The Effects and Structural Conditions of Network Closure
between Adolescents and Parents

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1. INTRODUCTION

Intergenerational network closure, best illustrated when an adolescent's parents know the parents of the child's friends, has emerged as an inspiring concept in the adolescence study. As a network that connects several significant actors, it also exemplifies how social actions utilize and produce social capital in the family, school, and community, thus becoming an important research topic in its own right. This study aims to investigate two issues that surround intergenerational network closure. First, it examines how adolescents' achievement and well-being vary by the extent to which a network across generations is closed. Second, it explores how the degree of network closure varies by two major structural conditions: the external network resources to which the actors can get access, and the strength and position of the internal ties that constitute such an intergenerational network.

In addition to the general contribution of the network perspective, the concept of intergenerational network closure further challenges the conventional thinking about the adolescents' achievement and well-being. According to Coleman (1988, 1990), it adds to the adolescence study in at least two ways. The concept leads researchers to pay more attention to the family background that extends from financial capital (e.g., family income) and human capital (e.g., parents' education) to within-the-family social capital (e.g., the parents-child relations). Outside the family, it captures the actors' overall social capital, as well as the social capital embedded in school and community. While parents' financial capital and human capital contribute to how well the children achieve at school, the various forms of social capital embedded in a closed network greatly facilitate and mediate such parental influences. Moreover, parents can ensure that the norms, expectations, and values they share flow to their

children not only through the parents-child tie, but also by the strong links with the parents of their children's friends. With adequate mutual parental supervision, thus, the children are able to perform better at school while keeping themselves out of troubles.

Empirical studies have produced mixed findings, but Coleman's arguments raise a critical issue about how various network forms bring about different outcomes. In a closed network where everyone knows everyone else, members typically receive better supports from one another. However, because a closed network tends to be more isolated from the outside world, the "closure argument" may be limited. When the network is not closed, the more structural holes it opens up facilitate bridges that lead members to wider resources outside the network (Granovetter 1973, 1983; Burt 1992). As Burt (2001) suggests, such an open network helps parents bring in more resources from outside to enrich the opportunities for their children and supplement the within-the-family social capital. In other words, a closed dense network may maintain or strengthen internal solidarity, while an open, loose network enhances the well-being of the members by expanding the overall resources (Lin 2001).

Each of the closure argument and the open argument emphasizes on different forms of network and explains different effects. Each supplements the other. In the adolescence study, in particular, these two perspectives can be integrated to help us better understand the circumstances under which a critical link is established between parents and their children's friends' parents. On the one hand, the link is more likely to exist if other ties within the intergenerational network are stronger. More specifically, both the friendship tie between two adolescents the parents-child tie tend to condition the parents-parents tie. On the other hand, the parents-parents tie also varies on how much the parents are involved in school, community, and other social activities, as well as how well the adolescent is integrated into school. In addition to examining the effect of network closure, therefore, this study analyzes the structural conditions that frame such network closure between adolescents and parents. The significance of the study thus lies in not only the adolescents' well-being, but also the

structural formation of a complicated network in which multiple actors interact across generations.

2. NETWORK CLOSURE ACROSS GENERATIONS AND ITS EFFECTS

In Coleman's observations, intergenerational network closure has become probably the most important attribute that affects many forms of an adolescent's social capital, which in turn largely determines how well the adolescent performs at school. The academic performance, for instance, varies not only by the adolescents' individual intelligence and family background, but also by parents' relationships with other parents. Both the family income and parents' education play important roles, but they help the adolescents most effectively if the parents maintain close relationships or pay a great deal of attention to their children. Only when the parents-child tie gets stronger, or when the within-the-family social capital is richer, do other forms of the family capital benefit the adolescents more fully. Moreover, the parental attention and involvement can go through the strong links with other parents to reach the adolescents.

Such network closure helps the adolescents achieve higher grades or scores, as some empirical studies have confirmed. It also keeps them out of troubles or delinquency (Israel et al. 2001:58; Fletcher and Newsome 1999; cf. Sampson et al. 1999). The strong parents-parents link allows parents to communicate with each other about children's behaviors, and enables them to monitor and supervise the children's activities more effectively. Under close supervision, the children are able to behave and act in line with socially productive and conventional norms. As a result, parents work together to create a supportive environment that enables them to detect early signs of deviance and prevent further delinquent behaviors. In other words, closure facilitates norms to encourage positive behaviors and limit the effect of negative influences (Giorgas 2000). Otherwise, the adolescents would develop their own peer cultures with distinctive norms and values, which help breed peer cultures that are not

necessarily aligned with social conventions (Arum 2000).

In other studies, the closure argument has gained little support and received critical comments. For example, in the families of first-generation American immigrants, the adolescents receive very limited academic benefits from parental involvement at school. Their school achievements even have negative association with intergenerational network closure (Pong et al. 2002). Another recent study shows that the adolescents' ability scores on math decrease if their parents know more of the children's friends' parents (measured from "most of them" to "none") (Chang et al. 2004). Researchers contend that network closure alone provides no obvious benefits to children. Only when parents who know each other actually share same norms, expectations, and values about child rearing does network closure play the critical role of mutual and effective supervision (Morgan and Sorensen 1999a, 1999b; Hallinan and Kubitschek 1999). In other words, for network closure to turn into the social capital that functions to the children's benefits, there must be subjective conditions that accommodate the structural form.

Besides the criticisms about network closure, the empirical evidence about the effects of network closure has been inconsistent, possibly because the school context differs from culture to culture. It may be also due to imprecise measurement about "intergenerational closure". By "intergenerational network closure", Coleman (1988, 1990) clearly refers to a network, or a community of networks, which good friends' parents know each other fairly well. At the community level, the degree of closure varies by the proportion of parents (at school of in community) who are mutual acquaintances. At the individual level, a specific intergenerational network ranges from a typical closed network, where two adolescent friends and their parents are all connected to each other with strong ties, to a typical open network, in which the parents-parents tie is missing.

