative father-headed families, and (4) mother-stepfather families to study children's educational attainments (years of education). Their results are consistent with Li and Wojtkiewicz's (1992) findings that children from single-father families and stepfamilies have consistently lower educational attainments than children from two-biological-parent and single-mother families.

Additionally, drawing on information from 11,318 youths from Add Health, Heard (2007) examined the influence of several dimensions of family structure trajectories, including duration, transition (i.e., mother's and father's entrances into and exits out of the parental role), timing, and family type, on three measures of school engagement; namely (1) GPA, (2) college expectations, and (3) suspension or expulsion from school during adolescence. Results also showed that living with married mother-stepfather, cohabiting mother-stepfather, married father-stepmother, single father, single mother, or nonparents predicted lower academic achievement and college expectations and a higher tendency to be suspended or expelled from school than did living with two biological parents.

Meanwhile, there is a debate about whether family structure is a strong predictor for youths' antisocial behaviors. Drawn on three waves (1976–1978) of the National Youth Survey, Rebellon (2002) found that broken homes (i.e., those in which divorce/separation has occurred, those in which a stepparent resides, and those in which another single parent resides) are strongly associated with a range of delinquent behaviors.

Living in a broken home increases by more than 15% the possibility of youths becoming involved in delinquency. However, one study from Add Health suggested no significant association between family type (i.e., intact, non-intact, divorce, death, or never married) and delinquency behaviors (Mack et al. 2007). Using the first wave in home-interview sample ( $N = 9,636$ ), Mack and colleagues examined delinquency among youths from different types of households, family processes (e.g., maternal attachment, parental control, and supervision), and economic factors (e.g., having an income) using negative binomial regression analysis. Rather than finding a strong association between family structure and delinquency, results overwhelmingly supported the theory that maternal attachment more consistently predicts delinquency than does family structure. Results also indicated that the degree of maternal attachment was a stronger explanation for delinquent behavior than maternal supervision and parental control.

The preponderance of evidence suggest that family structure may not directly reshape youths social adjustment but exert through other parent related measures such as SES and parenting. Because of the mixed predictive relationship of family structure and youths' social adjustment, I will not use it as a predictor but a control ( same family structure vs. different family structure) in the models.

## F. Summary

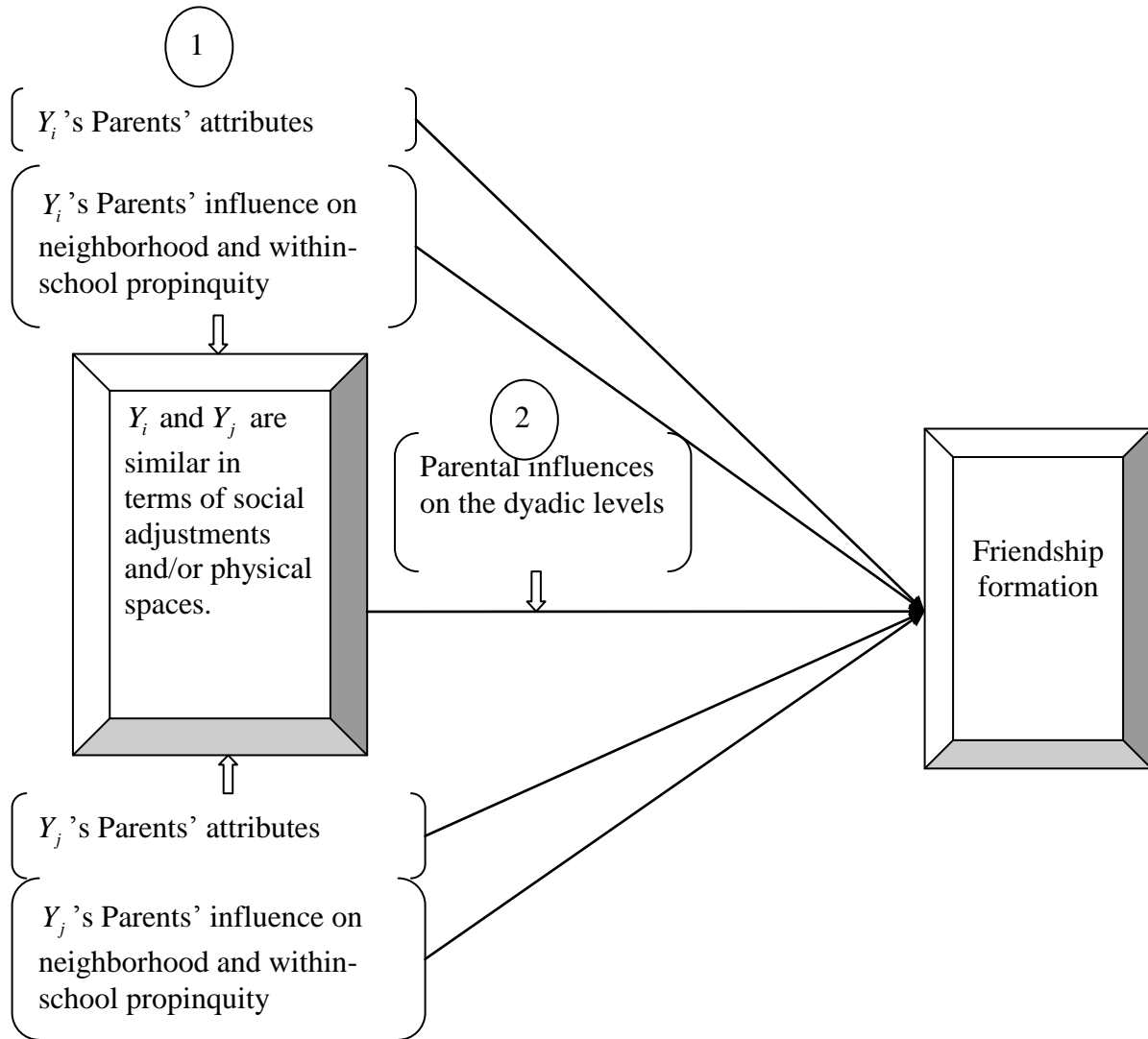
In this chapter, I reviewed the literature related to how parental influences may affect friendship pairings through fundamental and moderating influences and the mechanisms for friendship pairings (homophily and propinquity). Homophily explains that the similar pairs will be more likely being friends with each other. Propinquity takes



youths' activity spaces into account and explains how closeness affects friendship pairings. And parental influences can attenuate or accentuate the process of homophily and propinquity. Those hypotheses lead to Figure 2.6 for an overview of the current research framework where I lay out the hypotheses for fundamental influences ① and moderating influences ②.

The framework ① indicates that the attributes and influences of  $Y_i$  and  $Y_j$ 's parents will contribute to homophily and propinquity between  $Y_i$  and  $Y_j$  and in turn, increase their chance to be friends. The framework ② shows that dyadic level parental attributes and influences moderate the association between  $Y_i$  and  $Y_j$ 's homophily/propinquity and friendship pairings.

Figure 2.6: Parental Influences on Adolescent Friendship Pairings



### III. RESEARCH QUESTIONS AND HYPOTHESES

#### A. Research Questions

The main research questions for the current study are:

- ◆ *Do parents affect the friendship pairings, if so, is parental influences affect friendship pairings fundamentally (mediated by external effects such as homophily and propinquity) and/or moderately (the association between homophily/propinquity and friendship pairings vary by parental influences)?*

#### B. The Hypotheses Table

Table 3.1 Hypotheses

Fundamental influences	<i>Youth homophily mediates the relationship between parenting and friendship pairings. The relationship between homophily and friendship pairings is explained in part by parental SES, parental involvement, parental educational aspirations for youths, parent choosing neighborhood because of school, parental monitoring, and parental smoking and drinking.</i>	
	<i>Youth propinquity mediates the relationship between parenting and friendship pairings. The relationship between propinquity and friendship pairings is explained in part by parental SES, parental involvement, parental educational aspirations for youths, parent choosing neighborhood because of school, parental monitoring, and parental smoking and drinking.</i>	
Moderating influences	<i>Mod 1.1</i>	<i>Prosocial pairs with positively characteristic parents such as parents of high-high SES, high-high involvement, high-high educational aspirations for youths, yes-yes choosing neighborhood because of school, high-high monitoring, and low-low smoking and drinking are more likely to be friends with each other than prosocial pairs with other configuration of parents.</i>
	<i>Mod 1.2</i>	<i>Antisocial pairs with negatively characteristic parents such as parents of low-low SES, low-low involvement, low-low educational aspirations for youths, no-no choosing neighborhood because of school, low-low monitoring, and high-high smoking and drinking are more likely to be friends with each other than antisocial pairs with other configuration of parents.</i>
	<i>Mod 1.3</i>	<i>Prosocial-Antisocial pairs are more likely to form friends when they are with low-high positively characteristic parents than they are with other configuration of parents. Prosocial-Antisocial pairs are less likely to form friends when they are with high-low positively oriented parents than they are with other configuration of parents.</i>
	<i>Mod 1.4</i>	<i>Antisocial-Prosocial pairs are more likely to form friends when they are with high-low positively characteristic parents than they are with other configuration of parents. Antisocial-Prosocial pairs are less likely to form friends when they are with low-high positively characteristic parents than they are with other configuration of parents.</i>
	<i>Mod 2.1</i>	<i>Living in an advantaged neighborhood, pairs with positively characteristic parents such as parents of high-high SES, high-high involvement, high-high educational aspirations for youths, yes-yes choosing neighborhood because of school, high-high monitoring, and low-low smoking and drinking are more likely to be friends with each other than pairs with other configuration of parents.</i>

Table 3.1 Hypotheses (Continued)

Moderating influences	Mod 2.2	<i>Living in a disadvantaged neighborhood, pairs with negatively characteristic parents such as parents of low-low SES, low-low involvement, low-low educational aspirations for youths, no-no choosing neighborhood because of school , low-low monitoring, and high-high smoking and drinking are more likely to be friends with each other than pairs with other configuration of parents.</i>
	Mod 2.3	<i>Living in different neighborhoods, pairs with similar parents are more likely to be friends with each other than pairs with dissimilar parents.</i>
	Mod 3.1	<i>From similarly higher school local positions, pairs with positively characteristic parents such as parents of high-high SES, high-high involvement, high-high educational aspirations for youths, yes-yes choosing neighborhood because of school, high-high monitoring, and low-low smoking and drinking are more likely to be friends with each other than pairs with other configuration of parents.</i>
	Mod 3.2	<i>From similarly low school local positions, pairs with negatively characteristic parents such as parents of low-low SES, low-low involvement, low-low educational aspirations for youths, no-no choosing neighborhood because of school , low-low monitoring, and high-high smoking and drinking are more likely to be friends with each other than pairs with other configuration of parents.</i>
	Mod 3.3	<i>From dissimilar local positions, pairs with similar parents are more likely to be friends with each other than pairs with dissimilar parents.</i>

## **IV. DATA, MEASUREMENTS, AND ANALYTICAL METHODS**

### **A. Source of Data**

To test my hypotheses, I used data from the National Longitudinal Study of Adolescent Health (Add Health), a nationally representative sample of adolescents in grades seven through 12 (Harris 2009). The data allowed me to associate respondents' demographic data to their friendship nominations and their overall network nominations and to connect friendship with the broader social environment (schools, family, and neighborhoods).

During the 1994–1995 school year, in-school questionnaires were administered to approximately 90,000 students from 132 schools. Statistician sampled 80 high schools based on region, urbanization, sector, racial composition, and size. Most of these schools contained 9<sup>th</sup> through 12<sup>th</sup> grade but some included 7<sup>th</sup> and/or 8<sup>th</sup> grade as well. Fifty-two schools were added as feeder schools to attain a full sample of seventh and eighth grades students.

A subsample of 20,745 students was selected across school samples to complete extensive interviews in their homes, and one parent of each of these students was interviewed at the Wave I In-Home Interview in 1995. The in-home interviews for youths were repeated in 1996 (Wave II) with 14,738 adolescents (excluding the Wave I seniors who graduated) but not with parents. Two additional sets of interviews were conducted in 2001–2002 (Wave III) and in 2007–2008 (Wave IV).

Although Add Health is a rich source of data on social contexts and adolescent development, it has limited information on the academic trajectories of youth. Therefore, the Adolescent Health and Academic Achievement study (AHAA) extended Add Health

by gathering detailed measures of academic progress and high school curricula with official high school transcripts and course-selection patterns for most Wave III participants ( $N = 15,179$ ) during 2001–2002. Most importantly, the AHAA data provide indicators of course-taking patterns, which allow the creation of the new measures of within-school groups, i.e., *local positions*, as clusters of students who take courses that differentiate them from other students. It helps this study to capture the parental influences on within-school propinquity by measuring youths' local position and the rank of their local position. (i.e., rank refers to the difficulty of classes which can distinguish mostly advance placement versus remedial course.)

#### B. Sample Selection

To capture sociometric network information, Add Health allowed youths to nominate up to 10 friends (i.e., a maximum of five males and five females) from the school roster during both in-school and in-home interviews. Two large ( $N = 1,000$ ;  $N = 1,800$ ) and 14 small ( $N < 300$ ) schools were selected for saturated data collection. In these 16 schools, all students, rather than a subsample completed in-home interviews (at both Wave I and Wave II), which provided the full network structure for each school. Because sociometric networks are central to my hypotheses, I only used data from these 16 saturated schools in my study.

I considered two ways to select samples to model my fundamental (mediation) and moderation hypotheses. One used longitudinal data (two waves of in-home friends nomination) and assessed the dynamic changes in friendship pairings, including new friendships, dissolving friendships, and stable friendships. The other used cross-sectional data (in-school friends nomination) to focus on current friendships. Although the first

approach provided a more in-depth understanding of friendship changes over time, most friendships were stable over time, and there were too few new and ending friendships to support model estimation (details available in Appendix A). Thus I chose to use the second approach for the current study.

Because parents were not interviewed at Wave II, I only did the cross-sectional analysis at Wave I. I restricted the samples of the cross-sectional data from the 16 saturated schools to respondents who (1) participated and finished Wave I and the in-school survey (2) had parent data from Wave I, (3) had records of transcripts and local positions in the AHAA data, (4) had valid gender information, (5) from grade 9 and above. As a result, my sample for analysis comprises 2,412 cases, which includes 1,254 males and 1,158 females. The males had 545,324 potential pairs and the females had 446,198 potential pairs within the schools. Because earlier studies indicated that race and age homophily were dominant in U.S. junior high and high schools (Joyner and Kao 2000; Moody 2001; Quillian and Campbell 2003; Kao and Vaquera 2006; Mouw and Entwisle 2006), I examined homophily and propinquity within same gender, race and same year age group (Students who were born within 12 months of each other are treated as being in the same age group). Among males, focuses on pairings of the same race and age reduced the potential pairings from 545,324 to 135,032. For females, the 446,198 potential pairs reduced to 105,668. The total sample size also reduced to 2,392 cases (1242 males and 1150 females) because a small number of respondents had no potential pairs of the same race and age.

Table 4.1 summarizes the reduction in sample sizes resulting from the choices described above. The table shows that the sample of 2,392 students are selected from



20,745 cases. Through the sample selection process, 10 cases are reduced due to invalid gender information. 3,099 and 5,377 cases are also filtered because no parent interview information or invalid grade level. The restriction of saturated school takes 9,841 students out. Till now, only 2418 students from 13 saturated schools are left in the sample. Three saturated schools are excluded from sample because students from those schools are not qualified for the sample selection criteria above. In order to build the global network within each saturated school, I can only keep the saturated schools with more than 10 youths. As a result, 6 students from 3 saturated schools are excluded in the sample. The last criterion requires that sample had at least one same race and age schoolmate; it reduces sample size from 2,412 to 2,392.

Table 4.1 Reduction in Number of Students

Selection Criteria	Number of Students	Size Reduction
Original sample size	20,745	0
Sample with valid gender information	20,735	10
Sample had a parent interviewed	17,636	3,099
Sample from grade 9 and above	12,259	5,377
Sample from saturated school*	2,418	9,841
Sample from schools having more than 10 students interviewed **	2,412	6
Sample had at least one same race and age schoolmate	2,392	20
Note: * The number of saturated schools changed from 16 to 13; ** To build the global network, I restricted the minimal network size to 11 youths. The number of saturated schools changed from 13 to 10.		

#### C. Measurements

The network datasets allowed me to link adolescents to their friends. Thus, for each nominator and nominee pair, I was able to create dyadic-level measures from the

individual measures. The individual and dyadic measures are described in detail in the following sections.

### 1. Friendship Pairing

The dependent variable indicates the existence of a friendship nomination during the in-school survey. The resulting dyadic variable equals 1 if  $i$  nominated  $j$  as a friend, and 0 otherwise. In the current study, every student gets to be in both position  $i$  and position  $j$  for potential pair constructions. Thus,  $Y_j$ 's nomination of  $Y_i$  is an independent event from  $Y_i$ 's nomination of  $Y_j$ . I focus on the one-direction friendship nomination rather than the two-direction friendship nomination (nomination reciprocity). For example of the potential pairing of Jane and Mary, if Jane nominated Mary as a friend, then the dependent variable would be coded a 1 for the Jane-Mary pairing on Jane's record. If Mary did not nominate Jane as a friend then the Mary-Jane pairing would be coded a 0 on Mary's record.

### 2. Adolescent Reported Measures

To indicate homophily, I constructed a prosocial-antisocial continuum based on four homophily characteristics (GPA, educational aspirations, delinquency and drug use). I also coded two propinquity-related characteristics to indicate "whether the youth live in the same high-/low-status neighborhood or occupy the same high/low rank local position".

#### a. Homophily: Prosocial-Antisocial Continuum

I conducted an explorative factor analysis of four social adjustments—(1) grade point average (GPA), (2) educational aspirations, (3) drug use, and (4) delinquency—to define a latent construct ranging along a prosocial to antisocial continuum. I used overall

GPA's from the AHAA official transcripts for school year 1994-1995. Adolescents' expectations of graduating from college were measured on a scale of 1 = *no chance* to 5 = *it will happen*. Drug use were self-reports of the frequency during the past 30 days of using marijuana, cocaine, inhalants, or other illegal drugs. Youths report the exact number of times of drug use. Finally, to measure delinquency I summed 10 self-reported items to measure delinquency, each of which ranged from "never" (coded 0) to "five or more times" (coded 3). The participants reported whether in the previous 12 months they had: 1) deliberately damaged property that did not belong to you; 2) took something from a store without paying for it; 3) hurt someone badly enough that the person needed bandages or care from a doctor or nurse; 4) drove a car without the owner's permission; 5) stole something worth more than \$50; 6) entered a house or building to steal something; 7) used or threatened to use a weapon to take something from someone; 8) stole something worth less than \$50; 9) took part in a fight in which a group of your friends was against another group; 10) behaved in a loud, rowdy, or unruly manner in a public place.

The result showed that one factor explained 93% of the total variances of these four variables. GPA's and educational aspirations explain mainly of the variance. I used the resulting factor score to define the *Prosocial-Antisocial Continuum*. To simplify creation of dyadic measures I created a dummy variable (which I refer to as the *Prosocial-Antisocial Dichotomy*) that indicates whether each youth fell above or below the median of the *Prosocial-Antisocial Continuum*. For each potential friendship pairings, I then created a dyadic-level *Prosocial-Antisocial Classification* with four categories: Prosocial-Prosocial adjustment (PP), Antisocial-Antisocial adjustment (AA), Prosocial-Antisocial adjustment (PA), and Antisocial-Prosocial adjustments (AP). The first two

categories indicate that both the nominator and nominee fall in the same level of the prosocial-antisocial continuum, both above or below the median respectively. The latter two categories indicate that nominator and nominee fall in different levels of the prosocial-antisocial continuum (PA means nominator is prosocial and nominee is antisocial; AP means nominator is antisocial and nominee is prosocial).

b. Propinquity: Neighborhood

I used 1990 census tracts to represent the neighborhoods where respondents were living at the time of the wave I in-home interview. In a study of disadvantaged neighborhood, Harding and Karb (2008) defined the Structural Neighborhood Disadvantage Scale (hereafter, Neighborhood Disadvantage) based on economic and social characteristics of neighborhood families thought to lead to negative outcomes for youth. I also employed Neighborhood Disadvantage for the current study. It is constructed by calculating the mean of the following standardized items: the census tract's family poverty rate, the percentage of single mother households, the male unemployment rate, the percentage of those over 25 who are college graduates, the percentage of workers in managerial or professional occupations, and the percentage of affluent families (those with incomes above \$75,000 per year), with the last three reversed in polarity. The average inter-item correlation for this scale was 0.42 with a Cronbach's alpha of 0.82. I coded every youth as being in an advantaged or disadvantaged neighborhood using median split. In order to assess parenting influences on propinquity, I am not only coding propinquity but also coding the quality of the neighborhood. I created the 3-category dyadic measure based on the youths' Neighborhood Disadvantage measure. They are "*whether the participating youths lived*

*in the same advantaged neighborhood” “whether the participating youths lived in the same disadvantaged neighborhood” and “whether the participating youths lived in different neighborhoods” for neighborhood propinquity measures.*

c. Propinquity: School Local Position

High schools are social institutions with numerous hierarchical groupings. Field et al. (2006) introduced a technique for measuring student’s academic standing as one such hierarchical group. It is called *local positions*, demonstrating academic ability to complete classes with various levels of difficulties. It can distinguish mostly advance placement versus remedial course and then more accurately reflects youths’ rank within schools. In other words, local positions identified clusters of students who took similar courses (e.g., a group of students, all of whom take Mathematics level I, English level I, and Chemistry level I, are differentiated from another group of students, all of whom take Mathematics level II, English level II, and Chemistry level II.). In addition, local positions are non-overlapping, and students were assigned to a maximum of one local position. (Frank et al. 2008).

AHAA school transcript data adopted the measures of local positions and created unique school clusters within each school to help to identify unique clusters that connect students and their course taking.

I coded every youth as being in similarly low- or high-status local position using median split and then created the 3-category dyadic measure based on the youths' local position dichotomy measure.<sup>2</sup> They are the dummy indicators of “*whether the dyad of youths held a similarly higher local position*” “*whether the dyad of youths held a similarly lower local position*” and “*whether the dyad of youths held dissimilar local positions*”.

### 3. Parent-reported Measures

At Wave I, Add Health staff interviewed a parent of each youth. I used exploratory factor analyses to reduce the number of parent-reported items, ultimately defining three composite measures: *socioeconomic status (SES)*, *parental involvement*, and *smoking and drinking*; and, three single measures: *parental monitoring*, *parent choosing neighborhood because of school*, and *parental educational aspirations for youths*. To simplify the analyses, I dichotomized the six parent-reported variables at their medians, with “1” representing the higher level and “0” the lower level. At the dyadic level, I then indicated whether the each pair of potential friends had parents who occupied the high-high (HH), high-low (HL), low-high (LH), or low-low (LL) level on each of these measures.

I have begun with SES composite which is generated by the measure of parental educational level, total family income, and parental PTA membership. For the SES

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<sup>2</sup> I had originally separated those in the same local position into two groups, those in the same higher-ranked local position and those in the same lower-ranked local position. I did so to match my approach for neighborhood propinquity, where I distinguished those in the same more advantaged and those in the same less advantaged neighborhoods. I later learned that the ranks for local position do not have meaning (they are nominal rather than ordinal). Given I had already estimated my models and written up the results when I clarified the meaning of the local position codes, I have maintained the two dummies for same local position (of higher and lower rank) in the circulated manuscript. My coding reduces power in my tests.

composite, I measured parents' highest educational level (ten levels ranging from "never went to school" to "professional training beyond a four-year college or university"), youths' *total family income* divided by the appropriate poverty threshold for their family size (U.S. Census Bureau 1994), and PTA membership (whether participate in any school organization).

The second composite variable is parental involvement. Factor analysis indicated that closeness, parental involvement, and availability are the mainly contributors to this measures.

*Closeness.* Closeness measures were generated from the following pair of questions asked of the youths about their mother/mother figure or father/father figure: "How close do you feel to your [mother/father]"; "How much do you think she cares about you?" Responses to each question ranged from 1 to 5, and the sum of each pair with parent type ranged from 2 to 10. For youth with reports about both a mother and father, I picked the higher value. For youth with only one report, I used the single value.