The concept appears to be clear-cut, though Coleman (1988, 1990) admits that he uses indirect measurements to analyze the degree of network closure. Instead of showing whether parents-parents tie is present, he adopts more common measures that

imply the variation in network closure, as do some other researchers. Two common measures include "how many children there are in the family" and "how many times the family has moved". As a large family size has been proved to hinder children's educational performance (Blake 1989; Downey 1995), it also affects two of the structural components of the intergenerational network – the parents-child tie and the parents-parents tie (more children, less attention paid to each child's social activities). Likewise, the more frequent change of residence decreases the parents' chance of getting to know other parents at school or in the neighborhood. These indirect measures may be valid, but a direct measure would be certainly more convincing.

Some recent studies have used more direct measurements. Either students or parents answer the question about how many "parents of the child's friends" these parents know of (e.g., Chang et al. 2004). Others measure the ties that are closely relevant. For example, studies have shown that academic performance varies with how well mother knows the child's close friends (by sight and name), how frequent parents volunteer in school activities, and how much parents are involved in community associations (Parcel and Dufur 2001:894; Pong et al. 2002; Arum 2000). Such measures are often regarded as social capital in the family, school, and community contexts. As factors that have something to do with the student performance, they also reveal other critical components, both external and internal, that constitute an intergenerational network.

If an intergenerational network plays such a significant role in the adolescents' school performance and well-being, it should merit a more thorough analysis on its' structural conditions. To further examine the closure argument, we need to analyze the internal circumstances that contribute to network closure. To verify the merit of the open argument, in addition, we should also explore the external resources that the adolescents and parents bring in from outside the family, particularly at school and in the community.

3. STRUCTURAL CONDITIONS OF INTERGENERATIONAL NETWORK CLOSURE

Both internal and external conditions contribute to how an intergenerational network is structured. The external conditions involve more network resources to which both adolescents and parents are embedded. There are two competing possibilities about the relationship between external and internal conditions. First, external structural conditions may be in conflict with internal conditions. For example, if the adolescents and parents are engaged in many activities outside the family, they may not be able to maintain strong ties with other actors in the intergenerational network.

Second, external resources may help build stronger ties within the intergenerational network. In particular, the more community and school activities parents are involved, the more chances they have in getting to know other parents, especially the parents of the child's good friends, thereby increasing the likelihood of achieving intergenerational network closure. The degree of network closure, therefore, may depend on how parents and adolescents are embedded in external circumstances.

3.1. External resources

Parents normally know other parents through their children. When parents are active and heavily involved in school or community, however, they may get to know other parents directly. Instead of using children as a bridge, they make new acquaintances by investing their own time and efforts. Other possible effects beyond school and community seem less certain, and remain questionable. For example, are parents more likely to know other parents if they have better overall connections or participate in more voluntary associations? In addition to these direct effects, moreover, how strongly do the adolescents' network resources help establish the parents-parents ties indirectly? These various resources around different actors represent significant conditions external to an intergenerational network.

Unlike network closure in an adult's global personal network, the formation of

intergenerational network closure involves actors across two generations, in at least two separated but closely related social circles outside the family -- school and community. Studies have confirmed the strong association between parental involvement at school and the adolescents' academic performance. As parents volunteer in the PTA, assist classroom teachers, help with other school events, they are able to follow closely what their child has been learning. They can also exchange information more intensively and extensively with other parents. These opportunities further assist their child in academic performance and other well-beings (Pong et al. 2002). That is, parental involvement at school helps their child both directly and indirectly, by going through strong links with the parents of the child's close friends.

Parents differ on school involvement. At the aggregate level, network resources also vary from school to school. The environment and resources of school create different levels of social capital. Richer "school social capital", as furnished in many religious private schools in the U.S., provides better opportunities for parents to reach out to other parents. When most parents know one another, they form an informal support network for students, which in turn helps carry on what the school wants to accomplish. Such school-based involvement also enriches community social capital (Coleman 1988; Parcel and Dufur 2001:885).

Like the school-based network involvement, the community-based involvement should help parents reach out to other parents. In communities where residents attend community or neighborhood activities frequently, or in communities where most people know one another, parents tend to have more network resources within the community. By means of overlapping and multiple relationships, local interests of the community residents are also better coordinated. Such a high level of community involvement or density is usually present in ethnic or Catholic communities, or in villages and small towns (Israel et al. 2001:46; Coleman 1988; Freudenberg 1986).

Strong community involvement or high acquaintance density tends to prevent crime or adolescent delinquency, or at least lowers the fear of crime, though its effects on students' academic performance are unclear. However, do these community-based

network resources help build parents-parents ties? How is the community social capital transferred to the family social capital? Studies have shown that when parents attend community activities with their children, such as religious services, the effects of community participation usually become stronger (Pong et al. 2002; Israel et al. 2001:48). In other words, the parental involvement in community represents a significant factor in shaping intergenerational network closure, while the joint community participation by both adolescents and parents may further help constitute such a network form.

In addition to school and community involvement, do parents' resources in general help them get to know other parents? Among common perspectives of the overall social capital, both network and civic engagement arguments should help examine the question. According to both perspectives, a wider personal network and overall participation in voluntary associations increase one's contact resources. Such overall resources are the capital invested and ready to use, in both expressive and instrumental social supports (Lin 2001; Burt 2001; Putnam 1993a, 1993b). Since the parents-parents ties are a component of the school-related network, parents' overall network resources may be less relevant. However, the adolescents' own network at school may be an important factor, although its effects on the strength of parents-parents tie are indirect. When a student is well connected at school with more close friends or acquaintances, the parents are expected to know more other parents too. But these parents are usually also more involved in school activities. Thus, these overall external network resources of both parents and the adolescents represent another aspect to be examined in the formation of intergenerational network closure.

3.2. Internal structure

Besides the external resources, one should also take the internal structure into account while analyzing the structural conditions of intergenerational network closure. The actors' external resources are important in shaping the network structure, but the internal structural conditions may be more fundamental and decisive. In terms of

conceptualization, a line may be drawn between the external and internal structural conditions. More distinctively, the two kinds of conditions are to be analyzed at different levels. While the external resources belong to an individual property, we should examine the internal structure at the "tie" or "network" level. In other words, the internal structure consists of various ties. The topics of interests thus belong to a tie property or network property. Using tie or network as the unit of analysis, one can understand how intergenerational network closure becomes formulated beyond the individual properties.

The literature has been missing about how the strength of parents-parents tie varies with other, primary ties in an intergenerational network. In an intergenerational network, both the friendship tie (or ego-alter tie) and the parents-child tie (or the ego-parents tie) are strong, normally the most fundamental and significant interpersonal relationships for an adolescent. According to social network theory, when two adjacent ties are both strong in a triad network, the third tie should also get strong (Granovetter 1973, 1983). In an intergenerational network, however, more actors and more ties are involved. Around the two primary ties (the friendship tie and parents-child tie), are there more potential ties that may become significant?

When the friendship tie and parents-child tie are both strong, for example, parents and ego's friend should know each other well. But the parents-parents tie involves two actors beyond the ego-alter tie, and usually indirect social ties beyond a couple of steps are less likely to develop. In some intergenerational networks, however, all three ties that lead to parents-parents tie are so strong that it is more likely to develop a closure. That is, the ego's parents-child tie, the ego-alter tie, and the alter's parents-child tie are all strong. However indirect, several steps of strong, significant ties may still lead to a meaningful connection, particularly in East Asian cultures that place the values of strong ties very highly (Bassani 2003; Bian 1997).

Three ties in intergenerational network closure are significant components to the structure: whether ego knows the alter's parents, whether ego's parents know the alter, and whether ego's parents know the alter's parents (cf. Fletcher and Newsome 1999).

Using the last tie as the focal point, this study examines how it varies by the strength of the ego-alter tie and the strength of ego's parents-child tie. As these ties get stronger, the parents-parents tie is more likely to develop and flourish. Since an intergenerational network is built around the ego-alter tie, moreover, this tie should play a more decisive role that leads to a strong parents-parents tie.

The intergenerational network in this study starts from a single adolescent. But ego's parents are as important as the child in playing the focal point of the network. The parents' resources from outside the intergenerational network help explain how likely or how strong a parents-parents tie will develop. The effects of such parental resources may outweigh that of the adolescent's resources. In addition to these external resources, this study takes into account how the parents-parents tie varies by other critical components of an intergenerational network, particularly the ego-alter tie and the parents-child tie on the ego's side. While the external resources are individual properties, the internal structure involves properties at the "tie" or the "network" level. By means of analyses at both the individual and the tie levels, the study aims to understand intergenerational network closure more comprehensively.

4. DATA AND MEASURES

This study draws data from the Taiwan Youth Project, First Panel, Wave 3. The surveys were conducted in 2002, in Taipei City, Taipei County, and Ilan County. The successful samples include a self-administered survey of 2,663 students at middle schools (all third-year, equivalent to the 9th grade in the U.S.), and a self-administered survey of 2,023 parents. A merged data set contains 1,978 cases, which is used for analyses at the individual level.

In the student questionnaire, each respondent was asked to list up to three best friends. The student then gave details about each friend's characteristics and the relationship between ego and each alter. The data were then transferred from the individual to the "tie" level. In the second part of this study, these "tie characteristics"

become the focus of analysis, at the tie level. Because these characteristics differ from network to network, the analytical unit is also regarded as a network.

To make the analyses more focused, the network data exclude the following cases: (1) either one (or both) of ego's parents was (were) not alive (n=128; 5% of the students); (2) either ego or ego's parent(s) did not complete the questionnaire (n=730, 27% in the merged student-parent sample); and (3) the ego-alter tie is cross-sex (n=476, 8% of all pooled ego-alter ties). These exclusions can be justified because single parents may maintain very different tie patterns with the adolescents, while cross-sex close friends in middle school may have different implications for an intergenerational network. The final network data set contains 5,210 cases.

4.1 Dependent Variables

In the parent's questionnaire, each respondent was asked: "About how many parents in your child's class do you personally know?" The answers range from (1) none (30.1%), (2) 1-2 (30.5%), (3) 3-5 (25.7%), (4) 6-9 (7.0%), to (5) over 10 parents (6.7%). This variable is used as the major dependent variable when the individual is the analytic unit.

In student's questionnaire, each respondent judges whether his/her parents know each of his/her three best friends' parents. The response categories include: (1) know each other very well, (2) know each other, but not very well, and (3) do not know each other. When the unit of analysis is tie or network, this response constitutes the major dependent variable. The value of the response has been recoded, so a higher value always represents a stronger tie.

Two variables in student's questionnaire serve as the indicators of academic achievement and well-being, respectively. First, the original question about "class ranking" contains ordinal categories ranging from (1) top 5, to (5) 30 or higher. Since class size differs from school to school and from area to area, the ranking has been adjusted by the class size, then transformed into standardized scores. The higher the value, the better the student stands in academic performance.

Second, an indicator of "delinquent behaviors" is constructed from a 9-item scale (responses are from 1 "never" to 4 "often"), using Principal Component Factor analysis (Appendix 1). The first factor refers to more serious delinquency, such as disobey school rules, miss classes on purpose, drink, smoke, or use drugs, cheating in exam, and make troubles by fighting, etc. The final scores are standardized. The higher the score, the more delinquent the student tends to be.

4.2 Independent and Control Variables

Several demographic and socioeconomic characteristics, both of the student and of the parents, serve the basic control variables. These variables include student's gender, mother's education, the family income (recoded as seven ordinal categories), and rural-urban background. Since father's education is highly correlated with mother's education (r = 0.68), only mother's education is included in the analysis. The rural-urban background includes three levels of urbanization: rural, towns/small cities, and large city. In the sample, only Taipei City belongs to large city.

Parents' general network resources include three indicators. The first variable refers to the number of positions in the parent's (who filled out the questionnaire) acquaintance network, as measured by a position generator (see Lin et al. 2001), ranging from 1 to 4.[1] The second variable shows the extent of interpersonal contacts in one's daily life (ranging from 1 to 6). The third variable is a standardized score based on factor analysis of the items that indicate how broadly the parent participates in voluntary associations (Appendix 2).

Student's school resources contain two indicators: how many strong ties in class (5 ordinal categories) and how many acquaintances outside the class (6 ordinal categories). Parents' school involvement also includes two dichotomized variables: whether the parent volunteers in school's activities, and whether the parent helps

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[1] The number refers to how many positions exist in the respondent's acquaintance network. The positions used in the position generator are: physician, high school teacher, people's representative (at any level), and policeman/woman.

coordinate and supervise in the school's extra study sessions at nights or on the weekends. Parents' community involvement is measured by either (1) a standardized score of community participation (Appendix 3), (2) proportion of neighbors among one's daily contacts (ranging from 1 to 5), or (3) a standardized score of joint participation in community activities by both parents and students (Appendix 4).