*Parental involvement.* Parental involvement was measured using five questions answered by the parent: (1) "whether the parent was a member of a parent/teacher organization?"; (2) "In the past week, have you and your child talked about (his/her) school work or grades?"; (3) "In the past week, have you and your child talked about other things [he/she] is doing at school?"; (4) "Have you talked with any of his/her teachers about [his/her] schoolwork this school year, either informally or during a regularly scheduled parent-teacher conference?"; and (5) "During this school year, have you participated in school fund-raising or done volunteer work for his/her school, such as

supervising lunch, chaperoning a field trip, etc.?” These questions were coded 1 for yes and 0 for no. The five items were tallied and totals ranged from 0 to 5.

*Parental availability.* Youths were also asked to rate four scales about their mothers’ availability. The questions included “How often is she/he at home when you leave for school?”; “How often is she/he at home when you go to bed?”; “How often is she/he at home when you return from school?”; and “On how many of the past 7 days was at least one of your parents in the room with you while you ate your evening meal?” After summing mother and father’s availability separately (ranged from 4-20), I picked the higher number to represent the availability measures.

The last composite variable is *Parental Smoking and drinking*. Each parent reported his or her own and, where applicable, his or her partner’s *smoking and drinking* status.

*Parental monitoring.* Parental monitoring was coded based on items related to children’s autonomy. These items included the following questions: “Do your parents let you make your own decisions about... the time you must be home on weekend nights?” “the people you hang around with?” “what do you wear?” “how much television do you watch?” “which television programs do you watch?” “what time do you go to bed on week nights?” and “what do you eat?” These answers were coded 1 for yes and 0 for no. The seven items were tallied and totals ranged from 0 to 7. I dichotomized the sum by the median to capture whether parental monitoring was at a high or low level.

*Choosing of neighborhood because of school.* I used a dummy variable to indicate if parents reported “You live here because the schools here are better than they are in other neighborhoods.”



*Parental educational aspirations for youths.* Parents were also asked, “How disappointed would you be if your child did not graduate from college?” They could choose 1 for “very disappointed,” 2 for “somewhat disappointed,” or 3 for “not disappointed.” I reversed the code, making the higher number represent higher aspirations. If the answer to the question was “very disappointed” or “somewhat disappointed,” then I assigned a 1 for higher educational aspirations for youths. If the answer was “not disappointed,” I assigned a 0 for lower educational aspirations for youths.

#### 4. Control Variables

During the school interviews at Wave I, youths reported their race (non-Hispanic white, non-Hispanic African American, Hispanic, or other race/ethnicity group) and age (in months).

I obtained information about family structure from multiple sources, including adolescents’ reports of their family type and length of time they had lived with their residential parents and their residential histories with nonresidential parents. These data were collapsed into five categories: (1) two original (i.e., biological or adoptive) parents, (2) mother-stepfather, (3) single mother, (4) single father, and (5) nonparents (i.e., generally relatives or foster families). (Note: there is a hierarchy for classifying family structure.” Ever with and two biological parents” gets priority over “a biological and step parent”, and so forth.)

Again, the preponderance of evidence suggests that family structure may not directly reshape youths’ social adjustments. However, family structure is associated with some of parent related measures such as SES and parenting. Because of the mixed

predictive relationship of family structure and youths' social adjustment and casual relationship between hierarchy classifications of family structure and other parental variables, I will not use it as a predictor but a control (dyadic level same family structure vs. dyadic level different family structure) in the models.

#### D. Analytical Methods

##### 1. Introduction to the Crossed Random Effects Model

I used hierarchical linear modeling in which the structure of the probability model for the residuals reflected the hierarchical structure of the Add Health social network data (pairs are nested within individuals; Snijders and Bosker 1999:39–45). I use crossed random effects models (also known as cross-classified models) in which lower level units can belong to more than one cluster because each friendship pairing is nested within two students. When describing the model, I will sometimes refer to the cells defined by the cross-classification of youths; each cell reflects one pairing.

In addition to the crossed random effect model, some researchers employ multilevel exponential random graph models (Baerveldt, 2000; Zijlstra, van Duijn, and Snijders, 2006), another form of network multilevel data analysis. Although the cross-nested structure of my data could be fitted by such exponential random graph models, I did not use them for two primary reasons. First, exponential random graph models examine all possible nominations between youths (one of four possible outcomes, which are out-network nomination (productivity/sociability), in-network nomination (attractiveness), reciprocal nomination (reciprocity) and total nomination vs. network size (density)). I am interested only in the one directional ties between nominators and nominees (productivity in the language of exponential random graph models), and thus

crossed random effects models are simpler and more practical for my application. Second, some variants of exponential random graph models are designed to incorporate network covariates, like network size and density, which are not a focus of my analysis. In comparison, crossed random effect models have a broader view to deal with variables beyond network covariates.

In this study, I used Level-1 of the crossed random effect model for my dyadic-level variables (within-cell variation in the terminology of the crossed random effect model). The Level-1 coefficients capture associations between dyadic characteristics (i.e., prosocial-antisocial homophily) and friendship nominations. I used Level-2 of the cross random effect model for my individual-level variables (between-cell variation in the terminology of the crossed random effect model). The Level-2 coefficients capture associations between individual characteristics (e.g., own prosocial-antisocial level) and friendship nominations.

I also allowed for a third level in my models, since students are nested within schools. I specified fixed rather than random effects, because models with school random effects did not converge. The fixed effects were specified as dummy indicators of schools at Level 1 which estimate the average level of friendship nominations in each school and as such absorb school level variation in friendship levels.

I followed Raudenbush and Bryk (2002:376-378) and Hox (2010:171-187) to specify my crossed random effects models. HLM software version 7 is used to estimate models. Among same-gender, race, and age students in each school, every student is a nominator and nominee in every pair. If we think of a cross-classification table where each student is listed in the rows and across the columns, then every cell off-diagonal cell

represents one potential pairing. For example, among a set of three students, there would be six potential pairings.

Table 4.2 The Example of Pairings

$i \backslash j$	Mary	Jane	Karen
Mary	N/A	$k$	$k$
Jane	$k$	N/A	$k$
Karen	$k$	$k$	N/A

For simplicity, I treat the nominations as independent (e.g., I represent Mary's nomination of Jane as independent of Jane's nomination of Mary)

#### Level-1 Model

$$\log[Y_{kij}/(1 - Y_{kij})] = \pi_{0ij} + e_{kij} \quad e_{kij} \sim N(0, \sigma^2),$$

where  $Y_{kij}$  captures whether Person  $i$  nominated Person  $j$  as a friend on the in-school survey.  $\pi_{0ij}$  is the average log-odds of nomination.  $e_{kij}$  is the random "pair effect," that is, the deviation of the probability of forming Pair  $k$  from the mean of the probability of forming the pairs.

#### Level-2 Model

$$\pi_{0ij} = \theta_0 + b_{00i} + c_{00j} + \gamma_{ij0}$$

where  $\theta_0$  is the grand mean probability of friendship pairings for all pairs.  $b_{00i}$  is the random main effect of nominator ( $i$ ), and  $c_{00j}$  is the random main effect of nominee ( $j$ ).  $\gamma_{ij0}$  is a pair-level random effect.

## 2. Models for Parental Influences

I elaborate models of fundamental influences and moderating influences separately in Table 4.2. Again, in light of prior research indicating that the impact of parents on some aspects of adolescent adjustment may vary by gender and that

homophily effects are strong for race and gender, all analyses are conducted separately within same gender, race and age groups.

a. Models for Fundamental Influences

The fundamental influence hypothesis asks whether parental characteristics and behaviors significantly impact whether youths' nominate or are nominated by others. I separately examined this question at the dyadic level and at the individual level. After examining parental variables at the dyadic and individual level, I entered youth-level homophily and propinquity predictors into Level-1 models to assess the changes of coefficients of parental variables in magnitude and significance.

I estimated six models (Model A-F) for each gender group. The six models have varying sets of covariates. Model A has no covariates, and I refer to it as an unconditional model. Model B includes two covariates, which I refer to as minimal controls. The first minimal control is a set of dummy variables for each school, with one of the schools acting as the reference. These school fixed effects absorb unmeasured school differences. Prior literature indicates that family structures are indirectly associated with youths' outcomes through other variables such as parental SES. Thus, the second minimal control is a dummy indicator of whether each pair of youths had the same family structure (i.e., both two-parent or both single-parent family coded as one; one single-parent and one two-parent coded as zero). To aid in interpretation, both minimal controls are centered on their grand means. For example, each school dummy predictor is centered by using its value (0 or 1) minus its mean. Thus, the means of the centered minimal controls are all equal to zero. The intercept is the odds ratio of the reference group.

These remaining four models (Models C to F) add to the minimal controls. For the dyadic-level modeling strategy, Model C adds the dyadic parenting variables at Level-1. For the individual-level modeling strategy, Model C adds the individual level parenting variables to Level-2. Models D–F add the sets of mediators to Model C. Model D adds the youth homophily variables; Model E adds neighborhood and school local position propinquity; and Model F includes all of the variables. If, as different sets of mediators are added to Model C, I see relative changes in nominator and nominee variance, then I have evidence that these predictors help explain the variances at the nominator and nominee level. After the discussion of the relative variance changes, I look at the changes in size and significance of the parenting variables, comparing coefficients in Models D–F to Model C. If the magnitudes of the parenting coefficients become smaller or the significance of the parenting coefficients disappears, I then have evidence in support of the hypotheses of fundamental influences.

I presented the final models, with all predictors, in Table 4.2. In the dyadic-level fundamental influence model (see ① at Table 4.2), parental predictors were in the Level-1 model to examine how similarities between parents were mediated by youths homophily and propinquity to influence friendship pairings. In equation ① of Table 4.2,  $\pi_{1ij} \sim \pi_{11ij}$  were the regression coefficients relating dyadic level parental and youth's predictors (e.g. “*Parent\_HL*”; “*Youth\_PA*”) of the log-odds of the friendship nomination. *Parent\_HL<sub>kij</sub>* and all other predictors with subscript “<sub>kij</sub>” were dyadic level predictors.  $\Sigma \pi_{12ij}$  was the sum of the school fixed effects. In the Level-2 model, I allowed for random effects at the nominator and nominee level.

Again, parent variables were modeled not only at dyadic level where I examined how parental similarities were related to friendship pairings but also at individual level where I could differentiate nominator' and nominee's parental influences.

In the individual-level model (see ② at Table 4.2), parental predictors were added to the Level-2 model, which separately evaluated how nominators' and nominees' parental influences were mediated by youth homophily and propinquity in regard to friendship pairings. In the Level-2 model,  $\theta_0$ ,  $b_{00i}$ , and  $c_{00j}$  were still in the model, but the random effects are now conditional (controlling for the Level-2 parent variables).  $\alpha_{0i}$  was the regression coefficient for nominator's characteristics.  $Parent\_H_i$  and all other predictors with subscript  $i$  were individual level predictor of nominator  $i$ .  $\beta_{0i}$  were the regression coefficient for nominee's characteristics.  $Parent\_H_j$  and all other predictors with subscript  $j$  were individual level predictors of nominee  $j$ .

#### b. Models for Moderating Influences

I examined the moderating effects of the dyadic-level parenting influences by adding interactions between parent-reported variables and the youth-level homophily and propinquity variables.

In the moderating models for homophily, I identified 16 mutually exclusive and exhaustive configurations of parental dyadic-level predictors with youth dyadic-level homophily predictors based on the variables defined above that represent whether one or both parents in the dyad were high or low on each construct as well as whether one or both youths in the dyad were high or low on each construct. I presented moderating influences models for homophily in Table 4.2 ③. Similarly, I coded 12 mutually

exclusive and exhaustive configurations in the moderating models for propinquity. I show in Table 4.2④ the model with neighborhood propinquity. I similarly defined a model for school propinquity.



Table 4.3 Summary Equations for Models

Fundamental Influences Model	Dyadic Level ①	<p>Level-1</p> $\log[Y_{kij}/(1 - Y_{kij})] = \pi_{0ij} + \pi_{1ij} * Parent\_HL_{kij} + \pi_{2ij} * Parent\_LH_{kij} + \pi_{3ij} * Parent\_LL_{kij} + \pi_{4ij} * Youth\_PA_{kij} + \pi_{5ij} * Youth\_AP_{kij} + \pi_{6ij} * Youth\_AA_{kij} + \pi_{7ij} * SameDisadvantagedNeighborhood_{kij} + \pi_{8ij} * SameAdvantagedNeighborhood_{kij} + \pi_{9ij} * SimilarlyHighLocalPosition_{kij} + \pi_{10ij} * SimilarlyLowLocalPosition_{kij} + \pi_{11ij} * SameFamilyStructure_{kij} + \Sigma \pi_{12ij} * SchoolFixedEffects_{kij}$ <p>Level-2 <math>\pi_{0ij} = \theta_0 + b_{00i} + c_{00j} + \gamma_{ij0}</math></p>
	Individual Level ②	<p>Level-1</p> $\log[Y_{kij}/(1 - Y_{kij})] = \pi_{0ij} + \pi_{1ij} * Youth\_PA_{kij} + \pi_{2ij} * Youth\_AP_{kij} + \pi_{3ij} * Youth\_AA_{kij} + \pi_{4ij} * SameDisadvantagedNeighborhood_{kij} + \pi_{5ij} * SameAdvantagedNeighborhood_{kij} + \pi_{6ij} * SimilarlyHighLocalPosition_{kij} + \pi_{7ij} * SimilarlyLowLocalPosition_{kij} + \pi_{8ij} * SameFamilyStructure_{kij} + \Sigma \pi_{9ij} * SchoolFixedEffects_{kij}$ <p>Level-2 <math>\pi_{0ij} = \theta_0 + \alpha_{0i} * Parent\_H_i + \beta_{0i} * Parent\_H_j + b_{00i} + c_{00j}</math></p>
Moderating Influences Model	Homophily ③	<p>Level-1</p> $\log[Y_{kij}/(1 - Y_{kij})] = \pi_{0ij} + \pi_{1ij} * ParentHH\_YouthPA_{kij} + \pi_{2ij} * ParentHH\_YouthAP_{kij} + \pi_{3ij} * ParentHH\_YouthAA_{kij} + \pi_{4ij} * ParentHL\_YouthHH_{kij} + \pi_{5ij} * ParentHL\_YouthPA_{kij} + \pi_{6ij} * ParentHL\_YouthAP_{kij} + \pi_{7ij} * ParentHL\_YouthAA_{kij} + \pi_{8ij} * ParentLH\_YouthHH_{kij} + \pi_{9ij} * ParentLH\_YouthPA_{kij} + \pi_{10ij} * ParentLH\_YouthAP_{kij} + \pi_{11ij} * ParentLH\_YouthAA_{kij} + \pi_{12ij} * ParentLL\_YouthHH_{kij} + \pi_{13ij} * ParentLL\_YouthPA_{kij} + \pi_{14ij} * ParentLL\_YouthAP_{kij} + \pi_{15ij} * ParentLL\_YouthAA_{kij} + \pi_{16ij} * SameFamilyStructure_{kij} + \Sigma \pi_{17ij} * SchoolFixedEffects_{kij}$ <p>Level-2 <math>\pi_{0ij} = \theta_0 + b_{00i} + c_{00j} + \gamma_{ij0}</math></p>
	Propinquity ④	<p>Level-1</p> $\log[Y_{ijk}/(1 - Y_{ijk})] = \pi_{0ij} + \pi_{1ij} * Parent\_HH\_SameDisadvantagedNeighborhood_{kij} + \pi_{2ij} * ParentHH\_DiffNeighborhood_{kij} + \pi_{3ij} * ParentHL\_SameDisadvantagedNeighborhood_{kij} + \pi_{4ij} * ParentHL\_SameAdvantagedNeighborhood_{kij} + \pi_{5ij} * ParentHL\_DiffNeighborhood_{kij} + \pi_{6ij} * ParentLH\_SameDisadvantagedNeighborhood_{kij} + \pi_{7ij} * ParentLH\_SameAdvantagedNeighborhood_{kij} + \pi_{8ij} * ParentLH\_DiffNeighborhood_{kij} + \pi_{9ij} * ParentLL\_SameDisadvantagedNeighborhood_{kij} + \pi_{10ij} * ParentLL\_SameAdvantagedNeighborhood_{kij} + \pi_{11ij} * ParentLL\_DiffNeighborhood_{kij} + \pi_{12ij} * SameFamilyStructure_{ijk} + \Sigma \pi_{13ij} * SchoolFixedEffects_{kij}$ <p>Level-2 <math>\pi_{0jk} = \theta_0 + b_{00j} + c_{00k} + \gamma_{ij0}</math></p>

## **V. Results**

In this chapter, I analyzed the results from the model estimation in Chapter IV and discussed how these results contribute to both the parental-influence literature and the peer-influence literature.

### **A. Descriptive**

Table 5.1 provided descriptive statistics for variables used in the dyadic-level model which included the outcome variable, friendship nomination, the mutually exclusive four categories of youths' prosocial behaviors, the mutually exclusive three categories of propinquity measures, as well as the mutually exclusive four categories of each parental measures and the similarity of family structure.

Table 5.1 Descriptive Statistics for Key Study Variables (Dyadic Level)

	Adolescent Boys		Adolescent Girls	
	Mean	Std Dev	Mean	Std Dev
Friendship Nomination	0.010	0.099	0.012	0.110
Youths' Dyadic Level Prosocial-Antisocial Dichotomy Classification				
Prosocial-Prosocial	0.255		0.262	
Antisocial-Antisocial	0.256		0.263	
Prosocial-Antisocial	0.244		0.237	
Antisocial-Prosocial	0.244		0.237	
Youths' Neighborhood Propinquity				
Living in the Same Disadvantaged Neighborhood	0.101		0.081	
Living in the Same Advantaged Neighborhood	0.050		0.055	
Living in the Different Neighborhoods	0.849		0.864	
Youths' School Local Position Propinquity				
From Similarly High-Status Local Positions	0.250		0.261	
From Similarly Low-Status Local Positions	0.262		0.255	
From Dissimilar Local Positions	0.488		0.484	
Parental Dyadic Level SES				
High-High	0.280		0.299	
High-Low	0.220		0.201	
Low-High	0.220		0.201	
Low-Low	0.280		0.299	
Parental Dyadic Level Involvement				
High-High	0.251		0.25	

			4	
High-Low	0.249		0.24 6	
Low-High	0.249		0.24 6	
Low-Low	0.251		0.25 5	
Parental Dyadic Level Educational Aspiration for Youths				
High-High	0.217		0.22 0	
High-Low	0.211		0.22 5	
Low-High	0.211		0.22 5	
Low-Low	0.362		0.32 9	
Parent Choosing Neighborhood Because of School				
Yes-Yes	0.230		0.23 6	
Yes-No	0.250		0.24 5	
No-Yes	0.250		0.24 5	
No-No	0.270		0.27 3	

Table 5.1 Descriptive Statistics for Key Study Variables (Dyadic Level: Continued)

Variable	Adolescent Boys		Adolescent Girls	
	Mean	Std Dev	Mean	Std Dev
Parental Dyadic Level Monitoring				
High-High	0.203		0.183	
High-Low	0.233		0.226	
Low-High	0.233		0.226	
Low-Low	0.330		0.366	
Parental Dyadic Level Smoking and Drinking				
High-High	0.292		0.294	
High-Low	0.208		0.206	
Low-High	0.208		0.206	
Low-Low	0.292		0.295	
N (Dyads)	135,032		105,668	

Table 5.2 provided descriptive statistics for the variables used in the individual level model. Individual level model had six parental predictors, three composite variables (SES, parental involvement, and smoking and drinking) and three additional variables (parental monitoring, neighborhood selection, and parental educational aspirations for youths).

Table 5.2 Descriptive Statistics for Key Study Variables (Individual Level)

Variables	Adolescent Boys	Adolescent Girls
	Mean	Mean
Parental SES Composite		
Parental SES is High	0.489	0.528
Parental SES is Low	0.511	0.472
Parental Involvement Composite		
Parental Involvement is High	0.510	0.510
Parental Involvement is Low	0.490	0.490
Parental Educational Aspirations for Youths		
Parental Educational Aspirations for Youths are High	0.436	0.425
Parental Educational Aspirations for Youths are Low	0.564	0.575
Parent Choosing Neighborhood Because of School	0.434	0.441
Parental Monitoring		
Parental Monitoring is High	0.447	0.420
Parental Monitoring is Low	0.553	0.580
Parental Smoking and Drinking Composite		
Parental Smoking and Drinking are High	0.467	0.479
Parental Smoking and Drinking are Low	0.533	0.521
N	1,242	1,150

#### B. Fundamental Influences.

My fundamental influence hypothesis states that parenting characteristics affect youths' friendship pairings through the mechanisms of homophily and propinquity. To test this hypothesis, I estimated six models (Model A-F) and used the relative changes in variances and coefficients to examine the mediation effects through homophily and propinquity.

Putting together the two levels of analysis (dyadic and individual) and the two subsamples (girls and boys from same age and race groups) led to four sets of results: the

dyadic-level models for female-female pairs of the same race and age (Table 5.3), the dyadic-level models for male-male pairs of the same race and age (Table 5.6), the individual-level models for female-female pairs of the same race and age (Table 5.9), and the individual-level models for male-male pairs of the same race and age (Table 5.12). Additionally, Table 5.4, Table 5.7, Table 5.10, and Table 5.13 presented relative changes of variance. Table 5.5, Table 5.8, Table 5.11, and Table 5.14 showed relative changes of coefficients.

## 1. Dyadic-Level Models

### a. Same Race and Age Female-Female Pairs

Table 5.3 presented the unconditional model (Model A) and dyadic-level results of Models B–F for female-female pairs of the same race and age.