Each of the two critical ties in the internal structure contains two indicators. The parents-student tie is measured either by student-father attachment (a standardized score from a 12-item scale, with principal component factor analysis, Appendix 5), or by father's parenting (another standardized score from a 4-item scale, principal component factor analysis, Appendix 6). Because the mother-child tie is usually stronger than the father-child tie, the latter is regarded as more critical and thus included for analysis. Another tie, the adolescent's ego-alter tie, refers to either the length of acquaintance (3 ordinal categories) or the frequency of contact by telephone (4 ordinal categories).

5. THE EFFECTS ON CLASS RANKING AND DELINQUENT BEHAVIORS

The parents-parents tie at the individual level appears to be a significant factor that contributes to a better class ranking for the adolescents. As Table 1 shows, the class ranking varies by several background factors. For example, female students usually rank higher in class. A student's class ranking will be also better if mother has achieved a higher education level, or the family income is higher (Model 1). Such effects from human capital (parent's education) and financial capital (family income) remain significant in all models, when the analysis takes other factors into account.

(Table 1 about here)

The within-the-family social capital also plays a meaningful part in explaining class ranking. Even when we take both financial capital and human capital into consideration, both "attachment to mother" and "mother's parenting" are highly significant. When the adolescent feels more attached to mother, or when mother

spends more time and efforts on parenting the child, the better class rank the adolescent will achieve (Models 2 and 3).

As other studies have confirmed, an adolescent will perform better in class if the parents get more involved in school activities. It is clear that those whose parents ever volunteer at school during the past year will rank higher in class, regardless of individual or family characteristics, the degree of attachment to mother, and the severity of mother's parenting (Model 3). While the within-the-family social capital is important, parental involvement in school also renders positive contribution to the adolescent's academic performance.

More importantly, an adolescent will rank higher in class if his/her parents know more other parents. Compared to those adolescents whose parents know no other parents in class, those whose parents know other parents are apparently ranked higher. The effect is nearly linear -- the more parents one's parents know, the better ranking the adolescent will get, regardless of other relevant background factors. When parents know more than five other parents, the class rank will be particularly higher. In other words, even though an adolescent's academic performance gets better when parents have richer financial capital and human capital, parents are more involved in school activities, and parents and children share better family social capital, network closure across generations still plays a positive contributing role.

Likewise, an adolescent's tendency in displaying delinquent behaviors also varies by similar individual, family, school, and community background (Table 2). Delinquency is more evident among male students. It is less likely among those whose mothers have higher education levels, and among those who maintain positive and close relationships with their mothers. When these and other relevant factors are held constant, the adolescents whose parents know more than five other parents again show fewer signs of delinquency (Model 2). If the parents-parents tie is measured as a single ordinal variable, its overall effect on delinquent behaviors remains highly significant (Model 3).

(Table 2 about here)

Thus, intergenerational network closure clearly plays an important role in understanding the adolescents' academic performance and delinquency. Such effects are independent of the individual and family characteristics, parents-child ties, as well as parental involvement at school and in community. Regardless of parents' financial and human capital, the within-the-family social capital, parents' external network resources, network closure appears to help the adolescents significantly. Whether it facilitates support or supervision through close friends' parents, intergenerational network closure does promote the adolescents' well being and achievement. It is important to analyze how this significant network structure varies by both external and internal structural conditions.

6.   EXTERNAL NETWORK RESOURCES AND INTERNAL TIES

What kinds of individual, family, and structural conditions constitute intergenerational network closure? More precisely, which factors in external resources and internal structure contribute more to such a special network structure? Using the "number of parents known" as dependent variable, we can differentiate most of these effects (Table 3).

(Table 3 about here)

Among the three indicators of parents' general resources, both number of positions (from the position generator) and the participation in voluntary association show significant positive effects on the number of parents known (Models 2 and 3). When the parents get access to more positions in the acquaintance network, or when they participate in more voluntary associations, these parents will be likely to know more other parents from the child's class.

Parents' involvement in school and community also help them get to know more parents. Compare to other parents who are inactive at school, those who have volunteered or have helped extra study sessions at school during the past year apparently know more parents from the class. Likewise, those who are more active in

their communities also tend to be better connected with other parents (Model 3).

These effects from external resources are present at the individual level. Intergenerational network closure, however, represents a unique "network" type. Put it differently, the tie that distinguishes a closed network from an open network, the parents-parents tie, has its own unique "tie" property. An adolescent usually has multiple close friendship ties, which vary in strength and other tie properties. There may be several intergenerational networks that differ in the degree of closure, all surrounding the same adolescent. Analysis at the individual level will not reveal such a variation. To analyze such network or tie properties more appropriately, then, we now turn to use "tie" or "network" as an analytic unit.

Since each adolescent respondent lists up to three close friends and their characteristics, the potential number of networks would be three times of the respondents. Even with an identical adolescent ego, each of the friendship ties is likely to differ from network to network. So is the parents-parents tie. As Figure 1 shows, the first close friendship that a respondent lists appears to produce a more closed intergenerational network. Among the networks that surround the first close friends, 16.9% belong to closed networks, while 51.7% are open networks. For the third close friends, only 10.8% yield a closed network, while 64.7% generate open networks. In other words, 16.9% of ego's parents know the parents of their child's first close friends very well; 51.7% of parents do not know their child's first close friend's parents at all. Overall, 13.2% of the intergenerational networks are closed, and 58.9% are open networks. The following analyses include such a "network position" as a control variable.

(Figure 1 about here)

When we take into account individual and tie characteristics, the network position remains a very significant background factor. The networks surrounding the first close friends clearly tend to be more closed than that surrounding the other close friends (Table 4). In other words, the parents maintain stronger ties with the parents of the child's first close friend. The second close friend also yields a more closed

intergenerational network than the third close friend, though the gap decreases. The findings justify the ordering of close friends in the adolescents' mind. It also confirms that intergenerational network closure does build around friendship ties that are closer to ego.

(Table 4 about here)

Some of the individual and family characteristics also affect how an intergenerational network formulates. The networks are more likely to be closed around male adolescents, in core cities, or if mother's education is higher. While parents' human capital helps explain the emergence of network closure, the other findings render substantial implications and raise important questions. For example, why do parents get to know son's close friends and their family better? Do the parents do this as a way to pay more attention to son's education? Are they more cautious about son's social activities because it is easier for boys to have bad influences from friends? Or boys' parents have more opportunities to get to know one another simply because they are more social and more active? As shown earlier, female students tend to rank higher in class, while boys show more delinquent behaviors. Thus, even though the intergenerational networks around boys contain more strong ties, boys still do worse than girls in academic performance, and their behaviors are still more delinquent. These two gaps are so substantial that we cannot explain them by network closure. There should be other factors that contribute the gender differences.

When the individual and family characteristics are held constant, both the parents' and the students' network resources help establish the parents-parents ties (Models 2-4, Table 4). For the parents, either the number of positions in the acquaintance network or the participation in voluntary associations yields a separate positive effect on the parents-parents tie. Put together, however, only the social participation remains significant. For the student, both indicators of their network resources at school, strong ties in class and acquaintances outside the class, predict well how strongly the parents know the close friends' parents.

Most of the effects of both parents' and the student's general network resources

remain significant after we also take into account the parents' involvement at school and in community (Table 5). Similar to what we found at the individual level, the parental school involvement produces significant effects on parents-parents tie at the network level, in terms of either voluntary work in school activities or helping in extra study session (Models 1, 3). The effects of community participation and parents' general network resources, however, disappear. Instead, a joint participation by parents and students turns out to be significant in explaining the strength of parents-parents tie.

(Table 5 about here)

Therefore, the external resources generate mixed results. Parents' general resources and community involvement have little to do with how strongly they know the parents of the student's close friends. Both the student's networks at school and the parental school involvement turn out very important. The only meaningful structural condition outside the school setting is the joint participation of parents and student in their community. Because the majority of the intergenerational networks originate from the school setting , it is understandable that the school-based activities and networks are more relevant to network closure across generations.

After we add other tie properties into the analyses, however, some of these effects from the external resources become insignificant (Table 6). For example, whether we add parents-student tie or student-friend tie, the student's ties in class no longer makes significant difference (Models 1, 2). When we take both groups of the tie properties into account, moreover, the student's acquaintance volume outside class also ceases to be a major factor (Model 3).

(Table 6 about here)

However, both tie properties are strong predictors to network closure. When the student feels strong attachment to father, a stronger parents-parents tie becomes more likely. When ego and alter know each other longer, or contact each other by phone more frequently, the parents-parents tie will also get stronger (Model 3). In addition to the external resources, other tie properties within the intergenerational network

certainly contribute to the establishment of the parents-parents tie. The external resources may be important structural conditions to consider, intergenerational network closure still relies tremendously on the two founding ties -- the ego-alter tie and the parents-child tie. It is important to consider what kinds of resources the actors bring into the intergenerational network. It is even more crucial to focus on how the conditions in the internal structure determine the tie that indicates network closure.

7. CONCLUSION

Intergenerational network closure helps explain why some adolescents do better than others in academic performance and social conducts, even though their families share similar financial and human capital. The concept transcends the within-the-family social capital, and focuses on the network resources across generations. When we apply the concept to the adolescence study, it helps reveal how actors exercise and produce social capital in various settings around the family, school, and community.

This study first confirms that network closure across generations has indeed facilitated an adolescent to achieve better class rank and to avoid getting involved in delinquent behaviors. It then explores how such network closure becomes possible by examining the effects of the actors' external resources and the internal structure. To verify the tie or the network effects, the study employs "network" as an analytic unit, in addition to examining the similar structural effects at the individual level.

The findings at the network level confirm that at the individual level, but it adds the properties of two crucial ties that help found an intergenerational network -- the adolescent's friendship tie and the parent-child tie. The resources such as parental involvement at school are important for network closure. However, the tie properties embedded in the internal structure play more decisive roles. Put together into the analyses, both external resources and the internal structure reveal more comprehensive structural circumstances of intergenerational network closure.

The adolescence study can benefit greatly by integrating the closure argument and the open argument about intergenerational network closure. A closed intergenerational network does not rule out the outreaching bridges and structural holes that lead the actors to vast external resources (Lin 2001:27; Burt 2001). Strong ties in both external and internal networks help expand actors' resources and strengthen closure within the structure. These structural conditions are essential to the network study in its own right. As applied in the adolescence study, the mechanisms surrounding an intergenerational network also make significant contributions to the understanding of adolescents' academic achievement and general well-being.

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Table 1. Regression of Academic Achievement (nonstandardized regression coefficients)

Dep Var: Class ranking (standardized score, adjusted by class size)

Indep Var	Model 1	Model 2	Model 3
Number of parents known(0)			
1-2	0.149(.058)**	0.124(.058)*	0.099(.059)
3-5	0.155(.062)*	0.148(.062)*	0.102(.064)
6-9	0.517(.096)***	0.436(.096)***	0.379(.098)***
over 10	0.449(.098)***	0.367(.097)***	0.296(.100)**
Individual/family char.			
female students [male]	0.235(.045)***	0.164(.045)***	0.162(.045)***
mother's education(1-4)	0.176(.026)***	0.158(.027)***	0.150(.027)***
family income(1-7)	0.043(.013)***	0.040(.013)**	0.035(.013)**
Residence[rural]			
town/small cities	-0.008(.061)	-0.062(.062)	-0.059(.062)
large cities	-0.282(.067)***	-0.291(.067)***	-0.293(.068)***
Parents/student ties			
attachment to mother(z)		0.057(.023)*	0.053(.023)*
mother's parenting(z)		0.199(.023)***	0.194(.024)***
Parental involvement in school			
volun. work (0,1)			0.139(.049)**
help night session(0,1)			0.064(.082)
Constants	-0.732(.079)***	-0.584(.081)***	-0.594(.082)***
N	1795	1690	1680
R-Squared	0.098	0.136	0.141

* p < .05, ** p < .01, *** p < .001.
  Note: (1) Standard errors are in parentheses after coefficients.
  (2) For independent variables, ranges are in parentheses, comparison groups of dummy variables are in brackets; z in parentheses indicates a standardized factor score.