Table 5.3 Dyadic Level Mediating Models for Adolescent Girls' Friendship pairing

Predictors			Model C		Model D		Model E		Model F	
			Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio
Intercept			-	0.010	-4.694**	0.009	-	0.009	-	0.009
			0.042		0.043		0.043		0.044	
Parenting Similarities	Parental Dyadic Level SES (Ref: High- High)	High- Low	-	0.661	-0.328**	0.721	-	0.685	-	0.743
			0.092		0.092		0.092		0.092	
		Low- High	-	0.707	-0.262*	0.769	-	0.735	-0.227*	0.797
			0.095		0.096		0.095		0.096	
		Low-Low	-0.243*	0.785	-0.078	0.925	-0.211*	0.810	-0.054	0.947
			0.096		0.098		0.097		0.098	
	Parental Dyadic Level Involvement (Ref: High- High)	High- Low	-0.079	0.924	0.000	1.000	-0.085	0.918	-0.011	0.989
			0.085		0.086		0.085		0.085	
		Low- High	-0.158	0.853	-0.079	0.924	-0.164	0.849	-0.089	0.915
			0.093		0.093		0.093		0.093	
		Low-Low	-0.052	0.950	0.064	1.066	-0.060	0.942	0.050	1.051
			0.097		0.098		0.097		0.097	
	Parental Dyadic Level Educational Aspiration	High- Low	-0.240*	0.786	-0.180	0.835	-0.231*	0.793	-0.173	0.841
			0.099		0.099		0.099		0.099	
		Low- High	-0.163	0.849	-0.094	0.910	-0.153	0.858	-0.087	0.916
			0.103		0.103		0.103		0.103	
		Low-Low	-0.222*	0.801	-0.127	0.880	-0.208	0.812	-0.117	0.889
			0.108		0.108		0.108		0.108	
	Parent Choosing Neighborhood Because of School	Yes-No	-0.133	0.876	-0.110	0.895	-0.121	0.886	-0.098	0.907
			0.090		0.089		0.090		0.089	
		No-Yes	0.059	1.060	0.082	1.086	0.072	1.075	0.096	1.101
			0.092		0.091		0.092		0.091	
		No-No	-0.150	0.860	-0.115	0.891	-0.136	0.873	-0.103	0.902
			0.099		0.098		0.099		0.098	
	Parental Dyadic Level Monitoring (Ref: High- High)	High- Low	0.050	1.051	0.000	1.000	0.033	1.034	-0.018	0.982
			0.099		0.098		0.099		0.098	
		Low- High	-0.006	0.994	-0.060	0.942	-0.025	0.976	-0.079	0.924
			0.105		0.105		0.105		0.105	
		Low-Low	0.226*	1.254	0.125	1.133	0.189	1.208	0.088	1.092
			0.104		0.104		0.104		0.104	



Table 5.3 Dyadic Level Mediating Models for Adolescent Girls' Friendship pairing

(Continued)

Predictors			Model C		Model D		Model E		Model F	
			Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio
Parenting Similarities	Parental Dyadic Level Smoking and Drinking (Ref: High- High))	High-Low	-0.134	0.875	-0.187	0.830	-0.112	0.894	-0.162	0.85
			0.1		0.1		0.1		0.1	
		Low-High	-0.145	0.865	-0.198	0.821	-0.127	0.881	-0.178	0.837
			0.108		0.108		0.108		0.108	
		Low-Low	0.292*	1.339	0.163	1.178	0.324*	1.382	0.202	1.223
			0.112		0.112		0.111		0.111	
Homophily	Youths' Dyadic Level Prosocial- Antisocial Dichotomy classification	High-Low			-0.846**	0.429			-0.822**	0.440
					0.090				0.090	
		Low-High			-0.860**	0.423			-0.837**	0.433
					0.095				0.095	
		Low-Low			-0.659**	0.517			-0.626**	0.535
					0.098				0.098	
Neighborho od Propinquity	Youths’ Neighborhoods (Ref: Different Neighborhood)	Same					0.395**	1.485	0.418**	1.519
		Disadvantaged Neighborhood					0.099		0.099	
		Same Advantaged Neighborhood					1.115**	3.048	1.090**	2.974
						0.104		0.104		
School Local Position Propinquity	Youths’ School Local Positions (Ref: Dissimilar Local Position)	Similarly High- Status Local					0.505**	1.658	0.493**	1.637
							0.080		0.080	
		Similarly Low- Status Local					0.466**	1.594	0.428**	1.534
							0.082		0.082	
Nominator-Level Variance			0.408		0.385		0.397		0.374	
Nominee-Level Variance			0.211		0.182		0.200		0.172	
N (Adolescents)			1,150		1,150		1,150		1,150	
n (Pairs)			105,668		105,668		105,668		105,668	
Unconditional Model	Nominator-Level Variance		0.933							
	Nominee-Level Variance		0.418							
Minimal Controls	Nominator-Level Variance		0.430							
	Nominee-Level Variance		0.241							
Note : ** p<0.001 * p<0.05 one-side test										
High-Low: Higher level nominator with lower level nominee; Low-High: Lower level nominator with higher level nominee; Low-Low: Lower level nominator with lower level nominee; High-High (reference group):										

### a.1. Relative Variance Changes

The nominator and nominee variances and their relative changes as different sets of predictors were presented in Table 5.4.

Table 5.4 Relative Variance Changes Dyadic Level Mediating Models for Adolescent Girls

Models	Nominator-Level		Nominee-Level	
	Variance	Relative Changes Compared to the	Variance	Relative Changes Compared to the
Model A (Unconditional Model)	0.933	--	0.418	--
Model B (Minimal Control Model)	0.430	-54% <sup>a</sup>	0.241	-42% <sup>a</sup>
Model C (Parental Influence Model)	0.408	-5% <sup>b</sup>	0.211	-12% <sup>b</sup>
Model D (Homophily Mediators)	0.385	-10% <sup>b</sup>	0.182	-24% <sup>b</sup>
Model E (Propinquity Mediators)	0.397	-8% <sup>b</sup>	0.200	-17% <sup>b</sup>
Model F (Homophily and Propinquity)	0.374	-13% <sup>b</sup>	0.172	-29% <sup>b</sup>
Note: <sup>a</sup> The equation for the relative change calculation is (model variance-Model A variance)/Model A variance.				

The comparison of the unconditional model (Model A) to the minimal controls model (Model B) showed that adding minimal controls offset 54% and 42% of the variance for nominators and nominees, respectively.

I next examined the relative variance changes from Model B to the remaining Models C–F. As I added different sets of covariates to Model B, the variances for the nominator were reduced by 5% (Model C), 10% (Model D), 8% (Model E), and 13% (Model F). The nominees' variances were decreased by 12% in Model C, 24% in Model D, 17% in Model E, and 29% in Model F.

Table 5.4 showed that nominators' variance itself was larger than nominees (.933 vs. .418). It indicated that sending-network was larger than receiving network. It was what I expected for girl network that girls were different in their popularities. Thus, some

of them received more nominations than others. Table 5.4 also showed that the amount of reduction in the nominees' variance was relatively higher than the nominators' variances. This finding suggested that the added covariates explained more of the nominees' variance than the nominators' variance. The only exception was for Model B versus Model A where school dummy and family structure explained more on nominator's variance than nominee's variance. Another key finding concerned the contribution of the set of predictors. The comparison of Model D's variances with Model E's variances showed that homophily predictors did a better job in terms of variance reduction than propinquity predictors (e.g., 10% vs. 8% for the variance reduction of nominators; 24% vs. 17% for the variance reduction of nominees). The difference in reduction for homophily covariates and propinquity covariates also indicated that if mediating effects exists, homophily predictors will make a bigger contribution toward mediating parenting influences than propinquity predictors.

#### a.2. The Magnitude of Coefficients and Their Significance

I next examined the coefficients and their significance across Models C–F in Table 5.3, where I presented both coefficients and odds ratios to facilitate interpretation. Table 5.5 listed the relative changes of coefficients from Table 5.3 to facilitate the interpretations. I first discussed my expectation on the direction of coefficients and second indicated whether my hypotheses were supported.

Table 5.5 Relative Coefficient Changes for Dyadic Level Mediating Models for  
Adolescent Girls

			Model	Model D		Model E		Model F	
Predictors			Coef (1)	Coef (2)	Relative Change s	Coef (4)	Relative Change s	Coef (6)	Relative Change s
Parentin g Similarit ies	Parental Dyadic Level SES (Ref: High-High)	High-	-	-	-21%	-	-8%	-	-29%
		Low-	-	-	-24%	-	-11%	-	-34%
		Low-	-0.243*	-0.078	-68%	-	-13%	-0.054	-78%
	Parental Dyadic Level Involvement	High-	-0.079	0.000	--	-0.085	--	-0.011	--
		Low-	-0.158	-0.079	--	-0.164	--	-0.089	--
		Low-	-0.052	0.064	--	-0.060	--	0.050	--
	Parental Dyadic Level Educational	High-	-0.240*	-0.180	-25%	-	-4%	-0.173	-28%
		Low-	-0.163	-0.094	--	-0.153	--	-0.087	--
		Low-	-0.222*	-0.127	-43%	-0.208	-6%	-0.117	-47%
	Parent choosing neighborhood because of	Yes-No	-0.133	-0.110	--	-0.121	--	-0.098	--
		No-Yes	0.059	0.082	--	0.072	--	0.096	--
		No-No	-0.150	-0.115	--	-0.136	--	-0.103	--
	Parental Dyadic Level Monitoring	High-	0.050	0.000	--	0.033	--	-0.018	--
		Low-	-0.006	-0.060	--	-0.025	--	-0.079	--
		Low-	0.226*	0.125	-45%	0.189	-16%	0.088	-61%
	Parental Dyadic Level Smoking and Drinking	High-	-0.134	-0.187	--	-0.112	--	-0.162	--
		Low-	-0.145	-0.198	--	-0.127	--	-0.178	--
		Low-	0.292*	0.163	-44%	0.324*	11%	0.202	-31%

Note : \*\* p<0.001 \* p<0.05 one-side test  
High-Low: Higher level nominator with lower level nominee; Low-High: Lower level nominator with higher level nominee; Low-Low: Lower level nominator with lower level nominee; High-High (reference group): Higher level nominator with higher level nominee. The relative changes were for the comparison of the current model with Model C and only calculated when the coefficient in Model C is significant.

The relative changes are calculated by (current model's coefficient-Model C's

Recalled that the dyadic predictors in these models were coded to represent  
whether one or both parents in the dyad were high or low on each construct. In each case,  
the reference category was dyads in which both parents were high on the construct.

For each parent construct, I expected that dissimilar dyads in which parents were  
different on the construct were less likely to form friendships than the similar dyads in

which both of the parents were high or low on the construct. Thus, the sets of dummy variables for parental dissimilarities for all constructs (parental SES, parental involvement, parental educational aspirations for youths, parents choosing neighborhood because of school, parental smoking and drinking, and parental monitoring) should be negative in sign because I used the high-high construct as the reference group.

My expectations for the contrast of the category in which both parents were low on the construct depended on the characteristic. I expected that dyads in which both parents have a positive characteristic (parental SES, parental involvement, parental educational aspirations for youths, and parents choosing neighborhood because of school) would have a higher propensity to be friends than dyads in which both parents lacked these positive characteristics, because youths were encouraged to pick friends who had better family backgrounds. Thus, I expected that the sign of the “low-low” category should be negative for these constructs. I expected the reverse for the negatively oriented constructs (parental smoking and drinking); dyads in which both of the parents were low on the construct were more likely to form friendships than the reference group. Thus, the low-low dummy for the construct should be positive in sign for these constructs. For parent monitoring, I also expected a positive sign for the “low-low” category. For this construct, I anticipated that youths whose parents provided low monitoring had more freedom to make friends; thus, dyads in which both parents were low on parental monitoring were more likely to form friendships than dyads in which both parents were high on parental monitoring (the reference group).

The dyadic predictors for homophily were also coded to present whether one or both youths in the dyad scored high or low on prosocial behaviors. The reference

category was dyads in which both youths scored high on prosocial behaviors. Based on the basic principal of homophily, I expected that the coefficients of categories that captured dissimilar youths (high-low and low-high dummies) should be negative. Because prior research had indicated that prosocial youths had more school friends than antisocial youths, I also expected that youths in the “low-low” category – who were both antisocial – would be less likely to become friends than the reference group of youths who were both prosocial.

The dyadic propinquity predictors were coded depending on whether the youths lived in the same advantaged, same disadvantaged or different neighborhoods and have the same higher, same low or different school settings. The propinquity predictors should all have positive coefficients because I used youths who lived in different neighborhood and school settings as the reference group. In addition, I expected that whether the youths lived in the same advantaged neighborhood/from high-status local position had a larger positive coefficient than whether the youths lived in the same disadvantaged neighborhood/from low-status local position.

In Model C (see again Table 5.3), I estimated the overall associations between parent dyadic similarities and friendship pairings. The pattern of significance revealed four constructs associated with adolescent girls’ friendship pairings: SES, educational aspirations, drinking/smoking, and monitoring. As expected, the direction of the significant association was negative for SES and for educational aspirations for youths and positive for drinking/smoking and monitoring. The number of significant contrasts was also greater for SES and educational aspirations for youths than for drinking/smoking and monitoring. Specifically, pairs of girls in which either or both

parents were of low SES were less likely to be friends than pairs of girls whose parents were both of high SES. The odds ratios ranged from 0.661 to 0.785, indicating that the odds of friendships forming were about two-thirds lower in the former categories of girl pairs than in the latter.

Model D in Table 5.3 added the homophily mediator to Model C. As expected, the direction of all signs for homophily predictors was negative. This finding indicated that pairs of girls in which either or both were low in prosocial behaviors were less likely to be friends than pairs of girls who were both high in prosocial behaviors. The odds ratios range from 0.429 to 0.517, indicating that the odds of friendships forming were about half as likely in the former categories of girl pairs as in the latter.

The column (3) in Table 5.5 showed the relative changes of four significant construct coefficients between Model C and Model D. Comparisons of the relative changes in parental coefficients provided evidence in support of the mediating effect of homophily. The results indicated that one set of constructs (low-low SES, high-low and low-low educational aspirations for youths, low-low parental smoking and drinking, low-low monitoring) were mediated most by homophily because they not only showed a size reduction in the coefficients but also changed from significant to non-significant. For example, among those relative changes in column (3), the coefficient of parental low-low SES lost its significance and had sizable relative change of -68%. Of note, all significant contrasts between parental low-low and high-high constructs were mediated by homophily. These findings suggested that the association of high-high vs. low-low parental constructs was explained by youth homophily.

The remaining dummies in Table 5.5 (high-low SES and low-high SES) were less mediated by homophily as they remained significant in Model D and showed a smaller size change in the coefficient. This result indicated that a portion of the chances of friendship pairings for youth pairs whose parents had different SES levels relative to youth pairs whose parents were both high SES was not explained by the youths' similarity in prosocial behaviors.

Model E in Table 5.3 added the propinquity mediator to Model C. As expected, the directions of all signs for propinquity predictors were positive. This indicated that pairs of girls who lived in the same neighborhoods or in similar school local positions were more likely to be friends than pairs of girls who lived in different neighborhoods or were in less close school local positions. The odds ratios for neighborhood propinquity constructs ranged from 1.485 to 3.048, showing that the odds of friendships forming were about one and a half to three times higher in the latter categories of girl pairs than in the former. I also found that there was a much larger propinquity effect for girls living in the same advantaged neighborhood than girls living in the same disadvantaged neighborhood.

The odds ratios for school local position propinquity constructs ranged from 1.594 to 1.658, showing that the odds of friendships forming were about one and a half times higher in the latter categories of girl pairs than in the former category.

The column (5) in Table 5.5 showed the relative changes among the four significant construct coefficients from Model C to Model E. The comparisons of the relative changes of parental coefficients provided evidence in support of the mediating effect of propinquity. The results showed that low-low parental monitoring for youths were most mediated by propinquity than the other prior significant predictors in Model C ,



as its coefficient had a change of -16% and moved from significant to non-significant. This finding suggested that the association of high-high vs. low-low parental monitoring constructs was explained by youth propinquity.

In addition, comparing columns (3) and (5) in Table 5.5 showed that homophily (column 3) had a larger mediating effect on parenting predictors than did propinquity (column 5). This finding indicated that homophily predictors had a bigger contribution toward mediating parenting influences than propinquity predictors.

Model F in Table 5.3 added both homophily and propinquity mediators to Model C to examine the cumulative effects. The significance and the direction of signs of homophily and propinquity predictors in Model F had a pattern similar to that of Model D and Model E, in which I added each mediator separately to Model C. In the column (7) of Table 5.5, the relative changes in the coefficients of parental constructs indicated the cumulative mediator effects of column (3) and column (5). It suggested that homophily and propinquity largely captured distinct, rather than overlapping mediating pathways.

### a.3. Summary for Female-Female Same Race and Age Pairs

The above analyses indicated that the association between seven parental constructs and friendship pairings for same race and same age girls were mediated by homophily and propinquity predictors. The mediation size ranged from 29% to 78%. The results provided support for the mediation – and therefore fundamental influences – hypotheses. All categories of parental SES, high-low and low-low parental educational aspirations, low-low parental drinking/ smoking, and low-low parental monitoring affected friendship pairings. Five predictors were relatively more mediated by youth

homophily and propinquity than the other two. They were parental low-low SES, high-low and low-low parental educational aspirations, low-low parental drinking/ smoking, and low-low parental monitoring. As Model F indicated, by adding the homophily and propinquity mediators to Model C, those five predictors again had a reduction in coefficient size and lost their significance. In addition, the relative changes in Model D and Model E suggested that the association between parenting and girls' friendship pairings was mediated more by homophily than by propinquity.

b. Same Race and Age Male-Male Pairs

Table 5.6 presented the unconditional model and dyadic-level results of Models A–F for male-male pairs of the same race and age.

Table 5.6 Dyadic Level Mediating Models for Adolescent Boys' Friendship Pairings

Predictors			Model C		Model D		Model E		Model F	
			Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio
Intercept			-	0.0	-	0.0	-	0.0	-	0.0
			0.172		0.174		0.177		0.179	
Parenting Similarities	Parental Dyadic Level SES (Ref: High- High)	High- Low	-	0.7	-	0.7	-	0.7	-	0.7
			0.091		0.091		0.091		0.091	
		Low- High	-	0.7	-	0.7	-	0.7	-	0.7
			0.092		0.092		0.092		0.092	
		Low- Low	-	0.7	-0.134	0.8	-	0.8	-0.132	0.8
			0.098		0.099		0.098		0.099	
	Parental Dyadic Level Involvement (Ref: High- High)	High- Low	-	0.8	-	0.8	-	0.8	-	0.8
			0.087		0.088		0.088		0.088	
		Low- High	-	0.8	-0.153	0.8	-	0.8	-0.156	0.8
			0.088		0.088		0.088		0.088	
		Low- Low	-	0.7	-	0.8	-	0.7	-	0.7
			0.100		0.100		0.100		0.100	
	Parental Dyadic Level Educational Aspiration for the	High- Low	-	0.7	-0.186	0.8	-	0.7	-0.179	0.8
			0.107		0.108		0.107		0.108	
		Low- High	-0.153	0.8	-0.075	0.9	-0.149	0.8	-0.070	0.9
			0.106		0.107		0.106		0.107	
		Low- Low	-	0.6	-	0.7	-	0.6	-	0.7
			0.116		0.117		0.116		0.117	
	Parent choosing neighborhoo d because of school (Ref: Yes-Yes)	Yes- No	0.080	1.0	0.106	1.1	0.088	1.0	0.117	1.1
			0.093		0.093		0.093		0.093	
		No- Yes	0.055	1.0	0.087	1.0	0.063	1.0	0.097	1.1
			0.095		0.095		0.095		0.095	
		No-No	-0.040	0.9	0.013	1.0	-0.038	0.9	0.016	1.0
			0.102		0.102		0.102		0.102	
	Parental Dyadic Level Monitoring (Ref: High- High)	High- Low	0.130	1.1	0.109	1.1	0.110	1.1	0.090	1.0
			0.100		0.100		0.100		0.100	
		Low- High	0.202*	1.2	0.177	1.1	0.184	1.2	0.160	1.1
			0.099		0.099		0.099		0.099	
		Low- Low	0.238*	1.2	0.190	1.2	0.203*	1.2	0.156	1.1
			0.104		0.103		0.103		0.103	

Table 5.6 Dyadic Level Mediating Models for Adolescent Boys' Friendship Pairings

(Continued)

Predictors			Model C		Model D		Model E		Model F	
			Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio
Parenting Similarities	Parental Dyadic Level Smoking and Drinking	High-Low	-	0.9	-0.078	0.9	-	0.9	-0.069	0.9
			0.10		0.101		0.101		0.101	
		Low-High	-	0.8	-0.162	0.8	-	0.8	-0.154	0.8
			0.10		0.105		0.105		0.105	
		Low-Low	-	0.9	-0.175	0.8	-	0.8	-0.180	0.8
			0.12		0.120		0.120		0.120	
Homophily	Youths' Dyadic Level Prosocial- Antisocial Dichotomy	Prosocial- Antisocial			-	0.4			-	0.4
					0.091				0.091	
		Antisocial- Prosocial			-	0.4			-	0.4
					0.093				0.093	
		Antisocial- Antisocial			-	0.6			-	0.6
					0.100				0.099	
Neighborhood Propinquity	Youths' Neighborhoods (Ref: Different)	Same Disadvantage					0.536	1.7	0.542*	1.7
							0.085		0.085	
		Same Advantage					1.228	3.4	1.238*	3.4
							0.112		0.112	
School Local Position Propinquity	Youths' School Local Positions (Ref: Different)	Similarly High-					0.211	1.2	0.165*	1.1
							0.083		0.083	
		Similarly Low-Status					0.283	1.3	0.280*	1.3
							0.076		0.076	
Nominator-Level Variance			0.378		0.362		0.369		0.351	
Nominee-Level Variance			0.328		0.321		0.319		0.312	
N (Adolescents)			1242		1242		1242		1242	
N (Pairs)			135032		135032		135032		135032	
Unconditional Model	Nominator-Level		0.999							
	Nominee-Level		0.652							
Minimal Controls	Nominator-Level		0.407							
	Nominee-Level		0.344							
Note : ** p<0.001 * p<0.05 one-side test										
High-Low: Higher level nominator with lower level nominee; Low-High: Lower level nominator with higher level nominee; Low-Low: Lower level nominator with lower level nominee; High-High (reference group): Higher level nominator with higher level nominee.										

## b.1. Relative Variance Changes

The nominator and nominee variances and their relative changes as different sets of predictors were added to the model and presented in Table 5.7.

Table 5.7 Relative Variance Changes for Dyadic Level Mediating Models for Adolescent

Boys

Models	Nominator-Level		Nominee-Level	
	Variance	Relative Changes Compared to the	Variance	Relative Changes Compared to the
Model A (Unconditional Model)	0.999	--	0.652	--
Model B (Minimal Control Model)	0.407	-59% <sup>a</sup>	0.344	-47% <sup>a</sup>
Model C (Parental Influence Model)	0.378	-7% <sup>b</sup>	0.328	-5% <sup>b</sup>
Model D (Homophily Mediators)	0.362	-11% <sup>b</sup>	0.321	-7% <sup>b</sup>
Model E (Propinquity Mediators)	0.369	-9% <sup>b</sup>	0.319	-7% <sup>b</sup>
Model F (Homophily and Propinquity)	0.351	-14% <sup>b</sup>	0.312	-9% <sup>b</sup>
Note: <sup>a</sup> The equation for the relative change calculation is (current model variance-Model A variance)/Model A variance.				

I presented the fundamental influences on the dyadic level for adolescent boys in the same way as I did for adolescent girls because of the same modeling logic. Table 5.7 showed that nominators' variance itself was larger than nominees (.999 vs. .652). It indicated that sending-network was larger than receiving network. It was similar to girls' network and fitted in what I expected that boys were also different in their popularities. Thus, some of them received more nominations than others. The comparison of the unconditional model (Model A) to minimal controls model (Model B) showed that adding minimal controls offset 59% and 47% of the variance for nominators and nominees.

I next examined the relative variance changes from Model B to the remaining Models C–F. As I added different sets of covariates to Model B, the variances for the nominator were reduced by 7% (Model C), 11% (Model D), 9% (Model E), and 14%

(Model F). The nominees' variances were decreased by 5% in Model C, 7% in Model D, 7% in Model E, and 9% in Model F.

Table 5.7 showed that the amount of reduction in the nominators' variance was relatively higher than in the nominees' variances. This finding suggested that the added covariates explained more of the nominators' variance than the nominees' variance. In this way, the findings were different to adolescent girls. For the girls, the nominee variance was reduced more than nominator variance after adding set of covariates. It indicated that the homophily, propinquity and parental similarities explained more of nominees' variance for adolescent girls. On the contrary, for adolescent boys, they explained more of nominators' variance.

Another key finding concerned the contribution of the set of predictors. The comparison of Model D's variances with Model E's variances showed that homophily predictors did a better job in terms of variance reduction than propinquity predictors at the nominator level (e.g., 11% vs. 9% for the variance reduction of nominators). At the nominee level, homophily predictors were almost the same as propinquity predictors in terms of variance reduction (e.g., 7% variance reduction of nominees). The difference of reduction for homophily covariates and propinquity covariates also indicated that if mediating effects exists, homophily predictors will make a bigger contribution toward mediating parenting influences than propinquity predictors for male pairs, which was similar to the finding of female pairs.

#### b.2. The Magnitude of Coefficients and Their Significance

I next examined the coefficients and their significance across Models C–F. In Table 5.6, I presented both coefficients and odds ratios to facilitate interpretation. Table 5.8 listed the relative changes of coefficients from Table 5.6 to facilitate the interpretations. In Section a.1, I discussed my expectations for the direction of the coefficients. In this section, I examined model results to determine whether these expectations were fulfilled.