Table 2. Regression of Adolescent Delinquency (nonstandardized regression coefficients)

Dep Var: Delinquent behaviors   (standardized factor score from 5 items)

Indep Var	Model 1	Model 2	Model 3
Number of parents known(0)			
1-2	-0.083 (.058)	-0.071 (.059)	--
3-5	-0.087 (.062)	-0.117 (.064)	--
6-9	-0.232 (.096)*	-0.231 (.098)*	--
over 10	-0.250 (.098)*	-0.219 (.101)*	--
Number of parents known(1-5)	--	--	-0.060 (.021)**
Individual/family char.			
male students [female]	0.328 (.045)***	0.265 (.045)***	0.265 (.045)***
mother's education(1-4)	-0.041 (.027)	-0.063 (.027)*	-0.062 (.027)*
family income(1-7)	0.014 (.013)	0.014 (.013)	0.014 (.013)
Residence[rural]			
town/small cities	-0.074 (.062)	-0.027 (.062)	-0.028 (.062)
large cities	-0.073 (.067)	-0.033 (.068)	-0.034 (.068)
Parents/student ties			
Attachment to mother(z)		-0.179 (.023)***	-0.179 (.023)***
Mother's parenting(z)		-0.124 (.024)***	-0.125 (.024)***
Parents' community embeddedness			
community participation(z)		-0.018 (.024)	-0.018 (.024)
contact with neighbors(1-5)		-0.001 (.018)	-0.001 (.018)
Parental school involvement			
volun. work (0,1)		0.087 (.050)	0.086 (.050)
help night session (0,1)		-0.048 (.082)	-0.049 (.082)
Joint social participation			
parents/student part. together (z)		0.031 (.023)	0.032 (.023)
Constants	-0.012 (.079)	-0.004 (.103)	0.052 (.107)
N	1782	1657	1657
R-Squared	0.037	0.094	0.094

* $p < .05$, ** $p < .01$, *** $p < .001$.
 Note: (1) Standard errors are in parentheses after coefficients.
 (2) For independent variables, ranges are in parentheses, comparison groups of dummy variables are in brackets; z in parentheses indicates a standardized factor score.

Table 3. Background of Parental Mutual Acquaintanceship (ordered logit coefficients)

Dep Var: Number of parents known(range:1-5)

Indep Var	Model 1	Model 2	Model 3
Individual/family char.			
male students [female]	0.149 (.087)	0.127 (.088)	0.155 (.088)
mother's education(1-4)	0.251 (.052)***	0.181 (.053)***	0.201 (.054)***
family income(1-7)	0.062 (.026)*	0.030 (.026)	0.039 (.026)
Residence[rural]			
town/small cities	-0.717 (.120)***	-0.696 (.120)***	-0.667 (.121)***
core cities	-0.123 (.131)	-0.149 (.132)	-0.099 (.133)
Parents' resources			
Number of positions(1-4)	0.287 (.037)***	0.267 (.037)***	0.224 (.038)***
daily contact(1-6)	-0.039 (.030)	-0.025 (.030)	-0.001 (.032)
vol. Participation(z)	0.260 (.046)***	0.177 (.047)***	0.069 (.049)
Parents' school involvement			
volun. work (0,1)		0.925 (.095)***	0.834 (.097)***
help night session (0,1)		0.589 (.159)***	0.577 (.160)***
Parents' community involvement			
Community participation(z)			0.297 (.050)***
Contact with neighbors(1-5)			0.073 (.038)
N	1783	1774	1771
R-Squared	0.055	0.077	0.085

* p < .05, ** p < .01, *** p < .001.
Note: (1) Standard errors are in parentheses after coefficients.
   (2) For independent variables, ranges are in parentheses, comparison groups of dummy variables are in brackets; z in parentheses indicates a standardized factor score.

Table 4. Structural Conditions of the Parental Ties - Parents' and adolescents' network resources (ordered logit coefficients)

Dep Var: strength of ties between best friends' parents (1-3)

Indep Var	Model 1	Model 2	Model 3	Model 4
Network position				
[3rd close friend]				
1st close friend	0.567(.071)***	0.569(.071)***	0.568(.071)***	0.577(.072)***
2nd close friend	0.187(.073)*	0.186(.073)*	0.191(.073)**	0.197(.074)**
Individual/family char.				
male students [female]	0.215(.058)***	0.211(.058)***	0.217(.058)***	0.164(.059)**
mother's education(1-4)	0.082(.034)*	0.065(.035)	0.075(.034)*	0.078(.035)*
family income(1-7)	0.033(.017)	0.024(.017)	0.028(.017)	0.019(.017)
Residence[rural]				
towns/small cities	-0.155(.080)	-0.140(.080)	-0.158(.080)*	-0.118(.081)
core cities	0.140(.086)	0.165(.086)	0.144(.086)	0.206(.087)*
Parents' resources				
number of positions(1-4)		0.063(.023)**		0.037(.024)
vol. Participation (z)			0.108(.029)***	0.088(.030)**
Student's school resources				
ties in class (1-5)				0.058(.022)**
acq. outside class (1-6)				0.083(.019)***
N	4740	4740	4705	4693
Pseudo R-Squared	0.015	0.015	0.016	0.021

* p < .05, ** p < .01, *** p < .001.

Note: (1) Standard errors are in parentheses after coefficients.

(2) For independent variables, ranges are in parentheses, comparison groups of dummy variables are in brackets; z in parentheses indicates a standardized factor score.

Table 5. Structural Conditions of the Parental Ties - Involvement in School and Community
  (ordered logit coefficients)

Dep Var: strength of ties between best friends' parents (1-3)

Indep Var	Model 1	Model 2	Model 3
Network position			
[3rd close friend]			
1st close friend	0.577(.072)***	0.577(.072)***	0.576(.072)***
2nd close friend	0.196(.074)**	0.200(.074)**	0.197(.074)**
Individual/family char.			
male students [female]	0.156(.060)**	0.164(.060)**	0.158(.060)**
mother's education(1-4)	0.064(.035)	0.084(.035)*	0.067(.036)
family income(1-7)	0.011(.018)	0.023(.018)	0.010(.018)
Residence[rural]			
town/small cities	-0.119(.081)	-0.101(.081)	-0.084(.082)
core cities	0.193(.088)*	0.222(.088)*	0.236(.088)**
Parents' resources			
number of positions (1-4)	0.031(.024)	0.029(.024)	0.026(.025)
vol. Participation (z)	0.071(.031)*	0.063(.033)	0.025(.035)
Students' school resources			
ties in class (1-5)	0.055(.022)*	0.057(.022)**	0.051(.022)*
acq. outside class (1-6)	0.082(.019)***	0.083(.019)***	0.083(.019)***
Parents' school involvement			
volun. work (0,1)	0.191(.062)**		0.169(.064)**
help night session (0,1)	0.215(.101)*		0.227(.102)*
Community involvement			
community participation(z)		0.049(.033)	0.037(.033)
contact with neighbors(1-5)		0.039(.024)	0.040(.024)
pa/students joint part. (z)			0.068(.032)*
N	4671	4684	4642
R-Squared	0.022	0.021	0.023

* $p < .05$, ** $p < .01$, *** $p < .001$.
Note: (1) Standard errors are in parentheses after coefficients.
  (2) For independent variables, ranges are in parentheses, comparison groups of dummy variables are in brackets; z in parentheses indicates a standardized factor score.

Table 6. Structural Conditions of the Parental Ties - Student-Parents and Student-Friends Ties (ordered logit coefficients)

Dep Var: strength of ties between best friends' parents (1-3)

Indep Var	Model 1	Model 2	Model 3
Network position [3rd friend]			
1st close friend	0.588(.076)***	0.322(.075)***	0.347(.079)***
2nd close friend	0.166(.078)*	0.111(.077)	0.088(.081)
Individual/family char.			
male students [female]	0.199(.063)**	0.237(.062)***	0.277(.066)***
mother's education(1-4)	0.063(.038)	0.088(.037)*	0.092(.039)*
family income(1-7)	0.014(.019)	0.011(.018)	0.013(.020)
Residence[rural]			
town/small cities	-0.085(.087)	-0.004(.085)	-0.008(.091)
core cities	0.268(.094)**	0.276(.092)**	0.316(.097)**
Parents' resources			
number of positions (1-4)	0.033(.026)	0.019(.025)	0.032(.027)
vol. participation (z)	0.021(.037)	0.004(.036)	-0.003(.038)
Students' school resources			
ties in class (1-5)	0.038(.024)	0.042(.023)	0.031(.025)
acq. outside class (1-6)	0.074(.020)***	0.027(.020)	0.024(.021)
Parents' school involvement			
volun. work (0,1)	0.152(.067)*	0.176(.066)**	0.154(.070)*
help night session (0,1)	0.257(.104)*	0.279(.105)**	0.323(.107)**
Community involvement			
community participation(z)	0.048(.035)	0.015(.034)	0.026(.036)
contact with neighbors(1-5)	0.056(.026)*	0.040(.025)	0.057(.026)*
pa/students joint part.(z)	0.048(.033)	0.081(.033)*	0.064(.034)
Parent-student ties			
student-father attachment(z)	0.132(.039)***		0.099(.040)*
father's parenting (z)	-0.001(.038)		0.013(.040)
Student-friend ties			
length of acq. (1-3)		1.006(.051)***	1.039(.054)***
freq. phone contact (1-4)		0.443(.035)***	0.418(.037)***
N	4213	4639	4211
R-Squared	0.027	0.086	0.090

* p < .05, ** p < .01, *** p < .001.
Note: (1) Standard errors are in parentheses after coefficients.
  (2) For independent variables, ranges are in parentheses, comparison groups of dummy variables are in brackets; z in parentheses indicates a standardized factor score.