Table 5.8 Relative Coefficient Changes for Dyadic Level Mediating Models for  
Adolescent Boys

Predictors			Model	Model D		Model E		Model F	
			Coef (1)	Coef (2)	Relative Change	Coef (4)	Relative Change	Coef (6)	Relative Change
Parenting Similarities	Parental Dyadic Level SES (Ref: High-High)	High-	-	-	-15%	-	-4%	-	-18%
		Low-	-	-	-20%	-	-4%	-	-23%
		Low-	-0.224*	-0.134	-40%	-	-2%	-0.132	-41%
	Parental Dyadic Level Involvement	High-	-0.212*	-	-14%	-	0%	-	-12%
		Low-	-0.191*	-0.153	-20%	-	-1%	-0.156	-18%
		Low-	-0.275*	-	-21%	-	3%	-	-16%
	Parental Dyadic Level Educational	High-	-0.260*	-0.186	-28%	-	-2%	-0.179	-31%
		Low-	-0.153	-0.075	--	-0.149	--	-0.070	--
		Low-	-	-	-24%	-	-4%	-	-28%
	Parent choosing neighborhood because of	Yes-No	0.080	0.106	--	0.088	--	0.117	--
		No-Yes	0.055	0.087	--	0.063	--	0.097	--
		No-No	-0.040	0.013	--	-0.038	--	0.016	--
	Parental Dyadic Level Monitoring	High-	0.130	0.109	--	0.110	--	0.090	--
		Low-	0.202*	0.177	-12%	0.184	-9%	0.160	-21%
		Low-	0.238*	0.190	-20%	0.203*	-15%	0.156	-35%
	Parental Dyadic Level Smoking and Drinking	High-	-0.045	-0.078	--	-0.039	--	-0.069	--
		Low-	-0.124	-0.162	--	-0.120	--	-0.154	--
		Low-	-0.100	-0.175	--	-0.111	--	-0.180	--

Note : \*\* p<0.001 \* p<0.05 one-side test  
High-Low: Higher level nominator with lower level nominee; Low-High: Lower level nominator with higher level nominee; Low-Low: Lower level nominator with lower level nominee; High-High (reference group): Higher level nominator with higher level nominee. The relative changes were for the comparison of the current model with Model C and only calculated when the coefficient in Model C is significant.  
The relative changes are calculated by (current model's coefficient-Model C's

In Model C of Table 5.6, I estimated the overall associations between parent dyadic similarities and friendship pairings. The pattern of significance which was listed in Table 5.8 revealed four constructs associated with adolescent boys' friendship pairings: SES, parental involvement, parental educational aspirations for the youths, and parental monitoring. Compared with Adolescent girls' model, parental involvement was a newer covariate showing significance. Parental drinking and smoking lost its significant in boys.



As expected, the direction of the significant association was negative for SES, involvement, and educational aspirations for youths and positive for monitoring. The number of significant contrasts was also greater for SES and involvement than for educational aspirations for youths and monitoring. Specifically, pairs of boys in which either or both parents were of low SES were less likely to be friends than pairs of boys whose parents were both of high SES. The odds ratios ranged from 0.725 to 0.799, indicating that the odds of friendships forming were more than one-fifth lower in the former categories of boy pairs than in the latter.

Model D (again see Table 5.6) added the homophily mediator to Model C. As expected, all signs for homophily predictors were negative. Pairs of boys in which either or both were low in prosocial behaviors were less likely to be friends than pairs of boys who were both high in prosocial behaviors. The odds ratios ranged from 0.471 to 0.608, indicating that the odds of friendships forming were about half to two-fifths lower in the former categories of boy pairs than in the latter.

Column (3) in Model D in Table 5.8 showed the relative changes of 10 significant coefficients from Model C to Model D. Comparisons of the relative changes in parental coefficients provided evidence supporting the mediating effect of homophily. The results indicated that five of 10 constructs (low-low SES, low-high involvement, high-low educational aspirations for youths, low-high and low-low monitoring) were mediated most by homophily because they not only showed a size reduction in the coefficients but also changed from significant to non-significant. For example, among those relative changes in column (3), the coefficient of parental low-low SES lost its significance and had a sizable relative change of -40%. The pattern of the significance and size changes in

Model D for adolescent boy was similar to the change of adolescent girls. The only two differences were parental involvement and parental smoking and drinking. For adolescent girls, there was no significant association between parental involvement and friendship pairings but one significant association between parental smoking and drinking and friendship pairings. For adolescent boys, the association of parental involvement existed and was mediated by homophily. The association of parental drinking and smoking disappears. The finding indicated a significant and sizable change of low-high parental involvement. The coefficient lost its significance and about 20% of it was mediated by homophily. In short, the significant contrasts between parental low-high and high-high involvement were mediated by homophily.

The remaining dummies in Table 5.6 (high-low SES and low-high SES, high-low and low-low parental involvement, low-low parental educational aspirations) were less mediated by homophily as they remained significant in Model D and showed a smaller size change in the coefficient. This result indicated that a portion of the chances of friendship pairings for youth pairs whose parents had different SES levels relative to youth pairs whose parents were both high SES was not explained by youths' similarity in prosocial behaviors. Similarly, the portion of the association between friendship pairings and youth pairs whose nominee's parent had low level involvement/educational aspirations relative to youths pairs whose parents were both have high level involvement/educational aspirations can't be explained by youths' similarity in prosocial behaviors.

Model E in Table 5.6 added the propinquity mediator to Model C. The finding was similar to what I found in the adolescent girls' Model E (see Table 5.3). As expected,

all signs for propinquity predictors were positive. Pairs of boys who lived in the same neighborhood or were in similar school local positions were more likely to be friends than pairs of boys who lived in different neighborhoods or were in less close school local positions. Similar to adolescent girls, the odds ratios for neighborhood propinquity constructs for adolescent boys was the same neighborhood were much higher than in the different neighborhoods (odds ratios ranging from 1.709 to 3.414) and living in the advantaged neighborhood boys were more likely to form friends than boys living in the disadvantaged neighborhood. The odds ratios for the school local position propinquity constructs ranged from 1.235 to 1.328, showing that the odds of friendships forming were about 1.3 times higher in the latter categories of boy pairs than in the former category.

Column (5) of Model E in Table 5.8 showed the relative changes of 10 significant construct coefficients from Model C to Model E. Comparisons of the relative changes of parental coefficients provided evidence in support of the mediating effect of propinquity. The results showed that the coefficient of low-high parental monitoring of youths was most mediated by propinquity; there was a -9% change in the coefficient, and it moved from significant to non-significant (low-low parental monitoring had a -15% change in the coefficient but it did not lose significance). This finding suggested that the influence that the low-high and low-low parental constructs had on friendship pairings was mediated by propinquity. The remaining nine significant coefficients in column (5) were less mediated by propinquity as they remained significant in Model E and showed a smaller size change in the coefficient.

A comparison of the magnitude of Model D's relative changes with Model E's relative changes in Table 5.8 indicated that parenting predictors were mediated more by

homophily than by propinquity. This finding confirmed the discussion of variance reduction in Table 5.7 that homophily predictors made a bigger contribution toward mediating parenting influences than propinquity predictors. This result is true both for boys and for girls.

Model F added both homophily and propinquity mediators to Model C to examine the cumulative effects. The significance and the direction of signs of homophily and propinquity predictors in Model F had a pattern similar to those of Model D and E, in which I added each mediator separately to Model C. Column (7) showed the cumulative mediation effect of homophily and propinquity. Similar to adolescent girls, the finding suggested that homophily and propinquity generally captured distinct rather than overlapping mediating pathway.

### b.3. Summary for Male-Male Same Race and Age Pairs

The analyses reported above indicated that the association between 10 parental predictors and same race/age adolescent boys' friendship pairings were mediated by homophily and propinquity predictors. The mediation size ranged from 12% to 41%, supporting the fundamental influences hypotheses. Parental SES, parental involvement, high-low and low-low parental educational aspirations for youths, and low-high and low-low monitoring influenced homophily and propinquity so as to affect friendship pairings. The following five dummies had a relatively bigger impact than the other five dummies: parental low-low SES, low-high involvement, high-low and low-low educational aspiration on youths, and low-low monitoring. As Model F indicated, those predictors not only had a coefficient size reduction, but they also lost their significance. In addition, the

relative changes in Model D and Model E suggested that the association between parenting and boys' friendship pairings was mediated more by homophily than by propinquity.

Recalling the earlier discussion of adolescent girls, there were some similar patterns that I found for adolescent boys. First of all, the mediation effects existed across gender groups. The models for girl pairs and boy pairs indicated that homophily and propinquity mediated some of parental coefficients on their significance and magnitudes. Second, homophily had a relative larger mediation effect than propinquity for both gender groups.

There were some unique findings for boys and girls. For example, homophily, propinquity and parental similarities explained more of nominees' variance for adolescent girls. On the contrary, for adolescent boys, they explained more of nominators' variance. In addition, five of seven parental variables lost their significance and size change was up to 68% in the Model D for adolescent girls. For adolescent boys, four of ten parental predictors were mediated by homophily in the Model D and the size change was up to 40%. Low-low educational aspirations and low-low smoking and drinking were significant in Model C across gender groups. But they were only mediated by homophily in adolescent girls' model. In other words, the evidence indicated that the gender differences existed for homophily models as parental variables were mediated more in the girls' model than in the boys' model.

## 2. Individual-Level Models

The dyadic-level models showed how parents' similarities affect youths' similarities and thus influence friendship pairings. The individual-level models help explain how the characteristics of nominators' parents and nominees' parents differently affect the way that homophily and propinquity influence friendship pairings.

### a. Same Race and Age Female-Female Pairs

Table 5.9 presented the unconditional model, the minimal control model and individual-level model results of Models A–F for female-female pairs of the same race and age.

Table 5.9 Individual Level Mediating Models for Adolescent Girls' Friendship Pairings

Predictors			Model C		Model D		Model E		Model F	
			Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio
Intercept			-	0.009	-4.086**	0.017	-5.046**	0.006	-	0.011
			0.143		0.151		0.149		0.157	
Level-2 Parenting	Nominator	Parental SES is High	0.106	1.111	0.024	1.024	0.090	1.094	0.012	1.012
			0.077		0.078		0.077		0.078	
		Parental Involvement is High	0.056	1.057	0.000	1.000	0.060	1.062	0.007	1.007
			0.074		0.074		0.073		0.074	
		Parental Educational Aspiration for adolescents	0.063	1.065	0.015	1.015	0.056	1.058	0.010	1.010
			0.082		0.082		0.082		0.082	
		Parent choosing neighborhood because of	-0.005	0.995	-0.027	0.973	-0.012	0.988	-0.033	0.968
			0.073		0.073		0.073		0.073	
	Nominee	Parental Monitoring is High	-0.096	0.909	-0.043	0.957	-0.077	0.926	-0.026	0.974
			0.077		0.077		0.077		0.077	
		Parental Smoking and Drinking is High	-0.164	0.849	-0.095	0.909	-0.173*	0.841	-0.106	0.899
			0.088		0.088		0.088		0.088	
		Parental SES is High	0.129	1.138	0.115	1.122	0.084	1.088	0.068	1.070
			0.088		0.087		0.087		0.087	
		Parental Involvement is High	-0.007	0.993	-0.069	0.933	-0.004	0.996	-0.062	0.940
			0.066		0.066		0.066		0.066	
		Parental Educational Aspiration for adolescents	0.156*	1.168	0.100	1.105	0.147*	1.158	0.093	1.097
			0.073		0.073		0.073		0.073	
		Parent choosing neighborhood because of	0.164*	1.178	0.151*	1.163	0.162*	1.176	0.150*	1.162
			0.066		0.065		0.066		0.065	
		Parental Monitoring is High	-	0.859	-0.104	0.901	-0.135	0.873	-0.087	0.917
			0.070		0.070		0.070		0.070	
		Parental Smoking and Drinking is High	-	0.836	-0.115	0.892	-0.193*	0.824	-0.13	0.878
			0.08		0.079		0.08		0.079	

Table 5.9 Individual Level Mediating Models for Adolescent Girls' Friendship Pairings

(Continued)

Predictors			Model C		Model D		Model E		Model F	
			Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio
Level-1 Homophily	Youths' Dyadic Level Prosocial- Antisocial Dichotomy classification	Prosocial- Antisocial			-	0.422			-0.837	0.433
					0.090				0.090	
		Antisocial- Prosocial			-	0.424			-0.836	0.434
					0.096				0.096	
		Antisocial- Antisocial			-	0.526			-0.613	0.542
					0.099				0.098	
Level-1 Neighborhood Proximity	Youths' Neighborhoods (Ref: Different Proximity)	Same Disadvantage					0.384**	1.468	0.411	1.508
							0.099		0.099	
		Same Advantage					1.129**	3.093	1.105	3.020
							0.104		0.104	
Level-1 School Local Position Proximity	Youths' School Local Positions (Ref: Different Proximity)	Similarly High-					0.496**	1.642	0.481	1.617
							0.081		0.080	
		Similarly Low-Status					0.467**	1.596	0.430	1.538
							0.082		0.082	
Nominator-Level Variance			0.417		0.394		0.406		0.384	
Nominee-Level Variance			0.219		0.189		0.208		0.178	
N (Adolescents)			1,150		1,150		1,150		1,150	
N (Pairs)			105,668		105,668		105,668		105,668	
Unconditional Model	Nominator-Level		0.933							
	Nominee-Level Variance		0.418							
Minimal Controls	Nominator-Level		0.430							
	Nominee-Level Variance		0.241							
Note : ** p<0.001 * p<0.05 one-side test										
School fixed affects and family structure were centered and included as the minimal controls for Model										

## a.1. Relative Variance Changes

The nominator and nominee variances and their relative changes as different sets of predictors were added to the model were presented in Table 5.10. Because unconditional model (Model A) and minimal control model (Model B) had the same data structure in dyadic level models (Table 5.3) as in individual level models (Table 5.9), the



results of variance were identical. The minimal controls model (Model B) in Table 5.10 offsets 54% and 42% of the variance for nominators and nominees, respectively.

I next examined the relative variance changes from Model B to the remaining Models C–F. As I added different sets of covariates to Model B, the size of the reductions in the nominator variances was as follows: 3% (Model C), 8% (Model D), 6% (Model E), and 11% (Model F). The nominee variances were decreased by 9% in Model C, 22% in Model D, 14% in Model E, and 16% in Model F. Those reductions were smaller than what I found in Table 5.4. It suggested that dyadic level parental covariates explained more variance for nominators and nominees than individual level parental covariates.

Table 5.10 Relative Variance Changes for Individual Level Mediating Models for Adolescent Girls

Models	Nominator-Level		Nominee-Level	
	Variance	Relative Changes Compared to the	Variance	Relative Changes Compared to the
Model A (Unconditional Model)	0.933	--	0.418	--
Model B (Minimal Control Model)	0.430	-54% <sup>a</sup>	0.241	-42% <sup>a</sup>
Model C (Parental Influence Model)	0.417	-3% <sup>b</sup>	0.219	-9% <sup>b</sup>
Model D (Homophily Mediators)	0.394	-8% <sup>b</sup>	0.189	-22% <sup>b</sup>
Model E (Propinquity Mediators)	0.406	-6% <sup>b</sup>	0.208	-14% <sup>b</sup>
Model F (Homophily and Propinquity)	0.384	-11% <sup>b</sup>	0.178	-16% <sup>b</sup>
Note: <sup>a</sup> The equation for the relative change calculation is (model variance-Model A variance)/Model A variance.				

A key finding from Table 5.10 was that the amount of reduction in the nominee variances was relatively higher than the nominator variances for girls. It was similar to what I found at dyadic level models (Table 5.4). This suggested that – for girls -- the addition of nominees’ parental covariates explained more of the variance than the addition of nominators’ parental covariates. The second finding concerned the contribution of the set of predictors. A comparison of Model D’s variances with Model

E's variances showed that the homophily predictors did a better job in terms of variance reduction than propinquity predictors (e.g., 8% vs. 6% for the variance reduction of nominators; 22% vs. 14% for the variance reduction of nominees). The difference in the reduction of homophily covariates and propinquity covariates also indicated that if mediating effects exists, homophily predictors will make a bigger contribution toward mediating nominee parental influences than will propinquity predictors, which was similar to what I found for the dyadic models.

#### a.2. The Magnitude of Coefficients and Their Significance

I next examined the coefficients and their significance across Models C–F in Table 5.9, where I presented both coefficients and odds ratios to facilitate interpretation. Table 5.11 listed the relative changes of coefficients from Table 5.9 to facilitate the interpretations. I first discussed my expectation on the direction of coefficients and second indicated if my hypotheses were supported.

Table 5.11 Relative Coefficient Changes for Individual Level Mediating Models for Adolescent Girls

Predictors		Model	Model D		Model E		Model F	
		Coef (1)	Coef (2)	Relative Change	Coef (4)	Relative Change	Coef (6)	Relative Change
Nominator	Parental SES is High	0.106	0.024	--	0.090	--	0.012	--
	Parental Involvement is High	0.056	0.000	--	0.060	--	0.007	--
	Parental Educational Aspiration for	0.063	0.015	--	0.056	--	0.010	--
	Parent choosing neighborhood because of	-0.005	-0.027	--	-0.012	--	-0.033	--
	Parental Monitoring is High	-0.096	-0.043	--	-0.077	--	-0.026	--
	Parental Smoking and Drinking is High	-0.164	-0.095	--	-0.173	--	-0.106	--
Nominee	Parental SES is High	0.129	0.115	--	0.084	--	0.068	--
	Parental Involvement is High	-0.007	-0.069	--	-0.004	--	-0.062	--
	Parental Educational Aspiration for	0.156*	0.100	-36%	0.147	-6%	0.093	-41%
	Parent choosing neighborhood because of	0.164*	0.151	-8%	0.162	-1%	0.150	-9%
	Parental Monitoring is High	-	-0.104	-32%	-0.135	-11%	-0.087	-43%
	Parental Smoking and Drinking is High	-	-0.115	-36%	-	8%	-0.13	-27%
<p>Note : ** p&lt;0.001 * p&lt;0.05 one-side test</p> <p>The relative changes were for the comparison of the current model with Model C and only calculated when the coefficient in Model C is significant.</p> <p>The relative changes are calculated by (current model's coefficient-Model C's coefficients)/Model C's coefficient</p>								

The individual-level predictors in these models were primarily coded to represent whether parents were high on each measure. In each case, the reference category was the nominators or nominees' parents being low on the construct.

I expected that youths with positive parental characteristics (parental SES, involvement, parental educational aspirations, and parents choosing neighborhood because of school) had a higher propensity to be nominated by others than youths with parent who lacked such positive characteristics. This was likely because youths were encouraged to pick friends from positive oriented family backgrounds or because youths were more popular when they were raised by parents with positive parental characteristics. Thus, I expected the sign for these constructs should be positive. Of the

negatively oriented constructs (parental smoking and drinking), I expected the converse: youths who were high on these measures were less likely to form friendships than the reference group; and, the signs for their coefficients should be negative. In terms of parental monitoring, I expected that youths with closer monitoring had less freedom to choose friends than those with less parental monitoring. Thus, I expected that youths with high-monitoring parents were less likely to form friendships than the reference group. The sign should be negative.

In Model C (see again Table 5.9), I estimated the overall associations between nominators/nominees' parental variables and friendship pairings. Only the parental characteristics of the nominees matter for friendship pairings. Girls' propensities to nominate friends were not related to their parents' characteristics, but their chances to be nominated were partly influenced by their parents. The pattern of significance revealed four nominee covariates associated with adolescent girls' friendship pairings: educational aspirations, neighborhood choice because of school, drinking/smoking, and monitoring. As expected, the direction of the significant associations was positive for educational aspirations and for neighborhood choice because of school, and negative for drinking/smoking and monitoring. The odds ratios for educational aspirations and for neighborhood choice because of school were 1.17 and 1.18, respectively, indicating that the odds of friendships forming were about one-fifth higher in the former categories of girl pairs than in the reference group. The odds ratios for drinking/smoking and monitoring were 0.84 and 0.86, respectively, indicating that the odds of friendships forming were about one-fourth lower in the former categories of girl pairs than in the latter.

Model D in Table 5.9 added homophily mediators to Model C. It was similar to what I did in Table 5.3. The results of homophily predictors were also similar to what I found at Table 5.3 in that the odds of friendships forming were about half as low in the dissimilar girl pairs as in the similar girl pairs.

Column (3) of Table 5.11 also showed the relative changes of four significant individual level coefficients from Model C to Model D. Comparisons of the relative changes in nominator and nominee's parental coefficients provided evidence in support of the mediating effect of homophily on parental variables. The results indicated that one set of nominee variables (parental educational aspiration is high, parental drinking/smoking is high and monitoring is high) were mediated most by homophily as they not only showed a size reduction in the coefficients but also changed from significant to non-significant. That was, among those relative changes in Model D, the coefficients of educational aspirations, drinking/smoking, and monitoring lost their significance and had an obvious change of more than 30%. In contrast, parental choosing neighborhood because of school remained significant in Model D and decreased by just 8%. This result indicated that regardless of whether youths were similar or not in their prosocial behaviors, parental choosing neighborhood because of school for nominees impacted their likelihood to be nominated as a friend.

Compared with Column (3) of Table 5.5 where the coefficient of low-low parental SES lost its significance and had a sizable relative change of -68%, it is surprisingly that the coefficients of parental SES were not significant predictors for both nominators and nominees. The results indicated that the level of parental SES wasn't associated with the propensities of adolescent girls to nominate or to be nominated by

others. However, the similarities of parental SES were correlated with friendship pairings and the association of high-high vs. low-low parental SES was mediated by youth homophily.

Model E in Table 5.9 added the propinquity mediator to Model C. The direction of signs and magnitude of odds ratios of the propinquity predictors in the individual model were similar to what I found in dyadic level models (see Table 5.3). Column (5) of Table 5.11 showed the relative changes of four significant construct coefficients from Model C to Model E. Comparisons of the relative changes in nominees' coefficients provided evidence in support of the mediating effect of propinquity on monitoring. The coefficient for closer parental monitoring of nominees changed by -11% and moved from significant to non-significant, meaning that it was more mediated by propinquity than other prior significant predictors in Model C. This finding was consistent with what I found in the dyadic level model. Column (5) of Table 5.5 indicated that the association of the high-high vs. low-low parental monitoring categories was explained by youth propinquity. Beyond the high-high monitoring similarities, the individual model explained that closer nominee parental monitoring mattered more than closer nominator parental monitoring. Nominee parental monitoring was mediated by youth propinquity.

Model F added both homophily and propinquity mediators to Model C to examine the cumulative effects. The significance and the direction of signs of homophily and propinquity predictors in Model F had a pattern similar to that of Models D and E, where I add each mediator separately to Model C. The column (7) of Table 5.11 showed that the effects of homophily and propinquity were generally additive, showing that

(similar to Table 5.5) there were distinct pathways for homophily and propinquity to mediate parental influences.

### a.3. Summary for Female-Female Same Race and Age Pairs

The analyses above indicated that there were no mediation effects for nominators' parental characteristics because they were not significantly associated with friendship pairings. However, associations between nominees' parental characteristics and friendship pairings existed and were mediated by homophily and propinquity predictors. The mediation size ranged from 9% to 43%, supporting the fundamental influences hypotheses. Nominees' parental educational aspirations, neighborhood choice, drinking/smoking, and monitoring influence homophily and propinquity and, in turn, affected friendship pairings. Parental educational aspirations, drinking/smoking, and monitoring were mediated more as not only did their coefficients experience size reductions of 41%, 27%, and 43%, respectively, but they also lost their significance. In addition, the relative changes in Model D and Model E suggested that the association between nominees' characteristics and friendship pairings was mediated more by homophily than by propinquity.

As I stepped back to compare the dyadic level model with the individual level, some findings from Table 5.9 were consistent with Table 5.3. For example, for variance reduction homophily had a bigger contribution than propinquity to both dyadic level and individual level models. In terms of additive effects, I observed distinct mediating pathways for homophily and propinquity in Column (7) of both Tables. The consistency of

findings also included the same predictors that were mediated by homophily and propinquity across individual and dyadic level models.

Regardless of the similarities finding between dyadic level models and individual level models, there were some differences between those models. First of all, individual level parental covariates explained less variance of nominators and nominees than dyadic level parental covariates (see Table 5.10 vs. Table 5.4). This result suggested that fundamental influences of parents operated more from their dyadic level measures than individual level measures of parental variables. In other words, parental homophily was more influential than nominators and nominees' individual levels of parental characteristics in fundamentally affecting friendship pairings. Second, individual models for the adolescent girls indicated the different influences of nominator and nominee variables (see Table 5.11). For the adolescent girls, nominee's parental characteristics were more significant to predict friendship nomination than nominator's parental characteristics as none of girl nominators' parental characteristics were associated with friendship nomination. Third and last, individual level models extended the understanding of the predictors in the different dimensions. For example, parental SES on dyadic level was a significant predictor for friendship pairings. (See Table 5.3) The non-significances of parental SES in the individual level indicated that higher or lower parental SES were not associated with friendship pairings. (See Table 5.9) It was only an effective predictors when nominators and nominees' parental were similar in their SES level. Similarly, parent choosing neighborhood because of school was significant for nominee to be nominated. But whether parents were similar on this behavior wasn't associated with friendship pairings.



b. Same Race and Age Male-Male Pairs

Table 5.12 presented the unconditional model, the minimal control model and individual-level model results of Models A–F for male-male pairs of the same race and age.