Best friends   closed   open
(close friends)   ◄──────────────────────────────►

First
(n = 1,791)   16.9 %   31.4   51.7

Second
(n = 1,716)   11.7   27.7   60.6

Third
(n = 1,664)   10.8   24.5   64.7

Pooled
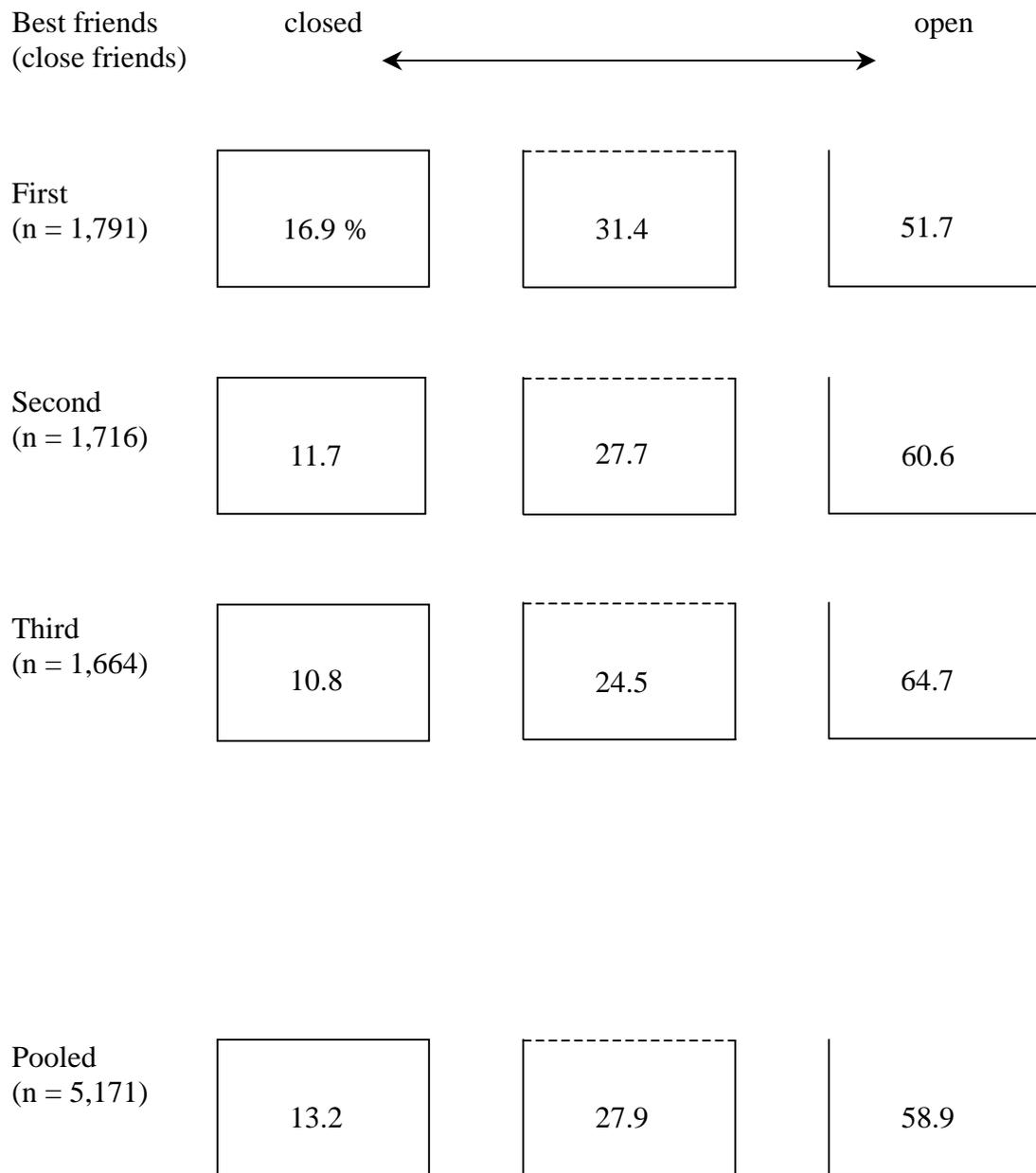(n = 5,171)   13.2   27.9   58.9

Figure 1. Patterns of Intergenerational Network Closure among Three Best Friends

Appendix 1. Principal Component Factor Analysis of Delinquent Behaviors

(promax rotation)

Delinquent behaviors	Rotated Factor Loadings		Factor Scores	
	1	2	1	2
cannot concentrate	-0.02282	0.74615	0.00968	0.46632
sleep in class	0.29946	0.49597	0.11547	0.31738
worry about acad. records	-0.28094	0.73498	-0.08003	0.45324
isolated	0.07823	0.43729	0.03742	0.27545
disobey school rules	0.66461	0.12352	0.23323	0.09296
miss classes on purpose	0.85637	-0.08394	0.29479	-0.03233
drink, smoke, use drugs	0.83697	-0.15978	0.28628	-0.08024
cheating in exam	0.47147	0.14200	0.16673	0.09996
make troubles (fighting, etc.)	0.78735	-0.01481	0.27250	0.00930
Eigen values	3.01	1.43		
% of variance	33.5	15.9		

Appendix 2. How often do you attend the following activities?   (promax rotation)
(1. never -- 4. often)

Original items	Rotated Factor Loadings		Scoring Coefficients	
	1	2	1	2
1. social with friends	0.72552	0.05424	0.31460	0.02231
2. gathering with colleagues	0.73989	-0.01495	0.32210	-0.02307
3. gathering with relatives	0.76985	-0.08133	0.33632	-0.06690
4. weddings	0.69234	-0.01597	0.30143	-0.02288
5. festivals	0.38870	0.48183	0.16040	0.30727
6. religious services	-0.05001	0.83597	-0.03680	0.54615
7. voluntary work	-0.04746	0.77065	-0.03452	0.50350
Eigen value	2.87	1.02		
% of variance	40.9	14.6		

Appendix 3. Have you participated in the following local activities during the past year?   (1 yes, 0 no)

variables	factor loadings	scoring coefficients
1. by community or residential organizations	0.73536	0.40240
2. by official neighborhood committee	0.77081	0.42180
3. by temple or church	0.53203	0.29113
4. by schools, institutes, or clubs	0.63990	0.35016
Eigen value	1.83	
% of variance	45.7	

Appendix 4. How often do you attend the following activities with your child? (1. never -- 4. often)

Original items	Factor Loadings 1	Scoring Coefficients 1
1. social with friends	0.77535	0.29729
2. gathering with colleagues	0.70918	0.27192
3. gathering with relatives	0.67506	0.25884
4. weddings	0.67747	0.25976
5. religious services	0.58183	0.22309
6. voluntary work	0.50077	0.19201
Eigen value	2.61	
% of variance	43.5	

Appendix 5. During the past 6 months, have you experienced the following situations
with your father/mother? (varimax rotation)
(1. always -- 5 none)

Original items	Rotated Factor Loadings		Scoring Coefficients	
	1	2	1	2

----

1. ask parent's ipinion about important matters	0.06677	0.78141	-0.04339	0.21393
2. pay attention to what parent thinks	0.15757	0.81648	-0.01351	0.21594
3. care about parent	0.12348	0.78758	-0.02337	0.21076
4. bad attitudes toward parent	-0.79618	-0.07650	-0.28192	0.04735
5. shout back to parent	-0.83236	-0.02297	-0.29967	0.06553
6. argue with parent	-0.77513	-0.03711	-0.27770	0.05661
7. let parent be proud of you	0.03070	0.75295	-0.05400	0.20905
8. take parent as model	0.06006	0.79454	-0.04695	0.21820
9. parent let you be proud	0.06635	0.73760	-0.03975	0.20165
10. ignore parent	-0.65020	-0.26101	-0.21306	-0.01715
11. parent intervenes too much	-0.58487	-0.14845	-0.19912	0.00885
12. parent does not care about you	-0.48176	-0.31734	-0.14715	-0.04756
Eigen value	4.42	2.40		
% of variance	36.8	20.0		

Appendix 6. During the past 6 months, have you experienced the following situations
with your father/mother? (promax rotation)
(1. always -- 5 none)

Original items	Rotated Factor Loadings		Scoring Coefficients	
	1	2	1	2

----

1. parent knows your whereabouts everyday	0.81656	0.06722	0.59155	0.05207
2. inconsistent punishment for doing the same thing	0.14415	0.79040	0.10467	0.60928
3. physical punishment	-0.13628	0.81429	-0.09846	0.62760
4. let you know what parent think after important decisions	0.82116	-0.07115	0.59484	-0.05458
Eigen value	1.41			
% of variance	35.3			