Table 5.12 Individual Level Mediating Models for Adolescent Boys' Friendship Pairings

Predictors			Model C		Model D		Model E		Model F	
			Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio
Intercept			-	0.005	-	0.009	-5.599**	0.004	-	0.006
			0.146		0.157		0.151		0.162	
Level-2 Parenting	Nominator	Parental SES is High	0.128	1.137	0.074	1.076	0.127	1.136	0.074	1.077
			0.073		0.074		0.073		0.073	
		Parental Involvement is High	0.132	1.141	0.100	1.105	0.136	1.146	0.107	1.112
			0.071		0.071		0.071		0.071	
		Parental Educational Aspiration for	0.167*	1.182	0.115	1.122	0.158	1.171	0.106	1.111
			0.083		0.083		0.083		0.083	
		Parent choosing neighborhood because of	0.044	1.045	0.015	1.015	0.043	1.044	0.014	1.014
			0.071		0.071		0.071		0.071	
		Parental Monitoring is High	-0.153*	0.858	-0.126	0.881	-0.136	0.873	-0.11	0.896
			0.073		0.073		0.073		0.073	
		Parental Smoking and Drinking is High	0.086	1.090	0.127	1.135	0.094	1.098	0.130	1.139
			0.086		0.086		0.086		0.086	
	Nominee	Parental SES is High	-0.042	0.959	-0.036	0.965	-0.062	0.94	-0.055	0.946
			0.080		0.080		0.08		0.080	
		Parental Involvement is High	0.153*	1.166	0.125	1.134	0.157*	1.17	0.133	1.142
			0.070		0.070		0.07		0.070	
		Parental Educational Aspiration for	0.291**	1.338	0.239*	1.269	0.281**	1.324	0.229*	1.257
			0.081		0.081		0.081		0.081	
		Parent choosing neighborhood because of	0.007	1.007	-0.014	0.986	0.006	1.006	-0.015	0.985
			0.070		0.070		0.07		0.070	
		Parental Monitoring is High	-0.082	0.921	-0.058	0.944	-0.064	0.938	0.040	0.961
			0.071		0.071		0.071		0.071	
		Parental Smoking and Drinking is High	0.006	1.007	0.044	1.045	0.011	1.011	0.046	1.047
			0.084		0.084		0.084		0.084	

Table 5.12 Individual Level Mediating Models for Adolescent Boys' Friendship Pairings

(Continued)

Predictors			Model C		Model D		Model E		Model F	
			Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio	Coef (SE)	Odd Ratio
Level-1 Homophily	Youths' Dyadic Level Prosocial- Antisocial Dichotomy classification	Prosocial- Antisocial			-	0.466			-0.764**	0.466
					0.091				0.091	
		Antisocial- Prosocial			-	0.443			-0.817**	0.442
					0.093				0.093	
		Antisocial- Antisocial			-	0.607			-0.496**	0.609
				0.099				0.099		
Level-1 Neighborhood Proximity	Youths' Neighborhoods (Ref: Different Proximity)	Same Disadvantage					0.533**	1.704	0.539**	1.714
							0.085		0.085	
		Same Advantage					1.237**	3.445	1.245**	3.474
							0.112		0.112	
Level-1 School Local Position Proximity	Youths' School Local Positions (Ref: Different Proximity)	Similarly High-					0.213*	1.237	0.166*	1.180
							0.083		0.083	
		Similarly Low-Status					0.289**	1.334	0.283**	1.328
							0.076		0.076	
Nominator-Level Variance			0.378		0.363		0.368		0.351	
Nominee-Level Variance			0.329		0.318		0.322		0.310	
N (Adolescents)			1242		1242		1242		1242	
N (Pairs)			135032		135032		135032		135032	
Unconditional Model	Nominator-Level		0.999							
	Nominee-Level Variance		0.652							
Minimal Controls	Nominator-Level		0.407							
	Nominee-Level Variance		0.344							
Note : ** p<0.001 * p<0.05 one-side test										
School fixed affects and family structure were centered and included as the minimal controls for Model										

## b.1. Relative Variance Changes

In Table 5.13 I presented the nominator and nominee variances and their relative changes as different sets of predictors were added to the model.

Table 5.13 Relative Variance Changes for Individual Level Mediating Models for  
Adolescent Boys

Models	Nominator-Level		Nominee-Level	
	Variance	Relative Changes Compared to the	Variance	Relative Changes Compared to the
Model A (Unconditional Model)	0.999	--	0.652	--
Model B (Minimal Control Model)	0.407	-59% <sup>a</sup>	0.344	-47% <sup>a</sup>
Model C (Parental Influence Model)	0.378	-7% <sup>b</sup>	0.329	-4% <sup>b</sup>
Model D (Homophily Mediators)	0.363	-11% <sup>b</sup>	0.318	-8% <sup>b</sup>
Model E (Propinquity Mediators)	0.368	-10% <sup>b</sup>	0.322	-6% <sup>b</sup>
Model F (Homophily and Propinquity)	0.351	-14% <sup>b</sup>	0.310	-10% <sup>b</sup>
Note: <sup>a</sup> The equation for the relative change calculation is (model variance-Model A variance)/Model A variance.				

The comparison of the unconditional model (Model A) to the minimal controls model (Model B) showed that adding minimal controls offset 59% and 47% of the variance for nominators and nominees, respectively. It was identical to the finding in Table 5.7 because Model A and Model B were with the same data structure across dyadic level models and individual level models.

I next examined the relative variance changes from Model B to the remaining Models C–F. As I added different sets of covariates to Model B, the variances for the nominator were reduced by 7% (Model C), 11% (Model D), 10% (Model E), and 14% (Model F). The nominee's variances were decreased by 4% in Model C, 8% in Model D, 6% in Model E, and 10% in Model F. The variance reduction results of the individual models were close to dyadic level model (Table 5.7) which suggested that individual level parental variables had similar explanation power as the dyadic level parental variables for boys.

Table 5.13 also showed that the amount of reduction in the nominators' variance was relatively higher than nominees' variances. This result suggested that the added nominators' individual-level covariates can explain more variance than added nominees' individual-level covariate. Additionally, the comparison of Model D's variances with Model E's variances showed that homophily predictors did a better job in terms of variance reduction than propinquity predictors (e.g., 11% vs. 10% for the variance reduction of nominators; 8% vs. 6% for the variance reduction of nominees). Above two findings were also consistent with Table 5.7 where I discussed the dyadic-level model for adolescent boys.

#### b.2. The Magnitude of Coefficients and Their Significance

I next examined the coefficients and their significance across Models C–F in Table 5.12 where I presented both coefficients and odds ratios to facilitate interpretation. Table 5.14 listed the relative changes of coefficients from Table 5.12 to facilitate the interpretations. Because I already discussed my expectations about the direction of the coefficients in Section b.1, here I examined modeling results to determine whether these expectations were fulfilled.

Table 5.14 Relative Coefficient Changes for Individual Level Mediating Models for  
Adolescent Boys

Predictors		Model	Model D		Model E		Model F	
		Coef	Coef	Relati ve	Coef	Relati ve	Coef	Relati ve
Nominator	Parental SES is High	0.128	0.07	--	0.127	--	0.07	--
	Parental Involvement is High	0.132	0.10	--	0.136	--	0.10	--
	Parental Educational Aspiration for	0.167*	0.11	-31%	0.158	-5%	0.10	-37%
	Parent choosing neighborhood because of	0.044	0.01	--	0.043	--	0.01	--
	Parental Monitoring is High	-	-	-18%	-0.136	-11%	-0.11	-28%
	Parental Smoking and Drinking is High	0.086	0.12	--	0.094	--	0.13	--
Nominee	Parental SES is High	-0.042	-	--	-0.062	--	-	--
	Parental Involvement is High	0.153*	0.12	-18%	0.157	3%	0.13	-13%
	Parental Educational Aspiration for	0.291*	0.23	-18%	0.281	-3%	0.22	-21%
	Parent choosing neighborhood because of	0.007	-	--	0.006	--	-	--
	Parental Monitoring is High	-0.082	-	--	-0.064	--	0.04	--
	Parental Smoking and Drinking is High	0.006	0.04	--	0.011	--	0.04	--
Note : ** p<0.001 * p<0.05 one-side test The relative changes were for the comparison of the current model with Model C and only calculated when the coefficient in Model C is significant. The relative changes are calculated by (current model's coefficient-Model C's coefficients)/Model C's coefficient								

In Model C (see Table 5.12), I estimated the overall associations between nominators/nominees and friendship pairings. The pattern of significance revealed two nominators and two nominees' covariates associated with adolescent boys' friendship pairings: nominators' parental educational aspirations and parental monitoring and nominees' parental involvement and parental educational aspirations. As expected, the direction of the significant association was positive for educational aspirations and for involvement and negative for monitoring. The odds ratios for nominators and nominees' educational aspirations were 1.18 and 1.34, indicating that the odds of friendships forming were about around one-fifth to one-third times higher among male nominators and nominees whose parents had higher educational aspirations for their children than among male nominators and nominees whose parents had lower educational aspirations

for their children. More involved parents also increased their sons' probability of being nominated, with an odds ratio of 1.17. The odds ratio for monitoring was 0.86, indicating that the odds of friendships forming were about one-fourth lower among male nominators with high parental monitoring than among males with low-monitoring parents.

Model D of Table 5.12 added the homophily mediator to Model C. Similar to the finding from dyadic-level adolescent boy model, pairs of boys in which either or both were low in prosocial behaviors were less likely to be friends than pairs of boys who were both high in prosocial behaviors.

Column (3) of Table 5.14 also showed the relative changes in the coefficients of four significant measures from Model C to Model D. The comparisons of the relative changes of nominator/nominee parental coefficients provided evidence in support of the mediating effect of youth homophily. The results indicated that nominators' parental educational aspirations, parental monitoring and nominees' parental involvement were mediated most by homophily because they not only showed sizable reduction in the coefficients but also changed from significant to non-significant.

Nominees' parental educational aspirations in Table 5.14 were less mediated by homophily as it remained significant in Model D and showed a smaller size change in the coefficient. This result indicated that a portion of the chances of friendship pairings for boy nominees whose parents were in high level of educational aspirations was not explained by their similarity in prosocial behaviors to their potential friends.

Let's first compare Column (3) of Table 5.14 with the Column (3) of Table 5.8 where I estimated the adolescent boy in dyadic level models. One interesting finding was

that the existence of mediation effects between parental dyadic level SES and homophily in Table 5.8 disappeared in Table 5.14 from either nominators or nominee's estimation.

I also compared Column (3) of Table 5.14 with the Column (3) of Table 5.11 to examine if there were gender differences for individual level models. Recalled that for adolescent girls (Column (3) of Table 5.11), there was only an association between nominees' parental characteristics (educational aspiration, drinking/smoking, monitoring) and friendship pairings which were mediated most by youth homophily. For adolescent boys (Column (3) of Table 5.14), nominators' parental educational aspirations, parental monitoring and nominees' parental involvement were mediated most by youth homophily. There was a gender difference for parental predictors being mediated by youth homophily.

Model E in Table 5.12 added the propinquity mediator to Model C. The direction of signs and magnitude of odds ratios of the propinquity predictors in the individual model were similar to what I found in dyadic level models (see Table 5.6). Model E in Table 5.14 showed the relative changes of four significant coefficients from Model C to Model E. The comparisons of the relative changes of the coefficients provided evidence in support of the mediating effect of propinquity on four variables. Among them, nominators' parental educational aspirations and parental monitoring were mediated most by youth propinquity because they not only showed sizable reduction in the coefficients but also changed from significant to non-significant. Nominees' parental involvement and parental educational aspirations were less mediated by youth propinquity as it remained significant in Model D and showed a smaller size change in the coefficient.

In addition, a comparison of Model D and Model E's relative changes in Table 5.14 indicated that homophily mediated the same parental variables as propinquity. The

only difference was that homophily mediates more for nominees' parental involvement than propinquity. This finding was consistent with the results of Table 5.13 where the variance reduction was similar between homophily and propinquity.

Model F added both homophily and propinquity mediators to Model C to examine the cumulative effects (see Table 5.12). The significance and the direction of signs of the homophily and propinquity predictors in Model F confirmed the finding from dyadic level adolescent boy models (see Table 5.6). The column (7) of Table 5.14 displayed the cumulative mediation effects which were similar to Table 5.8 showing that there was distinct pathway for homophily and propinquity to mediate parental influences.

### b.3. Summary for Male-Male Same Race and Age Pairs

The above analyses indicated that the association between the parental characteristics of male nominators and nominees and friendship pairings were mediated by homophily and propinquity predictors. The mediation size ranged from 13% to 37%, supporting the fundamental influences hypotheses. Nominators' parental educational aspirations and monitoring and nominees' parental educational aspirations and involvement influenced homophily and propinquity, and in turn, affected friendship pairings. Nominators' parental educational aspirations and monitoring and nominees' parental involvement were mediated more as not only did their coefficients see a size reduction of 37%, 28%, and 13%, respectively, but they also all lost their significances.

As I stepped back to compare the dyadic level model with the individual level, some findings from Table 5.12 were consistent with Table 5.6. For example, for variance reduction homophily had the similar contribution as propinquity to both dyadic level and



individual level models. In term of additive effects, I observed distinct mediating pathway for homophily and propinquity in Column (7) of Table 5.14 and Table 5.8. Additionally, I also found that individual level parental covariates explained as much variance of nominators and nominees as dyadic level parental covariates (see Table 5.13 vs. Table 5.7)

Regardless of the similarities in findings between dyadic level models and individual level models, there were some differences between those models. First of all, individual models for the adolescent boys indicated the different influences of nominator and nominee variables (see Table 5.11). For example, Table 5.6 with the dyadic level parental predictors indicated that parental involvement, educational aspiration, and monitoring were mediated by homophily and propinquity. Table 5.11 with the individual level parental predictors indicated that nominees' parental involvement, nominators' parental educational aspiration and monitoring were mediated by homophily and propinquity. Thus, beyond the similarities of parental characteristics, we had a clear vision of whether individual parental characteristics matter for the friendship pairings. Second, individual level models extended the understanding of the predictors in the different dimensions. For example, parental SES on dyadic level was a significant predictor for friendship pairings. (see Table 5.6) The non-significances of parental SES in the individual level indicated that higher or lower parental SES were not associated with friendship pairings. (see Table 5.12) It was only an effective predictor when nominators and nominees' parental were similar in their SES level. It was also interesting to compare Table 5.12 with Table 5.9 where adolescent boys and adolescent girls were modeled by

individual level models. The most significant difference across gender was the non-significance of nominator parental measures in adolescent girl model.

### C. Moderation Models

In the moderation models, the probabilities of friendship pairings were conditional on the configuration of parental and youth dyadic-level characteristics. The dyadic predictors in these models were coded to represent whether one or both parents in the dyad was high or low on each construct as well as whether one or both youths in the dyad was high or low on each construct. The new construct—parental dyadic level with youth dyadic level homophily—had 15 configurations plus a reference group, and parental dyadic level with youth's dyadic level propinquity had 11 configurations plus a reference group.

Because of the complexity of these models, I focused on predicted probabilities to present the moderating results. The general formula for calculating predicted probabilities of reference group was as follows:

$$P = \exp \sum (\text{Intercept} * 1 + \text{ConfigurationCoefficient} * 0 + \text{Coefficients of Controls} * \text{Means}) / (1 + \exp \sum (\text{Intercept} * 1 + \text{ConfigurationCoefficient} * 0 + \text{Coefficients of Controls} * \text{Means}))$$

Again, the moderation models included two minimal controls: school fixed effects and whether youths had the same family structure. To facilitate the explanation of the intercept, I centered minimal controls to their means, which were zero. Thus, the equation simplified to  $P = \exp(\text{Intercept}) / (1 + \exp(\text{Intercept}))$ . The intercept then became the predicted logit for the reference category of the 15 configurations for parental moderation effects on the homophily models. Likewise, for the propinquity model, the intercept was

the predicted logit for the reference category of the 11 configurations. The exponential of the intercept was the odds ratio of the intercept. I then calculated the probabilities using the following formula:

$$P = \text{odds ratio of intercept} / (1 + \text{odds ratio of intercept}) .$$

By switching the reference group used in each model, each configuration's probability of pairing and its confidence interval—which I simply calculated by using the confidence interval of the coefficient—can be calculated through the intercept using this equation. I can then compare the probabilities and the overlap of their confidence intervals, which allowed me to examine whether certain parental characteristics moderated the influence of homophily or propinquity on youths' friendship pairings.

The HLM software does not have a specific command to calculate the probabilities for each configuration. To generate predicted probabilities for each configuration, I run the homophily model 16 times and each propinquity model 12 times with a different reference group for each parental measure. This procedure produced a huge number of results with switched reference groups (e.g., for adolescent girls, there were 40 models for parental SES measures to predict the probabilities of friendship pairings. Sixteen SES configurations were from the homophily models and 24 configurations were from the propinquity models). To simplify the presentation, I only focused on the significant contrasts across configurations and showed them in a series of figures. In each figure, six parental measures were listed across the x-axis. The four bars in each segment indicated the predicted probabilities and their confidence interval bounds (as a percentage). The data table at the bottom of each figure was the predicted

probability of each bar (as a percentage). The average probability of friendship nomination between same race and same age girls and boys was small, only 1.2% and 1.0%, respectively. Thus, I used percentages in the figures.

For example, Figure 5.1a showed my expectations for girls who were both prosocial (Hypothesis Mod 1.1); the dark grey bar showed my hypothesized expectations, which contrasted the light gray bars of other configurations. Across the first five characteristics, I anticipated that the high-high (HH) pairs were more likely to be friends than the high-low (HL), low-high (LH), and low-low (LL) pairs. That is, when girls were both prosocial, they were most likely to be friends if their parents both shared desirable characteristics (higher SES, involvement, educational aspirations, choosing the neighborhood for the school, and higher monitoring). For the final characteristic, I expected that the LL pair was more likely to be friends than the HH, HL, and LH pairs. That was, when both girls were prosocial, they were most likely to be friends if their parents both lacked an undesirable characteristic (lower smoking/drinking). In Figure 5.1b, I removed the shading from all non-significant contrasts, leaving only three contrasts that were statistically significant as hypothesized. White bars indicated non-significant contrasts. Among girls who were both prosocial, those whose parents share high educational aspirations were more likely to be friends than those whose parents shared low educational aspirations. Likewise, prosocial girl dyads were more likely to be friends if both of their parents do not smoke and drink in contrast to pairs in which either girl had parents who drink or smoke.

Figure 5.1a: Hypothesized Contrasts of Mod 1.1: Prosocial-Prosocial Girls with Parental Characteristics of Various Levels

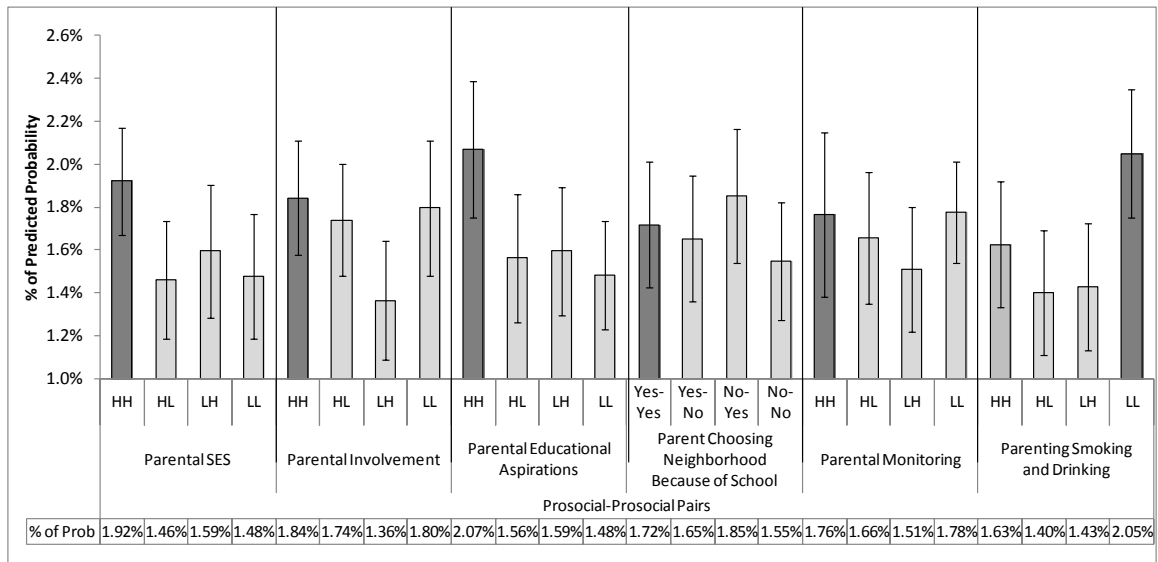
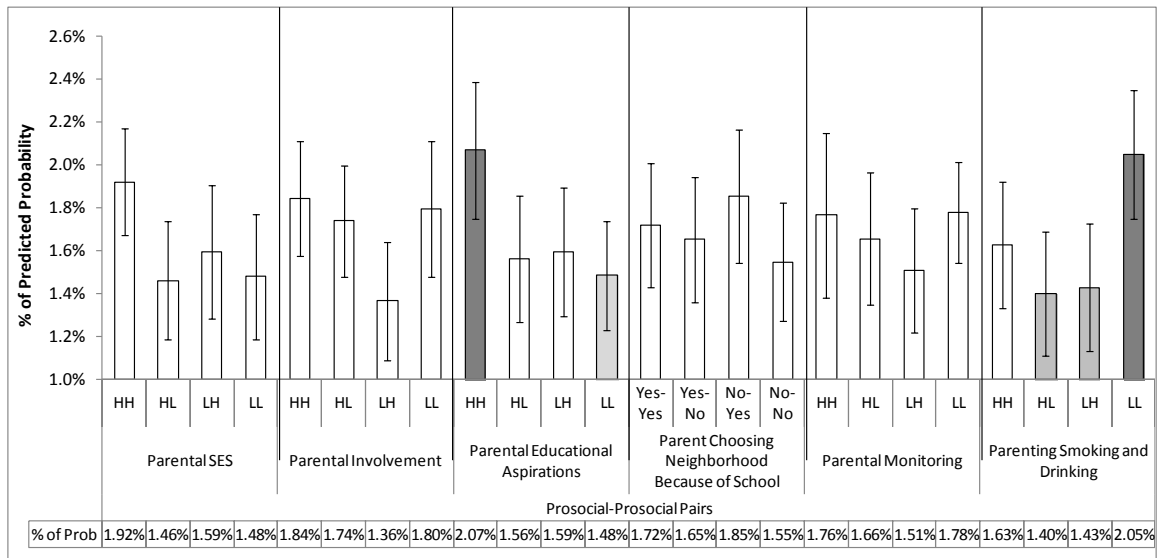


Figure 5.1b: Significant Contrasts: Prosocial-Prosocial Girls with Parental Characteristics of Various Levels



For neighborhood propinquity, I presented figures by youths 1) living in the same advantaged neighborhood, 2) living in the same disadvantaged neighborhood, and 3)

living in different neighborhoods. Similarly, for school local position propinquity, I presented three additional figures for 1) pairs from similarly high-status local positions, 2) pairs from similarly low-status local positions, and 3) pairs from dissimilar local positions.

Tables 5.15 and 5.16 summarized the tested contrasts for adolescent girls and adolescent boys, respectively. The significant contrasts were presented in the shaded cells. Given that a large number of categories in the series of figures did not show significant contrasts, I again simplified Figure 5.1a and Figure 5.1b to Figure 5.2a and Figure 5.2b by only providing bars from the shaded cells of the tables. (The whole series of figures was provided in the Appendix B.) Again, the series of “a” figures were for hypothesized contrasts, and “b” figures were for significant contrasts.

In Table 5.15, the shaded contrasts indicated the significance of moderation influences of parental measures for adolescent girl pairs. The associations between homophily measures (rows 1–4) and friendship pairings were significantly moderated by parental educational aspirations and parental smoking and drinking. Thus, I drew three significant contrasts into one figures—Figure 5.2b—which I then compared with the hypothesized contrasts in Figure 5.2a. I did not include figures for Prosocial-Antisocial, Antisocial-Prosocial, and Antisocial-Antisocial pairs because they showed no significant contrasts. The association between neighborhood propinquity (rows 5–7) and friendship pairings was moderated by four variables: parental SES, parental educational aspirations, parents choosing the neighborhood because of the school, and parental smoking and drinking. Eleven significant contrasts were displayed in Figures 5.3b and Figure 5.4b. The last section of Table 5.15 (rows 8–10) focused on the moderation influences on the

measures of school local positions. Figures 5.5b displayed three significant contrasts, indicating the existence of parental moderation effects. Based on the number of contrasts, propinquity measures seemed to be moderated more by parental measures than by homophily measures for adolescent girls.

In Table 5.16, significant contrasts for adolescent boy pairs were shaded. The association between homophily and friendship pairings (rows 1–4) were not significantly moderated by any parental variables. Thus, I did not include figures for those rows. Neighborhood propinquity (rows 5–7) and friendship pairings were moderated by parental SES and parental educational aspirations. Six significant contrasts were therefore displayed in Figures 5.6b. I did not produce figures for youths from same advantaged neighborhoods and same disadvantaged neighborhood because I detected no moderation influences for those pairs. Figure 5.7b and Figure 5.8b display two significant contrasts for the moderation influences on school local positions (rows 8–10). The significant moderators included the measures of parental educational aspirations and parental monitoring. Likewise for boys, the number of contrasts from the propinquity measures was bigger than from the homophily measures. The number of contrasts also differs by gender. Girls had 17 significant contrasts, and boys had eight significant contrasts. This summary provided a rough picture showing that parental moderation influences had a stronger effect on girls than on boys. In the sections that followed, I provided a more detailed discussion of these findings, including the magnitudes of the contrasts.

Table 5.15 Adolescent Girls: The Significant Contrasts from the Models of Moderation

## Influences

	Parental SES	Parental Involvement	Parental Educational Aspirations	Parent Choosing Neighborhood Because of	Parental Monitoring	Parental Smoking and Drinking	Figures
<b>Prosocial- Prosocial (1)</b>	None	None	HH vs. LL	None	None	LL vs. HL LL vs. LH	Figure 5.2a
<b>Antisocial- Antisocial (2)</b>	None	None	None	None	None	None	
<b>Prosocial- Antisocial (3)</b>	None	None	None	None	None	None	
<b>Antisocial- Prosocial (4)</b>	None	None	None	None	None	None	
<b>Living in the Same Advantaged</b>	HH/LL vs. HH HH/LL vs. LL	None	None	Yes-Yes vs. No-No	None	None	Figure 5.3a Figure
<b>Living in the Same Disadvantaged Neighborhood(6)</b>	None	None	None	None	None	None	
<b>Living in Different Neighborhoods(7)</b>	None	None	HH vs. HL HH vs. LH HH vs. LL	None	None	LL vs. HH LL vs. HL LL vs. LH	Figure 5.4a Figure
<b>From Similarly High-Status Local Positions(8)</b>	None	None	None	None	None	None	
<b>From Similarly Low-Status Local Positions(9)</b>	None	None	None	None	None	None	
<b>From Dissimilar Local Positions(10)</b>	None	None	HH vs. HL HH vs. LH HH vs. LL	None	None	None	Figure 5.5a Figure

Note: HH: high-high level parental variables; HL: high-low level parental variables; LH: low-high level parental variables; LL: low-low level parental variables; No-Yes: parents of nominators not choosing neighborhood because of school but parents of nominees choosing neighborhood because of school; No-No: parents of nominators and nominees not choosing neighborhood because of school. The last column in the table indicates whether figures are generated for various levels of prosocial pairs or propinquity pairs.



Table 5.16 Adolescent Boys: The Significant Contrasts from the Models of Moderation

## Influences

	<b>Parental SES</b>	<b>Parental Involvement</b>	<b>Parental Educational Aspirations</b>	<b>Parent Choosing Neighborhood Because of</b>	<b>Parental Monitoring</b>	<b>Parental Smoking and Drinking</b>	<b>Figures</b>
<b>Prosocial- Prosocial (1)</b>	None	None	None	None	None	None	
<b>Antisocial- Antisocial (2)</b>	None	None	None	None	None	None	
<b>Prosocial- Antisocial (3)</b>	None	None	None	None	None	None	
<b>Antisocial- Prosocial (4)</b>	None	None	None	None	None	None	
<b>Living in the Same Advantaged Neighborhood(5)</b>	None	None	None	None	None	None	
<b>Living in the Same Disadvantaged Neighborhood(6)</b>	None	None	None	None	None	None	
<b>Living in Different Neighborhoods(7)</b>	HH vs. HL	None	HH vs. HL	None	None	None	Figure 5.6a Figure
	HH vs. LH		HH vs. LH				
	HH vs. LL		HH vs. LL				
<b>From Similarly High-Status Local Positions(8)</b>	None	None	HH vs. LL	None	None	None	Figure 5.7a Figure 5.7b
<b>From Similarly Low-Status Local Positions(9)</b>	None	None	None	None	HH vs. LL	None	Figure 5.8a Figure 5.8b
<b>From Dissimilar Local Positions(10)</b>	None	None	None	None	None	None	

Note: HH: high-high level parental variables; HL: high-low level parental variables; LH: low-high level parental variables; LL: low-low level parental variables; No-Yes: parents of nominators not choosing neighborhood because of school but parents of nominees choosing neighborhood because of school; No-No: parents of nominators and nominees not choosing neighborhood because of school. The last column in the table indicates whether figures are generated for various levels of prosocial pairs or propinquity pairs.

## 1. Parental Moderation Effects on Homophily among Female Pairs

### a. Predicting Probabilities of Prosocial-Prosocial Pairs

Hypothesis Mod 1.1 in Table 3.1 states that prosocial youths who have parents with similar positive characteristics are more likely to be friends than prosocial youths with other parental configurations. I began by examining the results for Prosocial-Prosocial pairs to see how various parental characteristics affected the likelihood of friendship pairings. My expectations were displayed in Figure 5.2a, with hypothesized contrasts between the dark grey bar and the light grey bars. Again, if the displayed contrasts in Figure 5.2b were identical or partly matched in Figure 5.2a, the hypothesis was supported or partly supported by my data.

Figure 5.2b displays the significant contrasts from the modeling. When I compared Figure 5.2b to Figure 5.2a, I found that my moderation Hypothesis Mod 1.1 was partly supported by the measure of parental educational aspirations and parental smoking and drinking.

Figure 5.2a: Hypothesized Contrasts of Mod 1.1: Prosocial-Prosocial Girls with Parental Characteristics of Various Levels

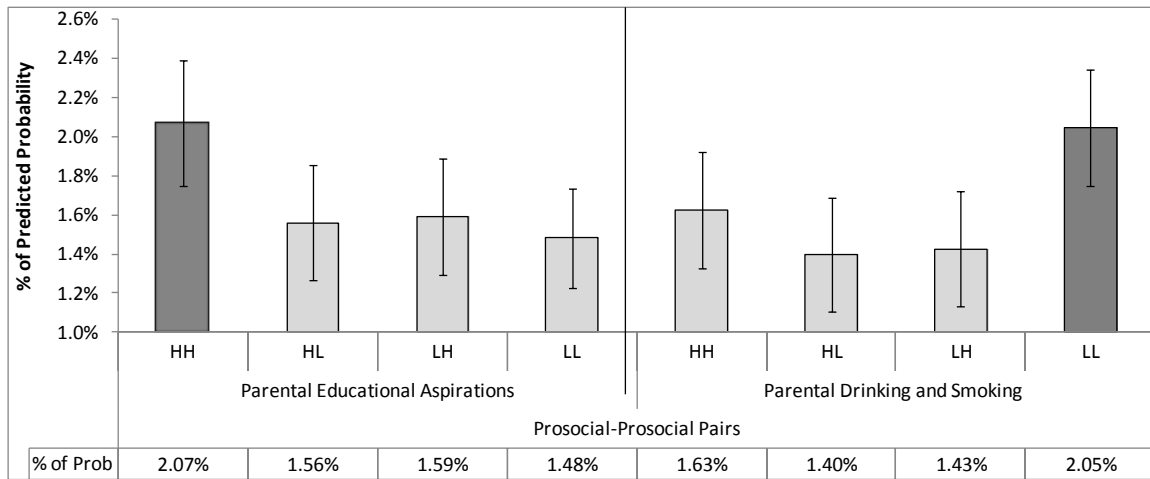
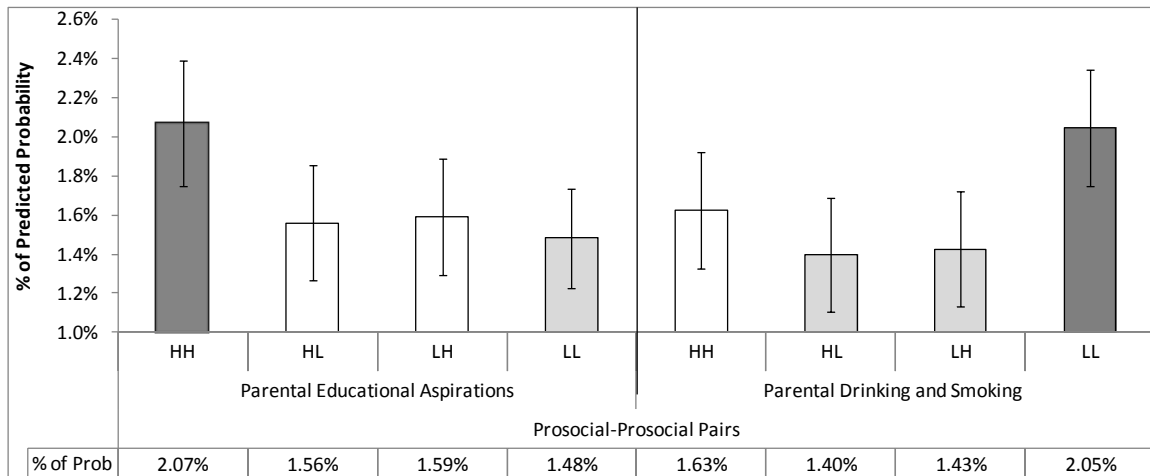


Figure 5.2b: Significant Contrasts: Prosocial-Prosocial Girls with Parental Characteristics of Various Levels



The left panel of Figure 5.2b showed that girls whose parents had HH educational aspirations had a significantly higher probability of forming friendships than girls whose parents had LL educational aspirations. The point estimate of the dark grey bar for HH parental educational aspirations was 2.07% with a confidence interval of [1.75%, 2.39%]; the point estimate of the light grey bar for LL parental educational aspirations was 1.48%

with a confidence interval of [1.23%, 1.74%]. The gap between the dark and the light grey bars was more than 5.4% of the outcome standard deviation (i.e.,  $(2.07\% - 1.48\%) / 0.11 = 5.4\%$ ).

Linear combination tests<sup>3</sup> indicated that the high-high and low-low parental educational aspiration gap among Prosocial-Prosocial pairs was significantly different from the same gap among Prosocial-Antisocial pairs ( $Z=2.35$ ,  $p<0.05$ ) and among Antisocial-Prosocial pairs ( $Z=2.01$ ,  $p<0.05$ ). (Note: more details for the linear combination tests were provided in Appendix C.) This finding evidenced the existence of moderation influences. Similarities in positive characteristics among parents (HH educational aspirations) significantly increased the chances of similar prosocial girls being friends. This finding also showed that the direction of similarities matters, at least to some extent, for friendship pairings. If youths had similar prosocial characteristics but their parents had similar negative characteristics (Prosocial-Prosocial pairs with LL parental educational aspirations), youths' probability of being friends was much lower than when youths and parents both had similar positive characteristics (Prosocial-Prosocial pairs with HH parental educational aspirations).

The point estimate of the dark grey bar for less smoking and drinking was 2.05% with a confidence interval of [1.75%, 2.35%]; the point estimate of the light grey bar for HL parental smoking and drinking was 1.40% with a confidence interval of [1.11%, 1.69%]; and the point estimate of the light grey bar for LH parental smoking and drinking was 1.43% with a confidence interval of [1.13%, 1.72%]. The gap between LL and HL

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<sup>3</sup> Due to the test limitation of HLM software, I used Stata 11 for all of Chi-square tests in the moderation section. I applied Stata's *lincom* command to examine whether the significant contrast between configurations in each figures varied across different homophily and propinquity classifications.

parental smoking and drinking was 5.9% of the outcome's standard deviation (i.e.,  $(2.05\% - 1.40\%) / 0.11 = 5.9\%$ ), and the gap between LL and LH parental smoking and drinking for Prosocial-Prosocial pairs was 4.3% of the outcome's standard deviation (i.e.,  $(2.05\% - .43\%) / 0.11 = 4.3\%$ ). Linear combination tests revealed that the LL-HL parental smoking and drinking gap from Prosocial-Prosocial pairs was significantly different from Prosocial-Antisocial pairs ( $Z=2.15$ ,  $p<0.05$ ). Likewise, the gap between LL-LH parental smoking and drinking among Prosocial-Prosocial pairs was significant different from the same gap among Antisocial-Prosocial pairs ( $Z=1.68$ ,  $p<0.05$ ). (Note: more details for the linear combination tests were provided in Appendix C.) Thus, it indicated that a moderation effect exists between groups of parents who smoke and drink less and parents who are dissimilar on this characteristic (LH and HL). For Prosocial-Prosocial pairs, friendship pairing probabilities were statistically different if both girls had parents who smoke and drink less or if only one of them had parents with a high level of smoking and drinking.

#### b. Summary

When I examined how female pairing percentages differ by levels of various parental characteristics, I found support for Hypothesis Mod 1.1 in the measures of parental educational aspirations and parental smoking and drinking. I found no evidence to support the other three hypotheses (Mod 1.2–Mod 1.4).

The measure of educational aspirations showed an interesting moderation effect (Figure 5.2b). This finding not only suggested the existence of the cumulative effects of similarities but also the importance of the direction of these similarities. The cumulative

effects of different directional similarities (prosocial youths with parents who had negative characteristics) decreased the chances for youths being friends significantly compared to the cumulative effects of same directional similarities (prosocial youths with parents who had positive characteristics). For example, Figure 5.2b showed that for Prosocial-Prosocial girls whose parents had LL educational aspirations, the chances of their forming friendships with youths whose parents had LL educational aspirations were significantly lower than their chances of becoming friends with youths whose parents had HH educational aspirations. The similarity of prosocial characteristics combined with the similarity of negative parental characteristics to decrease the chances of the girls forming friendships.

The other notable finding centered on the cumulative effect of moderation influences for the measure of parental smoking and drinking (Figure 5.2b). I found that the cumulative effects of same directional similarities (prosocial youths with parents who had positive characteristics) increased the chances of youths being friends. For example, parents with a low-low smoking and drinking status had a statistically significant moderation effect for Prosocial-Prosocial girl pairs (Figure 5.2b). When both girls had high prosocial characteristics, if they both had parents who do less smoking and drinking, they were more likely to be friends than pairs of prosocial youths in which either girl had parents who drink or smoke more. The similarity of prosocial characteristics combined with the similarity of the low smoking and drinking parental status to increase the chances of the girls forming friendships.

## 2. Parental Moderation Effects on Neighborhood Propinquity among Female Pairs

### a. Predicting Probabilities of Pairs Living in the Same Advantaged Neighborhood

Hypothesis Mob 2.1 states that youths living in an advantaged neighborhood who have parents with positive characteristics such as high-high SES, high-high involvement, high-high educational aspirations for youths, yes-yes choosing neighborhood because of school, high-high monitoring, or low-low smoking and drinking are more likely to be friends with each other than youths with other parental configurations. I presented this hypothesis in Figure 5.3a, which showed that I expected to find the following significant contrasts: HH vs. HL, HH vs. LH, and HH vs. LL.

Figure 5.3b showed that the two significant contrasts (HH vs. HL and HH vs. LH) of parental SES measures supported Hypothesis Mod 2.1. The point estimate of the HH parental SES was 3.38%, which was higher than the HL parental SES (1.29%) and the LH parental SES (1.42%). The gaps between HH vs. HL and HH vs. LH parental SES were 19.0% and 17.8% of the outcome's standard deviation of 0.11, respectively (i.e.,  $(3.38\% - 1.29\%) / 0.11 = 19.0\%$ ;  $(3.38\% - 1.42\%) / 0.11 = 17.8\%$ ). In addition, I found two more contrasts from parental SES measures that fall outside of my expectations: LL vs. HL and LL vs. LH. The gaps between the two contrasts were 15.8% and 14.6% of the outcome's standard deviation of 0.11, respectively (i.e.,  $(3.03\% - 1.29\%) / 0.11 = 15.8\%$ ;  $(3.03\% - 1.42\%) / 0.11 = 14.6\%$ ). This gap was smaller than the gaps generated by the HH contrasts.

These contrasts suggested that youths living in the same advantaged neighborhood with high or low SES parents had a statistically higher likelihood of

forming friendships than if either had low SES parents. Linear combination tests showed that the high-high SES vs. high-low SES gap among pairs who were living in the same advantaged neighborhood were significantly different from the same gap among pairs who were living in different neighborhoods ( $Z=2.37$ ,  $p<0.05$ ). It was also true for high-high vs. low-high SES pairs. The high-high vs. low-high SES gap among pairs who were living in the same advantaged neighborhood was significantly different from the gap among pairs who were living in the different neighborhood ( $Z=2.24$ ,  $p<0.05$ ). (Note: more details for the linear combination tests were provided in Appendix C.) Thus Parental SES moderated advantaged neighborhood propinquity by increasing the likelihood of youths with similar SES being friends and by decreasing the chances of youths with dissimilar SES being friends.

I also found that youths living in the same advantaged neighborhood had a statistically higher rate of friendship pairings when they had parents who chose the neighborhood for school reasons. This fitted with Hypothesis Mod 2.1. The point estimate of the dark grey bar was 4.03% for the yes-yes choosing neighborhood because of school group and was higher than the no-no choosing neighborhood because of school group (1.83%). The gap between the yes-yes and no-no groups was 20% of the outcome's standard deviation of 0.11 (i.e.,  $(4.03\%-1.83\%)/0.11=20.00\%$ ). Youths who lived in the same advantaged neighborhood and whose parents had similar positive characteristics (yes-yes choosing neighborhood because of school) were more likely to be friends with each other than youths whose parents had similar negative characteristics (no-no choosing neighborhood because of school). The moderation effect of choosing a neighborhood because of the school had a larger magnitude than the measure of parental



SES. In addition, there are no significant gap between yes-yes and no-no neighborhood choosing for pairs who were living in the same disadvantaged neighborhood pairs or living in the different neighborhoods. The statistical test indicated that the gap of living in the same advantaged neighborhoods pairs was significantly different from the gap of living in the same disadvantaged neighborhood pairs ( $Z=2.85$ ,  $p<0.05$ ) or living in the different neighborhoods pairs ( $Z=3.41$ ,  $p<0.01$ ). (Note: more details for the linear combination tests were provided in Appendix C.)

Figure 5.3a: Hypothesized Contrasts of Mod 2.1: Girls Living in the Same Advantaged Neighborhood with Parental Characteristics of Various Levels

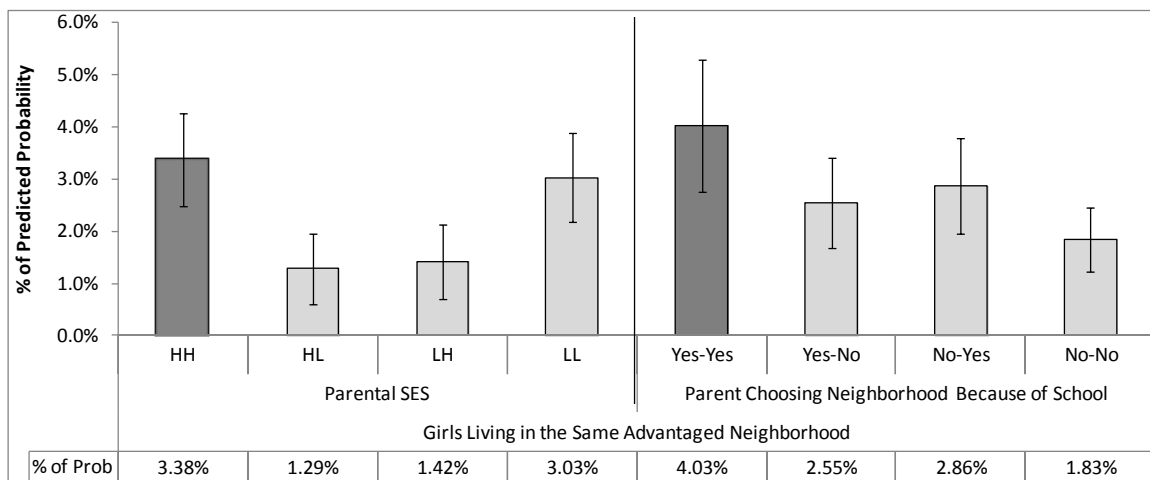
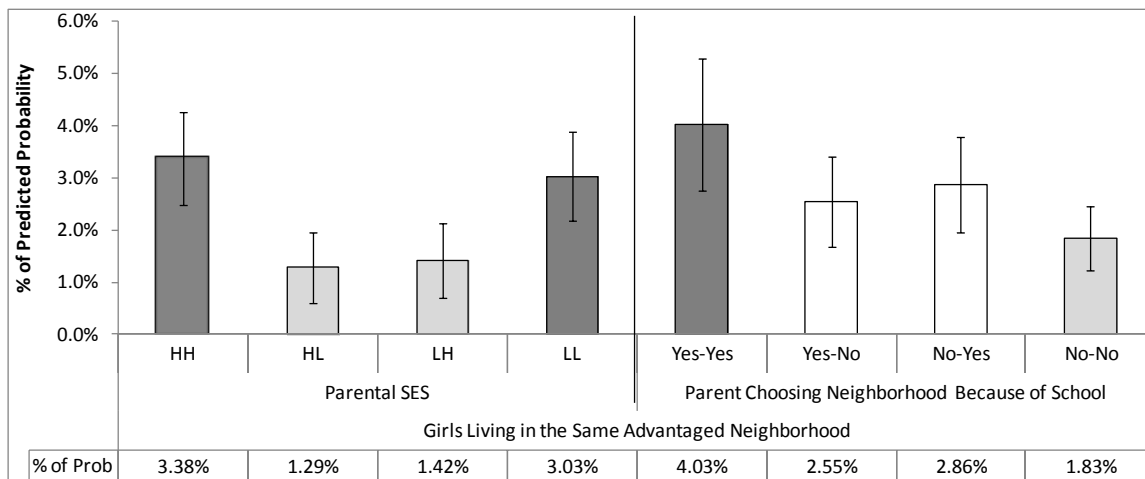


Figure 5.3b: Significant Contrasts: Girls Living in the Same Advantaged Neighborhood  
with Parental Characteristics of Various Levels



#### b. Predicting Probabilities of Pairs Living in Different Neighborhoods

Figure 5.4a showed the hypothesized contrasts of probability percentages among parental configurations for youths living in different neighborhoods. Based on Hypothesis Mod 2.3, I expected the lower bound of the confidence interval of the dark grey bars in each measure to be higher than the two light grey bars. In other words, for youths living in different neighborhoods, I expected that they were more likely to be friends with each other if they had similar parents.

Results in Figure 5.4b showed that youths living in different neighborhoods were especially influenced by positive parental characteristics including HH educational aspirations and LL smoking and drinking. Youths whose parents had HH educational aspirations were more likely to be friends than youths with other parental configurations. Notably, the biggest gap was between HH and LL measures, although the gap was small (3.77% of the outcome's standard deviation (i.e.  $(1.15\% - 0.74\%) / 0.11 = 3.77\%$ )). Again,

linear combination tests revealed that those gaps were significantly different between pairs who were living in the same advantaged neighborhood or living in the different neighborhoods. Girls were more likely to be friends if they both had parents who smoke and drink less, even if they live in different neighborhoods. The biggest gap was between girls with LL and LH smoking and drinking parents (i.e.,  $(1.13\% - 0.68\%) / 0.11 = 4.04\%$ ). The significant contrasts from both parental measures indicated that even if from different neighborhoods, girls were more likely to form friendships if their parents had similar positive characteristics. Linear combination tests suggested that the significant LL vs. HH contrast that I identified for pairs who were living in the different neighborhoods was statistically different from other propinquity classifications ( $Z=1.70$ ,  $p<0.05$  for pairs who were living in the same advantaged neighborhood;  $Z=-2.78$ ,  $p<0.05$  for pairs who were living in the same disadvantaged neighborhood. (Note: more details for the linear combination tests were provided in Appendix C.) Thus, the moderation hypothesis was supported.

Figure 5.4a: Hypothesized Contrasts of Mod 2.3: Girls Living in Different Neighborhoods with Parental Characteristics of Various Levels

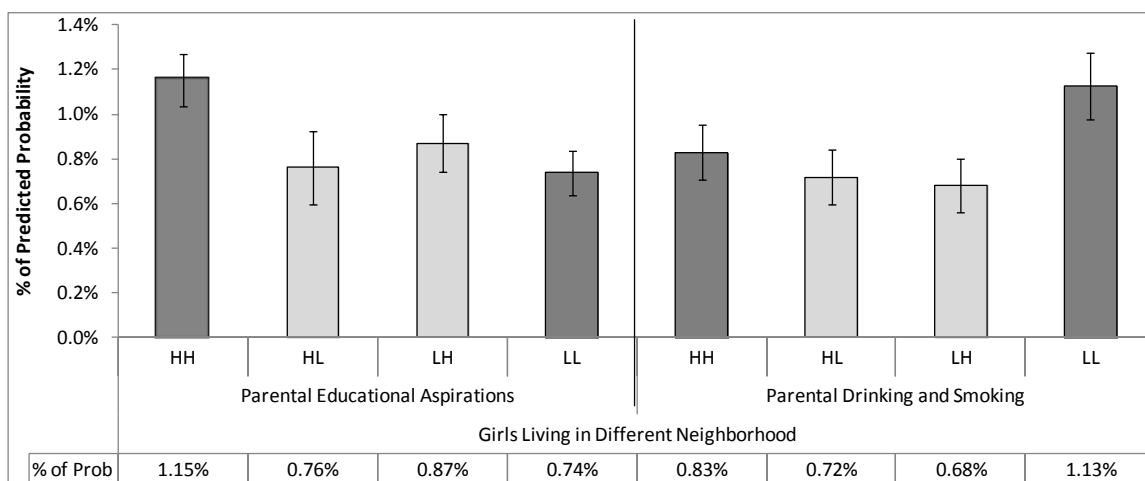
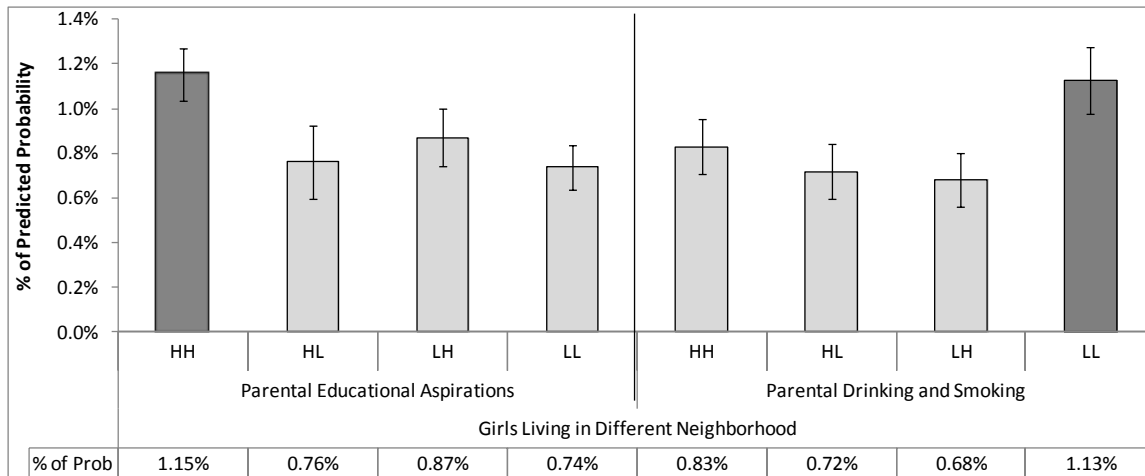


Figure 5.4b: Significant Contrasts: Girls Living in Different Neighborhoods with Parental Characteristics of Various Levels



### c. Summary

When I examined how female pairing percentages differ by parental characteristics of various levels, I found that the moderation effects on neighborhood propinquity stemmed from four parental measures: SES, educational aspirations, whether parents chose the neighborhood because of the school, and smoking and drinking. The significant contrasts fitted with Hypotheses Mod 2.1 and 2.3.

In advantaged neighborhoods, girls were more likely to be friends if they both had parents concerned about the neighborhood school district or if they both had high SES or low SES parents. In comparison, if girls were from different neighborhoods, their chances of being friends were higher if they both had parents with higher educational aspirations and if their parents drink and smoke less. Choosing the neighborhood because of the school had a relatively higher moderation effect than the other three measures.

In short, similarities in certain positive parental characteristics such as high SES, high educational aspirations, choosing the neighborhood because of the school, and low smoking and drinking can promote girls' friendship pairings regardless of whether the youths live in the propinquity or non-propinquity neighborhoods and regardless of whether they live in advantaged or disadvantaged neighborhoods.

### 3. Parental Moderation Effects on School Local Position Propinquity among Female Pairs

#### a. Predicting Probabilities of Pairs from Dissimilar Local Positions

Figure 5.5a showed the hypothesized contrasts of probability percentages among parental educational aspirations configurations for girls from dissimilar local positions. Based on Hypothesis Mod 3.3, I expected that girls from dissimilar local positions were more likely to be friends with each other if they had similar parents.

Figure 5.5b illustrated three significant contrasts. Youths with HH educational aspirations parents had a statistically higher rate of forming friendships than those with other parental configurations for educational aspirations. Two of the contrasts fit my expectations. The contrast gaps between HH vs. HL and HH vs. LH were almost identical with an outcome standard deviation of 3.8% (i.e.,  $(1.10\% - 0.69\%) / 0.11 = 3.80\%$ ;  $(1.10\% - 0.70\%) / 0.11 = 3.80\%$ ). The contrast between HH and LL parental educational aspirations did not fit with Hypothesis Mod 3.3. The magnitude difference between HH and LL measures of parental educational aspirations was 4.79% of the outcome's standard deviation (i.e.,  $(1.10\% - 0.58\%) / 0.11 = 4.79\%$ ), which was even higher than for the other two contrasts. This finding indicated that pairs whose parents had HH educational aspirations were significantly different from pairs whose parents had LL educational

aspirations. The former increased the chances of friendship pairings more than the latter. These results also provided evidence that not all similarities in parental educational aspirations significantly increased the chances of friendship pairings for girls. When girls were from dissimilar local positions, having parents with similar LL educational aspirations decreased the chances of the girls becoming friends. Similarly, having HH parental educational aspirations increased the chances of girls being friends. Again I didn't find the significant LL-HL, LL-LH, and LL-HH contrast of parental educational aspiration from pairs who were from similarly high-status local positions or similarly lower-status local positions. Linear combination tests suggested that the significant HH vs. LL contrasts that I identified for pairs who were from dissimilar local positions were statistically different from pairs who were from similarly high-status local positions ( $Z=2.87$ ,  $P<0.05$ ). (Note: more details for the linear combination tests were provided in Appendix C.) Thus, the moderation hypothesis was supported.

Figure 5.5a: Hypothesized Contrasts of Mod 3.3: Girls from Dissimilar School Local Positions with Parental Characteristics of Various Levels

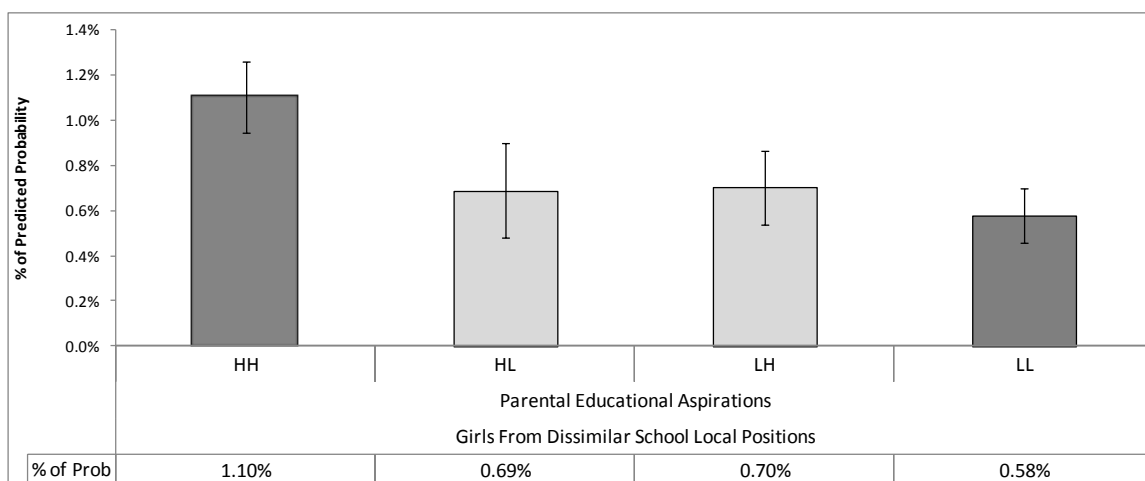
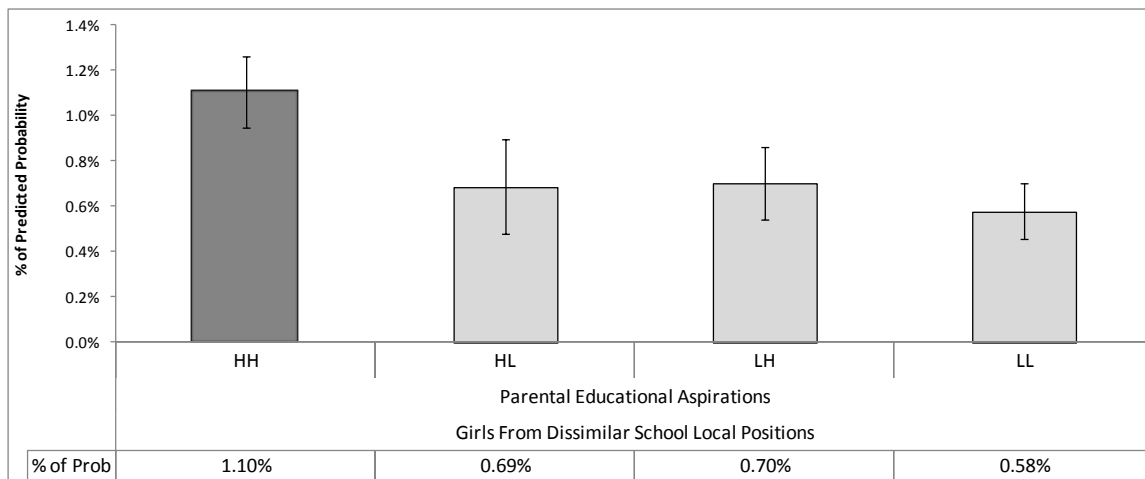


Figure 5.5b: Significant Contrasts: Girls from Dissimilar School Local Positions with Parental Characteristics of Various Levels



#### b. Summary

When I examined how female pairing percentages differ by parental characteristics of various levels, I found that the moderation effects on school local position propinquity were partly supported by parental educational aspirations for Hypotheses Mod 3.3.

These findings suggested that similarities in positive parental characteristics (HH educational aspirations for youths) can moderate the effects of non-propinquity pairs by increasing the chances of friendship pairings. In contrast, similarities in negative parental characteristics such as LL parental educational aspirations decreased the chances of girls from propinquity or non-propinquity local positions being friends.

#### 4. Parental Moderation Effects on Homophily among Male Pairs

Among all the moderation models for boy homophily, I found no significant contrast. Thus, I did not present any figures here.

#### 5. Parental Moderation Effects on Neighborhood Propinquity among Male Pairs

##### a. Predicting Probabilities of Pairs Living in the Different Neighborhood

No significant contrasts supported Hypothesis Mod 2.1 and Mod 2.2. Therefore, I began this section by discussing Hypothesis Mod 2.3, which states that for youths living in the different neighborhoods, pairs whose parents have similar characteristics are more likely to be friends with each other than other pairs. Figure 5.6a showed the hypothesized contrasts of probability percentages for two parental configurations among boys living in different neighborhoods.

Results in Figure 5.6b showed that youths living in different neighborhoods were especially influenced by positive parental characteristics including HH SES and HH educational aspirations. Youths with HH SES parents were more likely to be friends than youths with HL, LH, or LL SES parents. The biggest difference was the contrast between HH and HL SES parents. The gap was 2.19% of the outcome's standard deviation of 0.11 (i.e.  $(0.79\% - 0.55\%) / 0.11 = 2.19\%$ ). Likewise, youths with parents who had HH educational aspirations were more likely to be friends than youths with other configurations of parental educational aspirations. It was striking to find that the biggest gap was between HH and LL measures at 3.26% of the outcome's standard deviation (i.e.  $(0.85\% - 0.49\%) / 0.11 = 3.26\%$ ).



The significant contrasts for educational aspirations among boys were consistent with the girls' models (Figure 5.4b): adolescents were significantly more likely to be friends if they both had parents with HH educational aspirations, even if they live in different neighborhoods. For girls, the contrast difference between HH and LL was 3.77%, which was a little larger than the boys' at 3.26%. This finding suggested that the moderation influence of parental similarities on adolescents from non-propinquity neighborhoods depended on whether the similarities were positive or negative. If parents had similar negative characteristics (e.g., LL educational aspirations), their children's chances of being friends were much lower than for children whose parents had similar positive characteristics.

Again I didn't find other significant contrasts of parental SES/parental educational aspiration for pairs who were living in the same advantaged neighborhood or living in the same disadvantaged neighborhood. Linear combination tests indicated that those significant gaps that I identified for pairs who were living in the different neighborhoods were statistically different from pairs who were living in the same advantaged neighborhood or living in the same disadvantaged neighborhood. (Note: more details for the linear combination tests were provided in Appendix C.) Thus, the moderation hypothesis was supported.

Figure 5.6a: Hypothesized Contrasts of Mod 2.3: Boys Living in Different Neighborhoods with Parental Characteristics of Various Levels

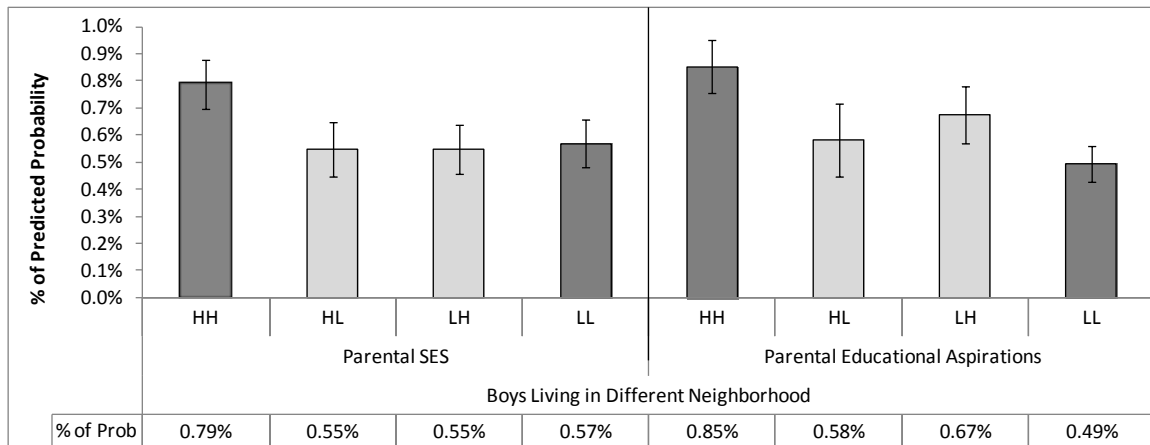
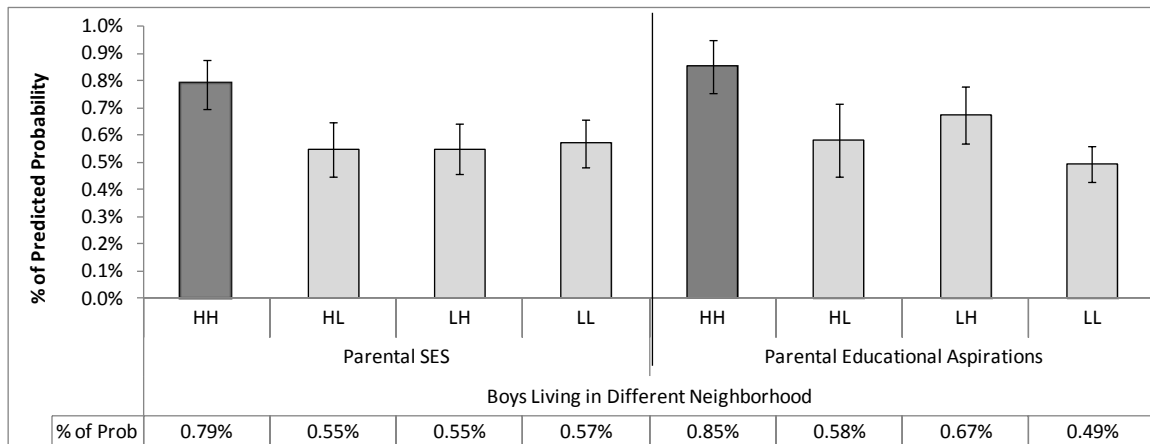


Figure 5.6b: Significant Contrasts: Boys Living in Different Neighborhoods with Parental Characteristics of Various Levels



## b. Summary

When I examined how male pairing percentages differ by parental characteristics of various levels, the moderation effects on neighborhood propinquity were partly supported by the measures of parental SES and educational aspirations. In the hypotheses tests, only Mod 2.3 was supported. Youths from different neighborhoods had an

increased chance of being friends if they both had high SES parents or if both sets of parents had high educational aspirations. Having parents with high educational aspirations had a relatively higher moderating effect on friendship pairings than having parents with high SES.

## 6. Parental Moderation Effects on School Local Position Propinquity among Male Pairs

### a. Predicting Probabilities of Pairs from Similarly High-Status School Local Positions

Figure 5.7a illustrated the distribution of the percentage of friendship pairings of boys from similarly high-status local positions broken down by dyadic-level parental educational aspirations. Figure 5.7b indicated that Hypothesis Mod 3.1 was partly supported by the measure of parental educational aspirations. Youths from similarly high-status local positions had a statistically higher rate of forming friendships when they both had parents with HH educational aspirations. The point estimate of this group was 1.23%. The gap between HH educational aspirations and LL educational aspirations was 6.29% of the outcome's standard deviation (i.e.,  $(1.23\% - 0.54\%) / 0.11 = 6.29\%$ ). Linear combination tests suggested that HH-LL parental educational aspiration contrast among pairs from similarly high-status local positions was significantly different from pairs among similarly lower-status local position ( $Z=2.11$ ,  $p<0.05$ ) or dissimilar local positions ( $Z=3.04$ ,  $p<0.01$ ), which again evidenced the existence of the moderation influences. (Note: more details for the linear combination tests were provided in Appendix C.)

Figure 5.7a: Hypothesized Contrasts of Mod 3.1: Boys from Similarly High-Status School Local Positions with Parental Characteristics of Various Levels

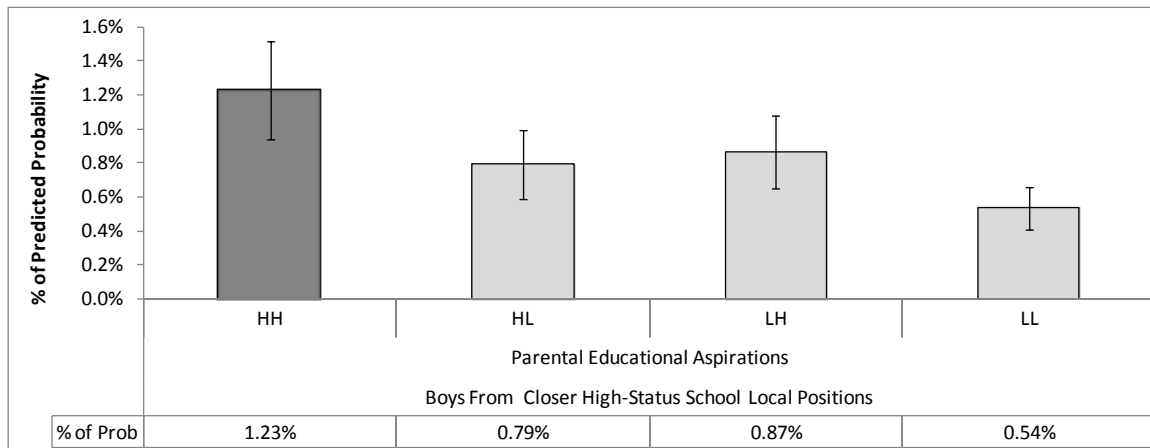
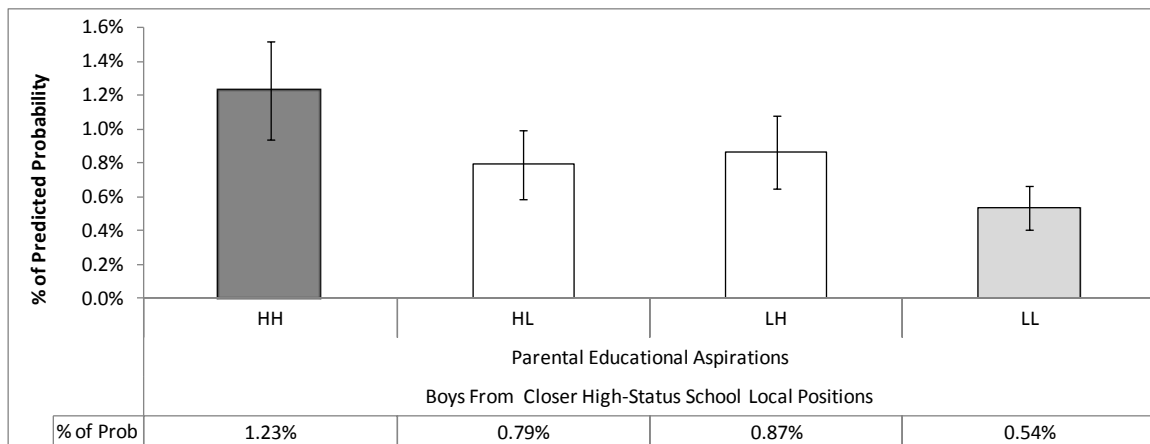


Figure 5.7b: Significant Contrasts: Boys from Similarly High-Status School Local Positions with Parental Characteristics of Various Levels



#### b. Predicting Probabilities of Pairs from Similarly Low-Status School Local Positions

Figure 5.8a illustrated the distribution of the percentage of friendship pairings of youths from similarly low-status local positions varied by dyadic-level parental SES and monitoring measures. According to Hypothesis Mod 3.2, I expected that among boys with similarly low-status school local positions, those whose parents shared negative

characteristics such as low-low monitoring were more likely to be friends with each other than youths with other parental configurations.

The significant contrast for the measure of parental monitoring in Figure 5.8b reinforces my hypothesis. I found that boys from similarly low-status local positions who had LL monitoring parents were more likely to be friends with each other than similar youths with HH monitoring parents. The difference between LL monitoring pairs and HH monitoring pairs was 3.55% of the outcome's standard deviation (i.e.,  $(0.97\% - 0.58\%) / 0.11 = 3.55\%$ ). Again I didn't find the significant LL-HH contrast of parental monitoring among pairs who were from similarly high-status local position or similarly lower-status local position. Linear combination tests revealed that the significant LL vs. HH contrast that I identified for pairs who were from dissimilar local positions were statistically different from pairs among similarly higher-status local positions ( $Z=3.29$ ,  $p<0.01$ ) or similarly lower-status local positions ( $Z=1.95$ ,  $p<0.05$ ). (Note: more details for the linear combination tests were provided in Appendix C.) Thus, the moderation hypothesis was supported.

Figure 5.8a: Hypothesized Contrasts of Mod 3.2: Boys from Similarly Low-Status School  
Local Positions with Parental Characteristics of Various Levels

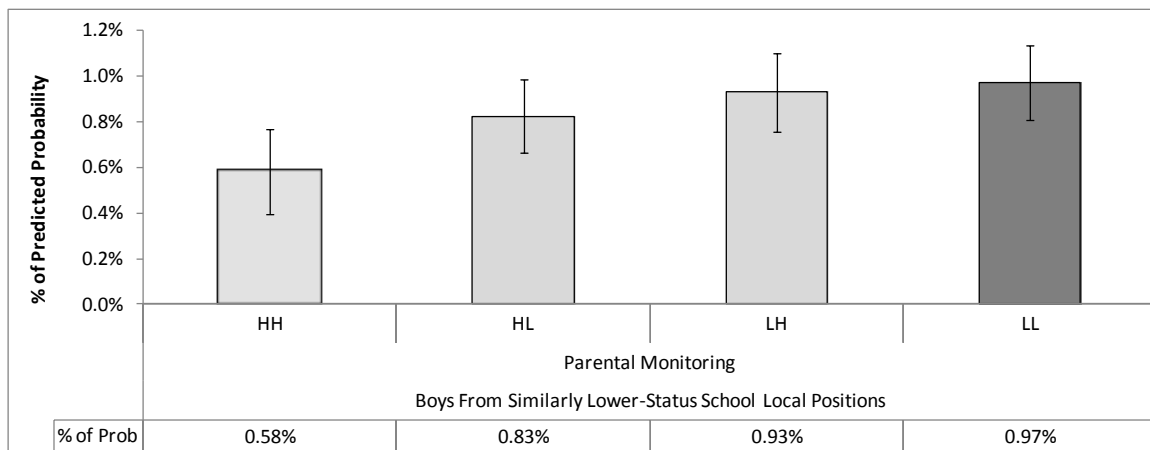
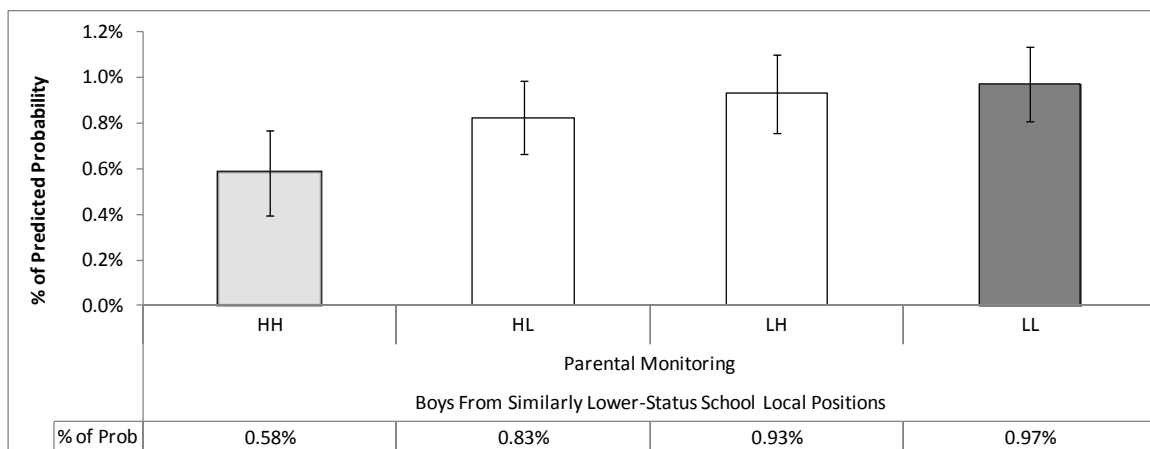


Figure 5.8b: Significant Contrasts: Boys from Similarly Low-Status Local Positions with  
Parental Characteristics of Various Levels



### c. Summary

When I examined how male pairing percentages differ by parental characteristics of various levels, I found that the moderation effects on school local position propinquity were supported by parental educational aspirations and parental monitoring models for Hypotheses Mod 3.1 and 3.2. Youths from similarly high-status local positions who had

parents with HH educational aspirations were more likely to be friends than with those whose parents had LL educational aspirations. Parental monitoring was an effective moderator for those from similarly low-status local positions as LL monitoring parents increased the chances of boys being friends more than having HH monitoring parents.

## 7. Gender Differences of Parental Moderation Influences

I had already discussed some of the gender differences in the previous section. To enable further study of the gender differences in moderation influences, I combined Tables 5.15 and 5.16 to create Table 5.17, which provided a high-level summary of gender differences. The light grey areas showed significant contrasts within gender. The dark grey areas highlighted that female and male pairs were moderated by the same parental measures: parental educational aspirations.

For both genders, parental educational aspiration moderated the association between neighborhood non-propinquity and friendship pairings. Based on moderation magnitude, girl pairs were more affected by parental educational aspiration than boy pairs (See Figure 5.4b and Figure 5.6b). For girls, the contrast difference was 3.77%, which was a little larger than that of boys (3.26%).

Table 5.17 also showed some gender differences in moderation influences. First, parental smoking and drinking and parent choosing neighborhood because of school were significant moderators only for girl pairs. There were five significant contrasts from the measures of parental drinking and smoking that moderate homophily and neighborhood propinquity. The directions of the contrasts across those findings consistently showed that LL parental smoking and drinking significantly increases the chances of girls being

friends. Among them, the biggest gap exists between low-low and high-low parental smoking and drinking from Prosocial-Prosocial pairs. It was 5.9% of the outcome standard deviation. There was only one significant contrast from the measure of parent choosing neighborhood because of school. Yes-Yes contrasts with No-No parents chose neighborhood because of school to increase girls' chances of being friends if girls were living in the same advantaged neighborhoods. The gap was 20% of the outcome's standard deviation.

Parental monitoring, however, was an only moderator for boy pairs. Its moderating effects were on boys' local position propinquity. Boys with LL monitoring parents were more likely to be friends with each other if they were from similarly low-status local positions than boys with HH monitoring parents. The gap was 3.55% of the outcome's standard deviation.

Finally, girl pairs were more likely to be moderated by parental influences in terms of the numbers of contrasts and magnitudes. Girls had 17 significant contrasts, three of which were from homophily measures and 14 of which were from propinquity measures. The gaps between the contrasts ranged from 2% to 20%. In contrast, boys had eight significant contrasts with the gaps between the contrasts ranging from 2% to 6%. All of eight were from the propinquity measures.



Table 5.17 Comparison of Adolescent Girls and Boys: The Significant Contrasts from the  
Models of Moderation Influences

	Parental SES		Parental Involvement		Parental Educational Aspirations		Parent Choosing Neighborhood Because of School		Parental Monitoring		Parental Smoking and Drinking	
	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys
<b>Prosocial-Prosocial (1)</b>	None	None	None	None	HH vs. LL	None	None	None	None	None	LL vs. HL LL vs. LH	None
<b>Antisocial-Antisocial (2)</b>	None	None	None	None	None	None	None	None	None	None	None	None
<b>Prosocial-Antisocial (3)</b>	None	None	None	None	None	None	None	None	None	None	None	None
<b>Antisocial-Prosocial (4)</b>	None	None	None	None	None	None	None	None	None	None	None	None
<b>Living in the Same Advantaged Neighborhood(5)</b>	HH/LL vs. HL HH/LL vs. LH	None	None	None	None	None	Yes-Yes vs. No-No	None	None	None	None	None
<b>Living in the Same Disadvantaged Neighborhood(6)</b>	None	None	None	None	None	None	None	None	None	None	None	None
<b>Living in Different Neighborhoods(7)</b>	None	HH vs. HL HH vs. LH HH vs. LL	None	None	HH vs. HL HH vs. LH HH vs. LL	HH vs. HL HH vs. LH HH vs. LL	None	None	None	None	LL vs. HH LL vs. HL LL vs. LH	None
<b>From Similarly High-Status Local Positions(8)</b>	None	None	None	None	None	HH vs. HL	None	None	None	None	None	None
<b>From Similarly Low-Status Local Positions(9)</b>	None	None	None	None	None	None	None	None	None	HH vs. LL	None	None
<b>From Dissimilar Local</b>	None	None	None	None	HH vs. HL	None	None	None	None	None	None	None

<b>Positions(10)</b>					HH vs. LH							
					HH vs. LL							
Note: HH: high-high level parental variables; HL: high-low level parental variables; LH: low-high level parental variables; LL: low-low level parental variables; No-Yes: parents of nominators not choosing neighborhood because of school but parents of nominees choosing neighborhood because of school; No-No: parents of nominators and nominees not choosing neighborhood because of school.												

## VI. CONCLUSION AND DISCUSSION

This chapter summarized the finding from the model estimation in Chapter V and discussed how these results contribute to both the parental-influence literature and the peer-influence literature.

### A. Summary of Findings

This dissertation focused on the relationship between parents and friendship pairings and the mechanisms behind friendship pairings among adolescent girls and boys. I used quantitative social network analysis to explore how parenting acts as a fundamental and moderating factor to influence homophily and propinquity mechanisms of friendship pairings. The findings indicated that parents fundamentally and moderately influenced adolescent girls' and boys' friendship nominations.

#### 1. Fundamental Influences

There were four primary findings for adolescent girls from the dyadic-level and individual-level models of fundamental influences on friendship pairings. First, the additive effects of homophily and propinquity suggested that they captured distinct rather than overlapping mediating pathways, but homophily was a better mediator than propinquity for the relationship between parenting and friendship pairings. The first

finding fitted with my expectation that homophily and propinquity differently mediated the association between parenting and friendship pairings. On the one hand, parents influenced youths' social adjustment and thus affected their homophily. On the other hand, parents restricted the pool of youths that their children will come in contact with, thereby controlling their propinquity. My findings reinforced discussions about the relationship between parents and peers. Although peers seem to have an influence on adolescent girls, parenting is still an active factor that adjusts their social behaviors and potential friend pool in ways that affect the possibilities of friendship pairings. I unexpectedly found that parents had a stronger influence on homophily factors than on propinquity factors for adolescent girls. There was no precedent for this finding in the literature. My findings also showed that parents may have less control over adolescent girls' potential friend pools and approachable contacts in their neighborhoods and schools than they have over their social adjustment outcomes.

Second, all significant LL parent predictors (e.g., SES, educational aspirations, smoking and drinking, and monitoring) were mediated by homophily. This finding indicated that similarities among parents was a powerful contributor to the homophily of adolescent girls. Similar parents had children with a similar level of social adjustment, which, in turn, fostered friendship. Surprisingly, this statement was true only if parents had similar positive characteristics. For example, if prosocial girls had parents with similar negative characteristics (e.g., LL SES parents, parents with LL educational aspirations, or HH smoking and drinking parents), they were less likely to be friends with each other. Thus, positive parenting had a stronger fundamental influence than negative parenting on girls' friendship pairings.

Third, parental SES was the only measure for which all classifications in the models—including HL, LH, and LL SES—were mediated by homophily. A large body of literature discussed how parental SES affected youths' potential friendships (Cohen 1987; Trust 2002; Clark and Loheac 2007). It was no surprise to find that SES had a strong influence on youths' social adjustment and affects friendship pairings.

My findings of parental influences from the dyadic-level models for adolescent girls sometime were not consistent with the evidence from the individual-level models. This fact led to the fourth and final finding. The dyadic-level models showed that parents' similarities affected youths' similarities and thus influenced friendship pairings. In contrast, the individual-level models helped explain how the covariates of nominators' parents and nominees' parents differently affected the way that homophily and propinquity influence friendship pairings. As a result, I was able to identify uneven predicted power between nominators' parental variables and nominees' parental variables in the individual models.

For example, I found that none of the female nominators' parental characteristics was associated with friendship nomination, leading me to conclude that among adolescent girls, the nominee's parental characteristics were a more significant predictor of friendship nomination than the nominator's parental characteristics. I also found that some of the predictors that were significant in the dyadic-level models lost significance in the individual-level models, and vice versa. For instance, neither nominators' nor nominees' parental SES status affected their chances of friendship pairings. This contradiction led to the need for further understanding about the role that parental SES played in adolescent girls' friendship pairings. As long as nominators and nominees had

similar SES status parents, their chances of being friends were higher than nominators and nominees with dissimilar SES parents.

Another interesting finding was that for girls only the effect of the nominees' parental characteristics were mediated by homophily and propinquity. Parental educational aspirations for their adolescent girls, neighborhood choice, parental smoking and drinking, and parental monitoring all significantly predict nominees' social adjustment and were mediated by homophily and propinquity. Fletcher et al. (1995) found that parental authoritativeness in the peer network benefits adolescent girls above and beyond the positive impact of parental authoritativeness at home. My finding suggested that nominees with authoritative parents (e.g., high monitoring parents) became more popular in network nominations than others. Because nominees' parental authoritativeness could influence both nominees' and nominators' social adjustment, it affected the results of homophily and thus the probability of pairing.

For adolescent boys, the fundamental influences models, which were tested at both the dyadic and individual levels, produced some statistically significant findings. For adolescent boys, dyadic-level parental SES and parental involvement were major factors affecting their nominations. As nominators, boys whose parents had higher educational aspirations and higher monitoring were more likely to nominate others. Similarly, if the nominees had parents with higher involvement and higher educational aspirations, they were more likely than other boys to be nominated.

Some of my findings from the girls' models were also applicable to the boys' models, including the first three finding that I discussed for girls. They were the additive effects of homophily and propinquity, the significance of LL parent predictors, and the

contribution of the measure of parental SES. There were also some gender differences between the models for girls and boys. I focused on two major differences. One such difference arose in the parental variables. Parental involvement was an effective way to influence friendship pairings, a finding consistent with the literature (e.g., Dornbusch et al. 1987; Steinberg, Dornbusch, and Brown 1992; Fan and Chen 2001; Hill et al. 2004). However, previous studies had not found gender differences for this parental behavior. I found that parental involvement seems more important for adolescent boys' friendship pairings than for adolescent girls'. One possible explanation was that during adolescence, an individual with weak social bonds had a greater tendency to engage in deviant behaviors such as delinquency and drug use. Adolescent boys were more likely to be involved in those types of deviant behaviors than girls (Giordano and Cernkovich 1997; Mears, Ploeger, and Warr 1998). Thus, parental bonding held an important position in shaping boys' social adjustments.

Parental smoking and drinking made a unique contribution to girls' network nominations as it had a significant negative impact on their attractiveness. Parents with negative characteristics in a female nominee's network could negatively impact her social adjustments and social competence. Thus, female nominators were reluctant to bring in nominees with parents who engaged in negative behaviors such as smoking and drinking.

The individual model also detected the fundamental influences of both nominators' and nominees' parents for adolescent boys. For nominators, their parents' educational aspirations and monitoring were significantly mediated by homophily and propinquity. Higher educational aspirations and higher parental monitoring had an influence on nominators' social adjustment and affected nominators' pools of potential

friends. I also found that nominees' parental involvement and educational aspirations seemed to promote their popularity: the higher the parental involvement and educational aspirations, the higher the chances that the youth were nominated.

## 2. Moderating Influences

The moderation models for adolescent girls indicated that some similarities among parents and girls had cumulative effects that promote friendship pairings. The main factors that I identified through the fundamental influence models (parental educational aspiration for youths and smoking and drinking) played significant roles in the moderation models of homophily. The similarity of prosocial characteristics combined with the similarity of positive parental characteristics (HH educational aspirations and LL smoking and drinking) to increase the chances of the girls forming friendships. Parental monitoring, which was mediated by homophily and propinquity in the fundamental influence models, lost its significance in the moderation models. This change indicated that parental monitoring only indirectly affected friendship pairings for girls.

In the examination of neighborhood propinquity, parental smoking and drinking was a significant moderator across most propinquity configurations for girls. If prosocial girls from different neighborhoods had parents who smoke and drink less, they were more likely to choose each other as friends. I also found that prosocial girls from the same advantaged neighborhood were more likely to be friends if they both had similar SES parents. In addition, girls from different neighborhoods were more likely to be friends if they both had parents with high educational aspirations for them. When I model local position propinquity, I found that prosocial girls were from dissimilar local

positions, having parents with high educational aspirations was an important factor that increases their chances of being friends.

For adolescent boys, at the dyadic-level, SES and parental involvement had a fundamental effect on their friendship pairings; at the individual level, parental educational aspirations, parental involvement, and parental monitoring had the most powerful influence. For the moderation effects on homophily, none of the above measures was significant.

In regard to moderation effects on propinquity, three of four significant predictors from the fundamental influences models still significantly moderated boys' friendship pairings. They were parental SES, educational aspiration on youths, and parenting monitoring. Parental involvement was out of predicting significance. For adolescent boys, if they were from different neighborhoods, having parents with high SES or high educational aspirations increased their chances of being friends. The moderation influence findings from school local position propinquity were spread across the measures of parental educational aspirations and monitoring. Among boys with low-status local positions, those with low monitoring parents were more likely to be friends than boys with high monitoring parents. The moderation influences of parental measures of educational aspirations indicated that, if boys who were from similarly high- status local positions had parents with similar positive characteristics, their chances of becoming friends was high.

### 3. Summary

In regard to parental influences on adolescent girls' friendship pairings, my primary finding was the fundamental and moderating effects of three parental measures:



SES, educational aspirations for youths, and smoking and drinking. (Parental monitoring only had fundamental effect on girl pairing, and parent choosing neighborhood because of school was only a moderator with significant contrasts for yes-yes vs. no-no among girls living in the same advantaged neighborhood.) Prosocial girls had a tendency to choose friends who were not only similar to themselves in terms of social adjustment or approachability in the neighborhood and the school, but also similar to themselves in family SES status and parental educational aspirations. Both prosocial and antisocial girls were likely to be friends with girls whose parents drink and smoke less. On the one hand, these findings showed that three parental measures—parental SES, educational aspirations for youths, and smoking and drinking—directly and indirectly affected girls’ peer group affiliations. On the other hand, they provided evidence that it was important that girls had parents with positive characteristics to prevent them from engaging in deviant behaviors or bonding with deviant peers. Parents who involved girls in prosocial activities and raised their girls to believe in conventional norms can shape their behaviors in a way that fundamentally (indirectly) and moderately (directly) affected their friendship pairings.

For adolescent boys, the fundamental and moderating parental influences were most apparent in the measures of SES, educational aspirations, and monitoring. (Parental involvement only had fundamental effect on boy pairing) The modeling results show that these parental controls not only influenced adolescent boys’ behaviors but also their potential contacts in the neighborhood and in school. For adolescent boys, parents not only shaped their social adjustment but also paid a lot of attentions to their socialization environment so as to affect their friendship pairings. However, parents had no direct

moderating influence on adolescent boys' behavior similarities and peer affiliations. Parental SES, educational aspirations, and monitoring only affected their neighborhood and school propinquity and their pairings. These results suggested that parents had a more direct influence on the pool of potential friends available to their adolescent boys than on friends' social adjustment outcomes.

## B. Conclusion

Prior literature offered two propositions about the relation between parents and peers: parent-peer conflict and parent-peer linkage. Studies using the conflict perspective showed that by the onset of puberty, adolescents were increasingly susceptible to peer influence and decreasingly susceptible to parental influence, which resulted in a rush from dependency on parents to dependency on peers (Steinberg and Silverberg 1986). From the linkage perspective, parents can influence peer group affiliation both directly and indirectly. For example, parents may influence the development of their child's social competence and social skills, which helps adolescents develop their peer relationships (e.g., Parke and Bhavnagri 1989; Fuligni 1993; Kandel 1996; Mounts 2002, 2004). Parents can also influence which qualities their children look for in friendships through their management of peer relationships (Durbin et al. 1993; Knoester et al. 2006; Nebbitt et al. 2007) as well as through parental control in the parent-child dyad (Updegraff et al. 2002) and maternal and paternal familism value interactions. (German, Gonzales, and Dumka 2009)

The primary difference between these two theoretical frameworks was whether parental controls wane during adolescence due to the increase of peer influences or whether parental controls were interacting with peer influences as parents indirectly and

directly guide youths to peer affiliation. Although scholars had widely and separately studied the mechanisms of homophily, propinquity, and parent-peer linkage, it was surprising that no studies had examined whether family context contributes to and/or interacts with homophily and propinquity in regard to adolescents' friendship pairings. There was a gap in the literature between the studies of friendship pairing mechanisms (i.e., homophily and propinquity) and the studies of parental influences on friendship pairings. Thus, in this study I hypothesized pathways from parents to friendship pairings instead of peer quality to fill the literature gap of the parent-peer linkage proposition.

Overall, the findings from the fundamental and moderating models support the parent-peer linkage proposition across gender, though parental influences worked through more on homophily variables than on propinquity variables to fundamentally affect friendship pairings for both boys and girls and in term of moderation, parental influences moderated propinquity more than homophily to affect friendship pairings.

Parents were not only guiding their adolescent children indirectly by bonding their children to conventional goals and activities so as to facilitate interaction with conventional peers but also by directly bonding them to conventional peers or conventional socialization contexts. I found the parent-peer linkage to be quite significant when I assess the measures of parental SES and parental educational aspirations. Prosocial youths who had parents with high SES and high educational aspirations were more likely to be friends with prosocial peers. Parents thus linked their children to peers through the influences of their socioeconomic status and through their beliefs in the value of education.

I also observed gender differences in the parent-peer linkage. First, the parent-peer linkage among adolescent girls had a stronger influence on girls' social adjustment than did manipulation of the socialization environment. Parents had more influence on their children's and their peers' behaviors and less influence on the potential friend pool that their children were exposed to. For boys, parents had both strong control over peer quality and the peers to which their boys were exposed. Second, parent-peer linkage for girls was distinctive on the measure of parental smoking and drinking. Girls whose parents smoke and drink less were more likely to form friendships with girls with similar parents. The parent-peer linkage for boys was not affected by this factor. In sum, parent-peer linkage had a fundamental and moderating influence on adolescent girls' pairings. For adolescent boys' pairing, however, such influences were more indirect than direct.

### C. Limitations and Future Research

One major limitation of this study is that I only examine parental influences through the nomination of school friends. Add Health data were collected in 1994, an era in which friendships were built mainly through physical interactions. In the 21<sup>st</sup> century, friendships are formed and develop in a variety of ways. One significant change is that friendships are now formed through social media. Because the Internet can broadly affect adolescents' social lives, the exclusion of the Internet as a means for friendship nomination limits my understanding of parental influences on all of a youth's possible social networks. As youths become more and more involved in virtual friendship networks such as Facebook and Twitter, the parent-peer linkage could develop differently from what I analyzed through school nominations. The addition of qualitative data or

quantitative virtual network data could provide essential input for understanding parental influences on virtual friendship pairings.

A second limitation centers on the omission of friendship dynamics in this study. As a national longitudinal study, Add Health provides data on the dynamics of friendship pairings including intact, new forming, and new dissolving pairings. However, because I introduced parental interview information and AHAA data into the saturated school samples, this limited my sample size and meant that I could examine friendship pairings at only one time point. In the future, it would be interesting to study the dynamics of friendship formation over time to determine whether parent-peer linkage is stable over time and what types of pairing are more vulnerable or stable under parental influences.

The third limitation is my inability to test school random effects, due to the sample size. This limited my understanding of school effects on youths' friendship pairings.

In addition to the above data limitations, a few gaps in the research deserve future study. One question is how parental influences affect cross-gender, cross-age, and cross-race friendship nomination. My study only focuses on friendship pairings within same-gender, same-race, and same-age dyads. Including pairs that mix race, gender, and age would provide a broader view of parental influences on the entire social network of adolescents. The other question is whether parental influences are moderated by neighborhood quality. In the research design, parents and youths are treated as units nested within neighborhoods and schools. Thus, another interaction that research can test in future studies is the crossed random effect of neighborhoods and schools. Because parents play an important role in their children's friendship pairings, the interaction with

neighborhood effects is an area for future research. Connecting parental influences and neighborhood influences could lead to a research framework of parent-neighborhood-peer linkage for examining adolescents' peer group affiliations.

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